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Praxis of University-School Partnerships to Foster Information, Knowledge and Technology Exchange in Tanzania

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Abstract

This paper examines the collaboration between universities and primary and secondary schools in Tanzania, the reasons behind these partnerships, and the outcomes of such collaborations. The paper draws from McQuaid's theory of organisational partnerships, which assumes that partnerships have purpose, actors, structures, and benefits. A multi-site case study of public and private universities and schools engaged in partnerships was employed. The study used purposive sampling to generate data by targeting partnering universities and schools. The data were collected through interviews with coordinators of these partnerships in their respective organisations, as well as open-ended questionnaires administered to university and basic education students engaged in partnership-based projects that are pivotal in fostering information and knowledge transfer and technology at the secondary level. Another method used was a document review of records on the country's university-school partnerships. The study found that Tanzania's universities and schools work collaboratively to execute their core functions and enhance equity, inclusion, and quality education, aligning with institutional, national, and international goals that are fundamental to sharing information, knowledge, and technology for optimal results. Overall, the study found that university-school partnerships in the country extend beyond promoting practical training for pre-service teachers, supporting professional development, and enhancing teaching and learning through the sharing of information and knowledge. Moreover, these partnerships contribute to technological development, innovation, job creation, and the resolution of practical problems in the education sector through enhanced information and knowledge exchange. Overall, university-school partnerships are crucial in institutional and individual well-being; hence, they are worth sustaining through comprehensive policies and improved practices.

Keywords: Partnerships, Higher and basic education, Information and Knowledge exchange, Innovations, Science and technology, Tanzania

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Introduction

Over the years, universities worldwide have formed partnerships and collaborated with lower-level elementary, secondary, and tertiary educational institutions. Such a situation has drawn the attention of researchers in education, teacher educators, and people involved in managing educational organisations (Zeichner, 2010). However, little information is available on the

nature of such partnerships, their benefits to universities, schools, and the education sector, especially from the Global South. With such a paucity of knowledge, it becomes difficult for educational policymakers to guide collaboration between different levels of education, and it remains a challenge for practitioners in universities and schools to be well-equipped when a need for partnering arises. This paper sheds light on such partnerships in Tanzania, focusing on what these partnerships entail, particularly how universities collaborate with schools in the country to foster the sharing of information, knowledge, and technology, why they do so, and the outcomes of such practices for partner institutions. The paper seeks to generate an understanding of the partnerships' reciprocity and the benefits that current and potential partners may accrue. The study's central questions were: What issues do universities and schools in Tanzania create partnerships for, and how do the members of the partnering institutions benefit in terms of information, knowledge, and technology sharing? Drawing from McQuaid's theory of organisational partnerships and the Transformational Learning Community model (Bernay et al., 2020), the study assumes that partnerships have purpose, actors, structures as well as benefits (McQuaid, 2010)and the complexity of university-school partnerships since they affect the society, individuals, and institutions, respectively.

Understanding the praxis of the partnership can inform policies and guidelines that guide the modus operandi of universities and schools entering into partnerships, including how to collaborate, the areas in which partnerships should be created, and the reasons behind these partnerships. The paper encompasses a range of literature to highlight the research gap regarding the purpose and outcomes of partnerships. It also presents the qualitative methodology by which data were collected and analysed thematically. The study results are presented in line with the research questions, with a central argument that all core functions of educational institutions are areas of partnership between universities and schools. These partnerships have proven to be diversely beneficial, hence worth sustaining.

Literature Review

Literature has demonstrated that partnerships between universities and schools are often lopsided in favour of universities and fraught with barriers and challenges (Walsh &Backe, 2013). Recently, however, the needs of the schools have increasingly determined the formation of partnerships in America. Such development differs from what was previously the case, when universities used partnerships to secure placements for practicum and research undertakings (Walsh & Backe, 2013). Moreover, studies such as Green et al (2020) claim that university-school partnerships have benefits in creating theory-practice linkage. Other benefits include a shared understanding of institutional goals and the creation of new opportunities. Moreover, universities offer high-quality teaching practices, whereas schools benefit through professional learning (Bruton & Greher, 2007) and provide high-quality programmes for students. Literature further claims that partnerships are beneficial in sharing resources and identifying interventions for children's challenges (Swick et al, 2022). However, this is not an exhaustive account of the benefits.

Lessons from studies indicate that, when not properly managed, these partnerships are at risk of demise; however, it is possible to sustain them (Peel et al., 2002), and they can remain successful (Jones et al., 2016). According to Swick et al. (2022), other lessons learned from existing partnerships include that they help connect institutions, are established through

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signing a memorandum of understanding, and require mechanisms to maintain them when collaborative projects, through which they were initiated, come to an end.

Previous studies have focused on what the university faculties/colleges of education are doing with schools, particularly teacher education (see, for example, Kruger et al., 2009; Nath et al., 2011; Bernay et al., 2020), leaving out natural, applied, and social science faculties, as well as the humanities.

Generally, literature is inconclusive on the purpose of the partnership, the outcomes and benefits to individuals, and solutions to challenges faced, especially in the Global South. Meanwhile, little has been established on how schools can initiate such partnerships, be strong partners, and gain as required regarding information, knowledge, and technology sharing. Moreover, claims that these partnerships lead to improved teaching practices and strengthen community engagement (Day & Smethem, 2009) present a limited scope regarding the capabilities of partnerships. Besides, the focus of previous studies has predominantly been on short-term impacts on teacher education, thereby neglecting issues such as the sustainability of partnerships, support for quality, equity, and other educational agendas (Cochran-Smith et al., 2021). Hence, there is a need for further inquiry into the dimensions and benefits of university-school partnerships, particularly in the Global South, which has yet to be adequately explored.

To bridge the gap, this study used a multi-site case study conducted in both public and private universities and schools to examine how these institutions collaborate in Tanzania, why they do so, and the outcomes of such partnerships for both sides. Furthermore, the current study offers additional benefits beyond teacher training; it sheds light on the Tanzanian context and critically examines areas that need improvement in policies and practices.

Methodology

This qualitative study used a multi-site case study of Tanzanian educational institutions involved in nationwide university-school partnerships. Thus, the study entailed identifying university-school partnership projects, which necessitated the application of purposive sampling, targeting universities and schools with a stake in these partnerships. Moreover, the study selected universities based on their institutional policies or guidelines, which inform their forging of partnerships with schools and/or institutions at lower levels of education.

Consequently, five universities were selected. Hence, the University of Dar es Salaam (UDSM), the University of Dodoma (UDOM), Nelson Mandela African Institution of Science and Technology (NM-AIST), and Tumaini University Makumira (TUMA) participated in the study. Specifically, from the UDSM, the units that participated in the study were the College of Information and Communication Technology (CoICT), the ICT Innovation Hub (UDICTI), and the Department of Computer Science and Engineering (CSE). These units hosted a partnership project called the Smartgirlz programme. Moreover, UDSM, in its policies, treat secondary schools as one of its key partners (UDSM, 2021). Besides, Dar es Salaam University College of Education (DUCE), a constituent college of UDSM, was selected due to its participation in the Science, Technology Higher Education Project – Additional Fund (STHEP- AF) for retooling, and the HELVETAS Tanzania Model for Mathematics Teachers' Professional Development (CPD) project. The latter was also known as school-based in-service teacher training (SITT). UDOM was also sampled because its policies state a

commitment to partner with other learning institutions (see UDOM, 2020). Additionally, the university's College of Natural and Mathematical Sciences (CNMS) helps secondary schools benefit from UDOM science practicals. The NM-AIST, on the other hand, participated in the study because it was running Science, Technology, Mathematics, Engineering and Innovation (STEMi) clubs in various schools. Finally, TUMA was engaged due to its participation in the Participatory and Integrative Teaching Approach (PITA) project. These institutions generate information and share knowledge and innovations through technology, whether it is information technology-related or otherwise. Additionally, all the selected universities are in partnership through the Consortium of Tanzania Universities and Research Libraries (COTUL). Table 1 presents the sampled partnership projects and the institutions participating in them.

Table 1: *Some University-School Partnership Projects in Tanzania*

SN.	Partnership projects	Partnering Institutions	
		Universities	**Schools**
1	STEMi Africa Platform	1	22
2	SmartGirlz Programme	1	18
3	STHEP-AF Retooling	1	20
4	Enhancing Mathematics &Science Education in Tanzania	1	584
5	HELVETAS Tanzania Model for Mathematics Teachers CPD	1	35
6	Participatory and Integrative Teaching Approach (PITA)	1	220

The projects in Table 1 were implemented in various regions of the country, each with a distinct purpose. The northern administrative regions of Tanzania hosted the Science, Technology, Engineering, Mathematics and Innovation (STEMi) Africa Platform. The project execution required the partner university to support and facilitate the teaching and learning of science and mathematics subjects that teachers and students find daunting for several reasons, including a lack of resources and limited skills. On the other hand, the SmartGirlz Programme helped secondary school female students participate meaningfully in learning Information and Communication Technology (ICT) and other subjects. It supported girls in being information-rich, knowledge-savvy, innovative, and creative, and in gaining self-confidence in learning subjects related to university degree programmes that typically enrol more boys than girls.

The Science Technology and Higher Education Project – Additional Fund (STHEP-AF Retooling) for retooling engaged a university and several secondary schools where science subjects are taught. Specifically, the project aimed to provide in-service training for science teachers, equipping them with the knowledge and skills necessary for the information age. The training covered the use of technology and reflection on difficult-to-teach topics in the targeted subjects. The partnership project was run from 2014 to 2016. Meanwhile, with support from the Every Adolescent Girl Learns (EAGL) programme, funded by Canada, a Project for Enhancing Mathematics and Science Education in Tanzania's secondary schools was also implemented. The project trained 3,000 secondary mathematics and science subject teachers targeting scientific practicals in three central and western regions. Additionally, the project motivated students to enhance their learning prospects in the targeted subjects.

Meanwhile, several secondary schools participated in the Mathematics Teachers' Professional Development (CPD) project to support the teaching and learning of mathematics using a model developed by HELVETAS-Tanzania (an organisation which is a member of a network of independent development organisations that operates in 29 countries across Africa, Asia,

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Latin America, and Eastern Europe). Since the 1970s, HELVETAS has been active in Tanzania, improving basic education, developing skills, enhancing access to quality services, and promoting inclusive economic growth and good governance to support local development. We take a systemic approach by collaborating with government, civil society, and private sector stakeholders. In this effort, the availability of valuable and meaningful information is essential.

Another project operated on a partnership basis is the Participatory and Integrative Teaching Approach (PITA), which served as an outreach programme for TUMA. It involved providing in-service training to teachers working in disadvantaged secondary schools in a northern region of one country. Its focus was threefold: language-supportive pedagogy, gender-responsive pedagogy, and a multidisciplinary approach to environmental education. The programme rewards them with value-adding information and an enhanced capacity to share knowledge with their students.

The sampling of 110 schools from different regions was based on their collaborative engagement with higher learning institutions through the aforementioned projects. From Dar es Salaam, 10 secondary schools were sampled due to their partnership with UDSM through the Smartgirlz programme. From Arusha, 20 secondary schools were selected because they are in STEMi clubs in partnership with NM-AIST and others in PITA, working with TUMA. From Kigoma, Tabora, and Songwe, 40 schools participated in the study due to their involvement in the Enhancement of Mathematics and Science Education project. In Pwani, Morogoro, and Singida, 30 schools were selected because they were part of the HELVETAS-Tanzania project. Ten more schools were selected from other regions due to their participation in STHEP – AF retooling.

Eight university academics, who coordinated these partnerships, and 110 teachers serving as school-based partnership coordinators were purposively selected for the study. Moreover, 300 university students (50 from each selected university) and 5,500 secondary education students (50 from each selected school) engaged in the collaborative projects were selected based on their involvement in the partnerships. The sample was considered manageable, representative and sufficient for a qualitative study.

Data were collected using interviews with the university academics and selected teachers. Moreover, questionnaires with open-ended questions were administered to the students. The study also reviewed documented records of university-school partnerships. These documents included project evaluation reports, such as the evaluation of school-based in-service teacher training (SITT) and the final evaluation report on the performance of the Strengthening In-Service Teacher Mentorship and Support (SITMS) project, implemented through HELVETAS Tanzania. The document review also covered the TCU (2024) National Guidelines for Teacher Education Programmes in Tanzania (GTEPUET) and institutional documents, such as Customer Service Charters, to determine the nature of collaborative arrangements the institutions had.

Subsequently, the study employed inductive Thematic Analysis for data support, whereby each set of data collected from participants' interview statements, written responses to the questionnaire, and document extracts were read through to identify central points treated as coded, that is, targeting the key words expressing central issues and outcomes of the

partnerships. The codes that appeared to address a similar issue were combined from different data sets, under broad categories, to create thematic areas. In that way, identified partnership issues and the outcomes of the partnerships were organised along themes presented in the results.

Results

Purpose of university-school partnerships in Tanzania

The study found that university-school partnerships predominantly manifest as sponsored projects or programmes that target various educational issues, including the sharing of information, knowledge, and technology. Thus, universities and schools come together to implement specific educational projects. The projects, therefore, bear a component of role distribution among the different institutions involved, whereby each partner plays a distinct function, with universities being instrumental in initiating the partnership. Explicating, one of the coordinating academics said during an interview: "Our University contacted several schools explaining and asking them to take part in the SmartGirlz programme, as a project that we were to implement together to support female students." Another academic said;

> After securing funds from [organisation name] in 2023, [university name] launched three STEMi clubs in three secondary schools in the Longido district. In 2024, [university name] launched nineteen STEMi clubs in Arusha, Arumeru, and Meru districts to work with them in scientific disciplines.

These statements reveal the initiator-participant structure of these institutional partnerships. They also depict how partnerships are dependent on financiers. Therefore, they could have been stronger had they been funded internally, rather than waiting for sponsors to support the partnering institutions.

The role assigned to universities concerning partnership is further stipulated in the guidelines for higher education in the country, as one of the documents reads:

> The role of universities extends beyond mere coordination; they are pivotal in setting the stage for a successful PTT experience. This involves establishing formal agreements, planning and assessing needs, integrating cultures, providing effective mentorship, facilitating professional development, and ensuring structured teaching practice. By doing so, universities shall facilitate the creation of a conducive environment where student teachers can thrive, and schools can effectively contribute to their development. In this context, the university's responsibilities are multifaceted and crucial for the overall success of the PTT process (GTEPUET, p.33).

The statement refers to partnering in running teaching practice, as university-school partnerships materialise following agreements reached, with universities initiating them. Thus, the statement narrowly focuses on the issues that partnerships strive for in sharing information, knowledge, and technology. Therefore, such statements in policies and guidelines could be improved by making them cover a wide range of issues that partnerships can address in the realm of information, knowledge and technology exchange, with the schools benefiting from the universities' broader base. The issues are presented later in this paper. The current state of affairs is that universities are not the sole initiators of the partnerships. It emerged that third parties, such as development partners (e.g., UNICEF), could initiate and support such partnerships. One of the interviewed academics said:

> We did not start by agreeing to collaborate with the schools; instead, a memorandum of understanding was initially formed between UNICEF and our university. The support

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> from these education stakeholders is advantageous because it ensures the programme's sustainability through the continuous availability of funds and expertise.

In other words, donors and/or development partners initiate funded projects to which universities and schools team up to implement. Apart from international organisations, national institutions such as the ICT Commission in Tanzania, the Tanzania Communication Regulatory Authority (TCRA), and Tanzania Data Laboratory (dLab) were also mentioned by participants as initiators or financiers of university-school partnerships. Implicitly, universities and schools team up to support the interests of other organisations and institutions, hence their participation in partnerships. It could have been better if the memorandum of understanding (MoU) had also been signed between the partnering institutions. None of the partnerships identified in this study was grounded on an MoU between the universities and the schools.

Schools also play a crucial role in forming partnerships, for instance, by preparing students for participation and benefiting from the partnerships. Their access to invaluable information, knowledge, and technology would not have materialised without such active participation. They establish platforms for students to participate in activities while encouraging them to join initiated projects, creating an environment where learners can explore and develop interests in the activities and goals. In this regard, one of the interviewed academics said:

> The schools we collaborate with provide the necessary infrastructure and support for STEMi club activities, including laboratory space, materials, and time allocations for meetings and projects. Through STEMi clubs, schools encourage students to develop innovative solutions to real-world problems, fostering a culture of creativity and critical thinking.

The statement reveals how partnerships discuss real-life problems through information exchange. However, the participants in this study claimed no evidence regarding the scaling up of solutions and information obtained to address the problems.

Another key issue around which universities and schools form partnerships is the adoption of the national and international agenda for promoting gender equality, equity, and inclusion in education across various disciplines and subjects, an undertaking that is strongly dependent on the easy accessibility of value-adding information. This is evidenced by, for instance, the SmartGirlz programme, which is essentially designed to support girls' education so that they will eventually know what is necessary for their empowerment. Likewise, partnering through STEMi clubs aimed to increase the participation of female students in science subjects through information exchanges and address gender disparity in science learning. Implementation records of the STEMi project show that;

> [Due to STEMi clubs], the participation rate of female students in schools increased by 60.3 per cent, which is higher than that of male students (39.7%). However, there is considerable variation between schools. Some schools, such as [names omitted], have a very high percentage of female students (100%), whereas others, including [names omitted], have a higher proportion of male students (54.6% and 54.9%, respectively). Meanwhile, some schools [names omitted] recorded a significant female representation (73.3% and 74.5%, respectively), indicating a strong participation of female students in those institutions (STEMi report).

While partnership-based projects have enabled some schools to achieve the elusive goal of gender parity in science in Tanzania, others are still struggling, hence in need of more concerted efforts that are widespread and learning from initiatives taken by schools that have succeeded. For equity and inclusion, participants expressed that efforts for professional development through the HELVETAS project entailed enhancing equity, inclusion and women's participation in leadership.

Furthermore, university-school partnerships in Tanzania are often manifested in collaborative research undertakings. One of the academics affirmed this as follows:

> We once researched how to implement a learner-centred teaching approach. We partnered with our university team and secondary school teachers to do this. The aim was to facilitate the adaptation and application of pedagogical strategies that promote active student engagement and improve educational outcomes. Our colleagues have written a research-based book chapter on this.

These partnerships, therefore, facilitate such participatory research and its dissemination through peer-reviewed publications, a crucial role for universities. This should be maintained by establishing a research agenda in the partnership agreements.

Partnerships are also evident in the exchange of space for practical training, particularly for university student-teachers who undergo annual placements in schools for teaching practice. This is a pillar of their hands-on training for in-class teaching. Such teaching practice helps bridge the gap between theoretical knowledge and its application, enabling these student-teachers to develop essential teaching skills. Bridging such a gap requires information with practical implications. Indeed, solid partnerships between secondary schools and universities are crucial for effective teaching practices in Tanzania, with university-school relationships primarily governed by policy and government guidelines that provide support. As one of the documents reads in part:

> A university-school partnership is a collaborative relationship between universities and schools that improves educational outcomes and enhances teacher preparation. These partnerships involve mutual support and shared goals between institutions of higher education and local schools (GTEPUET, p. vi).

In the document, the aim for partnership is categorically stated, and the fact that universities and schools have common goals is why they should work together. On the same subject, the document adds:

> The importance of robust university-school partnerships (USPs) in the success of teacher preparation programmes. These partnerships are designed to bridge the gap between theoretical knowledge and practical classroom experience, providing student teachers with invaluable real-world insights and skills while offering schools fresh perspectives and additional resources. In today's educational landscape, it is not enough for universities to merely deliver academic instruction. They must actively engage with schools to create dynamic, mutually beneficial partnerships that enhance the quality of teacher training. (GTEPUET, p.33)

These statements outline the university-school partnership and emphasise the roles of partners and institutions in ensuring its success. However, statements from the guideline (GTEPUET) present a limited focus on what partnerships are intended to address. Thus, there is a need to develop comprehensive policies and guidelines for the partnerships. A school-level partnership coordinating teacher confirmed the implementation of the existing guidelines, emphasising the need for institutions to act accordingly:

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> Universities in this country have actively engaged with our secondary schools to enhance educational outcomes. For instance, [university name] collaborates with our school through the Secondary Education Development Programme to improve teacher training. Besides, year after year, they send their students here to practise teaching.

Likewise, the partnerships also serve as platforms for teachers' continuous professional development. Thus, universities involved in the partnerships run teachers' continuous professional development (CPD) programmes for schools, whereby academics act as facilitators and teachers participate in the CPD. Thus, in-service teachers benefit from partnership agreements, seizing opportunities for further studies. For instance, as study participants testified, through STHEP-AF, a total of 1,920 secondary school teachers benefited from in-service training offered by the collaborating university to upgrade their knowledge and skills in teaching, particularly in science and mathematics, with a focus on difficult-to-teach topics. One of the academics said:

> Partnerships are strengthening teacher professional development and mentorship. For example, HELVETAS has developed a 30-month initiative that involves [university name] and several schools, aiming to enhance teacher professional development in the country. The project emphasises a mutual exchange of expertise, with universities providing training and schools offering practical environments for implementation. It has a school-based in-service teacher training component.

Such practices also effectively strengthen the teaching profession, enabling educators to address challenges and boost teaching skills through shared experiences.

Furthermore, these partnerships help cultivate a culture in which universities and schools mutually benefit from each other through their products. As one interviewed academic stated:

> We have the Tanzania Partnership Programme, which fosters collaboration among universities in Tanzania and the United States. The programme facilitates the exchange of knowledge and resources between universities and secondary schools, benefiting both educational research and practical teaching applications.

Indeed, through partnerships, universities feed schools with their research output, which informs teaching and learning; reciprocally, schools foster practices that inform university research agendas.

The study also found that partnerships enabled both sides to collaborate in developing value-added school curricula. While schools are involved in day-to-day curriculum implementation, academics from universities, as masters of curriculum theories and subject experts, enrich the development of school curricula and syllabi with their input and advice. Such value-adding information and guidelines are central to promoting quality education. Explaining, one of the interviewed teachers said:

> In 2014, we participated in the Language Supportive Pedagogy (LSP) initiative. Under the project, researchers from the university collaborated with us to develop LSP, aiming to improve learning outcomes by adapting curricula that support language development in subjects taught in English. The partnership integrated the language-supportive strategies into the national curriculum, which boosted students' performance.

As the results further illustrate, these education partnerships support enhanced student assessment. They involve schools as national examination centres; university academics ensure the quality of these assessments. For example, they support schoolteachers in

developing better assessment techniques for sharing information and knowledge to help students pass examinations. One of the partnership coordinating teachers explained that:

> Sometimes, after we have constructed our assessment tools and even used them for internal tests and examinations, lecturers from universities with which we have established relationships support us by evaluating our work. They provide us with feedback on the quality of the exams and suggest areas for improvement. Moreover, when they send their students here, they come to assess them, but they also ask us to do the same and send reports to the universities.

This explanation reveals that assessment in schools and universities is collaborative work between academics and teachers through established partnerships. Additionally, through agreements with schools, universities organise and facilitate academic competitions to foster growth among primary and secondary schools. In these competitions, schools prepare their students, while universities facilitate inter-school competitions. One of the interviewed partnership coordinating teachers said:

> We prepare our students for university competitions, which universities bear all the costs of. For example, through the Young Scientist Tanzania programme, we organise annual science competitions for secondary school students in Tanzania. This encourages students to develop scientific projects, strengthening their creativity and problem-solving skills. The programme is implemented by providing motivation and resources to bridge the gap between secondary and higher education.

Partnerships also entail working together to provide student services through mentorship, guidance, and counselling services, which all require updated information and accessibility. In this regard, participants reported that secondary schools collaborate with universities to mentor students and guide them in developing innovations and addressing other issues. They share information, knowledge and technology through innovations. Tanzania's schools also participate in university-organised competitions and workshops, which allow students to display their projects and innovations, share information, and exchange knowledge with attendees and other participants. After mentorship sessions, schools form groups to compete against the best teams, advancing to competitions held at NM-AIST to showcase their unique talents and enhanced knowledge. Secondary schools also collaborate with NM-AIST to monitor the progress of STEMi clubs, ensuring the achievement of objectives that enhance science education through the sharing of information, knowledge, and innovation.

Another facet of these partnerships is the collaborative provision of physical education, manifested in the organisation of sports and game events. Such sporting events catalyse learning, build relationships, and entertain the learners. Schools bring their student teams to the games, whereas universities finance these games, and their sports experts render support. In some cases, university teams participate in these games. As one of the coordinating teachers explained during an interview:

> We participate in sports events organised by [university name] through the support of SDA. SDA is a sports development non-governmental organisation that collaborates with universities to organise seminars and training sessions for physical education teachers from secondary schools in Tanzania. Their programme enables universities to provide sports experts and facilitate workshops, thereby enhancing the quality of sports education in our secondary schools.

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Moreover, these partnerships aim to enhance students' learning across various subjects. For instance, in addition to education, some university faculties partner with schools to enhance learning in natural and formal sciences. A vivid example is the STEMi project, which aims to encourage students to embrace the learning of Science, Technology, Engineering, Mathematics, and Innovation in a positive light. One of the students' responses in a questionnaire reads:

> [University name], collaborating with the Foundation for Upgrading Education Standards and STEMi-Africa, hosted the science and mathematics awards in December 2024. This event recognised and rewarded outstanding secondary school students excelling in physics, chemistry, biology, and mathematics, fostering a competitive spirit and encouraging academic excellence in these subjects.

In some cases, however, partnerships also impact the learning of English (see the statement on LSP) and other subjects. Nevertheless, strengthening these partnerships needs to entail broad coverage of subjects, unlike the case seen in the studies projects, which focus predominantly on STEM. A consideration of STEAM (Science, Technology, Engineering, Arts, and Mathematics) is needed.

The nurturing and scaling up of innovative pedagogy, as well as the sharing of information and knowledge, are also evident in these university-school partnerships. Through STHEP-AF retooling, several university colleges partnered with schools to execute the retooling project as a teaching and learning innovation that requires up-to-date information. One of the coordinating teachers affirmed:

> The retooling targeted innovative pedagogy for science and mathematics teachers. University experts visited our schools and organised workshops for us to train in various new techniques for teaching these subjects, which many perceive as relatively tough.

This statement testifies that effective pedagogy in schools is a key reason why university-school partnerships are formed. Apart from partnering with schools, universities in Tanzania also have partnerships to share information and facilities. For instance, universities in the country are collaborating through COTUL to serve these purposes. One of the participating academics revealed this as follows:

> Through the COTUL team, we are collaborating to procure publications that are available as e-resources, enabling us to utilise them in research and education within this country. Doing so makes the costs relatively affordable compared to what would be possible if each university were to undertake it independently.

The statement verifies that university partnerships enable them to share information and materials through e-resources at a reasonable cost.

Outcomes of University-School Partnerships

The outcomes of university-school partnerships in Tanzania include reciprocal benefits and others that specifically apply to participating universities and schools, such as the sharing of information, knowledge, and technology. Indeed, university-school partnerships are instrumental in knowledge exchange and advancement. These partnerships facilitate the sharing of academic materials and the continuous flow of information and ideas between academia and the practical educational environment. Through joint research projects, seminars, and workshops, university faculty and school educators share their expertise and insights, thereby enhancing the overall knowledge of professional teachers. Moreover, the partnerships provide educators with opportunities to stay up-to-date with the latest

pedagogical methods and educational technologies, ensuring that teaching practices remain relevant and practical. Testifying on knowledge advancement, one of the science teachers' interviewees, who happened to double as a project coordinator, stated:

> Our partnership enhances our knowledge, particularly in simplifying the learning and teaching of science subjects. We have an extensive understanding of the subject's information content. As a teacher, I also learned how to make and use low-cost lab kits.

This testimony suggests that the partnerships' contribution to advancing knowledge includes enabling teachers to learn more and develop teaching aids, which they can use to deliver knowledge to students through practical training. This process could have been complicated without such aids. Knowledge advancement and sharing are also evident in university consortia, such as COTUL, which benefits universities by making it easier for them to access and utilise knowledge materials that could have otherwise been prohibitively expensive for individual universities. This was, for instance, revealed by an academic who stated the following:

> COTUL has made it easy for members to get research-based publications at affordable costs. We have purchased databases such as Ebscohost, which contains numerous books and journals, as well as Taylor and Francis and Emerald, from which we obtain many journals.

The statement implies that partnership allows several institutions to receive service as one entity, thus strengthening their relationship and serving their students by enabling affordable access to scholarly works. In this information age, such partnerships have helped make a difference in information, creating a win-win situation for universities and research institutions that readily share value-adding information and knowledge with secondary schools at the lower level through partnerships.

Another significant outcome of university-school partnerships is the creation of employment opportunities. These partnerships often develop internship and job placement programmes that allow students to gain practical experience and secure post-graduation employment. On the one hand, schools benefit from accessing a pool of well-trained graduates ready to fill teaching and administrative positions; on the other hand, universities showcase the success of their training programmes through their graduates' employment rates. Additionally, partnerships help establish career fairs and recruitment drives, thus further enhancing job prospects for students. As one partnership coordinating teacher said:

> After completing their studies, some student-teachers return to volunteer or secure part-time employment at the schools where they undertook their teaching practices, due to the exemplary character they demonstrated during their field practices. The schools accommodate them easily because they already know their capacity.

Indubitably, university-school partnerships in Tanzania also play a crucial role in addressing some practical issues within and outside the education sector, thus making education more meaningful. Collaborating on problem-solving initiatives enables universities and schools to address curriculum gaps, resource shortages, and ineffective teaching methods, ultimately enhancing educational outcomes. Significantly, these partnerships encourage the application of theoretical knowledge to real-world challenges, fostering a practical approach to education

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that benefits both students and educators. As a result, education becomes more relevant and impactful in addressing the community's immediate needs and the broader challenges of the educational landscape. Cumulatively, document reviews, interviews, and questionnaire responses highlight the following problems and solutions from university-school partnerships.

Table 2: *University-School Partnership Initiated Projects and Targeted Problems*

Partnership-resultant Project	Description	Problem Solved
"KIWI" Shoe Polish	Created using local materials, demonstrating resourcefulness and practical application of science.	Expensive shoe polish
Rocket Demonstration	An engaging presentation on how to fly a rocket, developed through a student's hands-on approach to learning.	Non-practical learning
Water filtration project	Project for fostering healthy competition among various secondary schools. The competition inspires students to think critically and apply their knowledge in real-world contexts.	Unsafe water
Matofali Project	A project focused on sustainable building materials.	Unsustainable building materials
Biogas Project	An initiative for promoting renewable energy solutions.	Use of non-renewable energy
Kuku Smart Farming	Students in their clubs have come up with innovative solutions, such as one group developing a system to monitor the poultry farm.	Poor poultry farming
Teaching resources	Schools have enhanced teaching resources and materials that support the ongoing STEMi education project.	Scarcity of teaching materials

Source: Reviewed documents

These projects by students require incubation and support beyond the school level to reach society and enable them to become self-employed.

University-school partnerships have also encouraged more students to pursue science subjects. This is evidenced in STEMi clubs and SmartGirlz, which encourage students to learn science, technology, engineering and mathematics at the secondary and university levels. Such learning requires students to access vital information and acquire the necessary knowledge to succeed in STEM fields. SmartGirlz focuses on female students, who, for cultural and patriarchal reasons, have been sidelined and have played second fiddle to male students as they go higher up the educational ladder. Thus, these university-school partnerships make a significant contribution to the development of scientific disciplines. A STEMi evaluation report further states: "During the visit, it was evident that the awareness

campaign conducted in 2023 had a positive impact. More students showed interest and joined the STEMi club, indicating an increased engagement with science and innovation."

Furthermore, partnerships enhance information and knowledge sharing, as well as the development of inventions and creativity. The study findings show that the partnership projects have supported secondary school students in creating and inventing things from their scientific ideas. As a STEMi evaluation report explicates:

> A significant number of new club members have developed innovative and creative ideas. Notable projects include; Smart Poultry System—A system designed to monitor and optimise poultry farm operations; Bio-Generator—A generator powered by biogas, promoting sustainable energy use; Smart Farming System—A mobile application that allows farmers to monitor their farming activities remotely; and Akili AI, An educational tool developed to enhance students' learning experiences using AI technology, involving collaboration with social sciences students. These innovations highlight the potential of encouraging creativity and interdisciplinary collaboration within STEMi clubs.

The university-school partnerships provide fertile ground for identifying and nurturing talents by exposing them to the much-needed value-adding information. Joint programmes, talent identification initiatives, and extracurricular activities in the partnerships allow students to discover and develop their skills and interests. Universities offer advanced information and knowledge-sharing resources for incubation, helping students hone their skills and talents in academics, sports, arts, or other fields. These partnerships ensure the recognition of young talent and provide them with the necessary support and guidance to reach their full potential. One of the university academics explained:

> When we visit schools with which we partner, we take the time to engage students in competitions and showcase their creativity. This enables us to identify exceptional students and stay in touch with them to ensure they progress to higher education.

University-school partnerships also significantly enhance the accessibility of higher education, allowing students who matriculate to access even more information, knowledge, and technological innovations. Creating pathways and linkages between secondary education and higher learning institutions, these partnerships facilitate students' transition to university programmes. Schools also offer pre-university courses and counselling services in collaboration with universities to prepare students for higher education. Such a collaborative approach ensures that students, especially those from underrepresented or disadvantaged backgrounds, have better access to university education and the opportunities it brings. One of the partnership coordinating teachers pointed out:

> Our project empowers students, particularly girls and those from disadvantaged backgrounds, to pursue higher education. Both male and female students are encouraged to join science classes and later participate in STEM programmes at the university level. The project focuses on three regions: Kigoma, Songwe, and Tabora. These regions are located in remote geographical areas, and the schools are also situated in rural areas. Thus, the project benefits students from remote settings by allowing them to access university education.

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Partnerships between schools and universities also pave the way for scholarship opportunities, helping to alleviate the financial burden of higher education. Through these partnerships, universities identify deserving students and provide them with scholarships based on academic excellence, financial need, or specific talents. On their part, schools nominate students for these scholarships and ensure they meet the award criteria. This collaborative effort also ensures that talented and deserving students have the financial support to pursue their academic goals. One of the project coordinating teachers reported:

> The partnership enhances talent by providing our partnering universities with established scholarships for secondary school students, particularly girls, who have achieved high scores in their advanced-level national examinations. These students, of course, were identified earlier on as we implemented the project.

Furthermore, partnerships between universities and schools create valuable opportunities for students to participate in excursions and outreach programmes, sharing information, knowledge, and technology. These knowledge-enriching activities offer a hands-on learning experience that extends beyond the classroom, enabling students to apply their knowledge in real-world settings. Excursions to universities, research centres, and industry sites expose students to critical information that allows them to explore different career paths and educational opportunities. Outreach programmes, such as community service and leadership development initiatives, help students strengthen their soft skills, including communication, leadership, teamwork, and problem-solving. One of the interviewed academics said:

> Through our project, STEMi, female university students participated in outreach programmes and visited secondary schools to inspire students. Seeing that their sisters can pursue STEM-related studies at the university level, they gain the intrinsic motivation that if females are capable, they too can achieve the same. During the school visits, we had students from Chemical Engineering, Civil Engineering, ICT Engineering, Medicine, Pharmaceutical Sciences, and programmes including BSc with Education, Bachelor of Science, and Bachelor of Education in Science. When we reached a school, we would speak with all the students from that particular school.

Additionally, partnerships between universities and schools engender connections with various organisations, including businesses, non-profits, and government agencies. These usually provide them with information not readily available in the education circles. These connections enable students and educators to access both information and broader networks of resources and opportunities. Universities also leverage their partnerships to bring industry experts into the classroom and establish industry-school collaboration programmes. Schools gain valuable insights into industry trends through these connections, secure guest speakers for career talks, and arrange practical training sessions for students. This collaborative network enhances the educational experience and prepares students for future careers. One of the academics said during an interview:

> The requests for ongoing support underscore a growing emphasis on helping students understand various career paths, ensuring they are well-informed and prepared for future opportunities. The first mentorship session has laid the groundwork for a sustained focus on student performance and career development in science, demonstrating the value of ongoing support and engagement in education.

Indeed, the partnerships contribute significantly to making education more meaningful in Tanzania through the enhanced sharing of information, knowledge, and innovation. Aligning academic programmes with real-world informational needs and challenges enables these partnerships to ensure students receive relevant and impactful education. Joint projects, such as community development initiatives and applied research, also allow students to see the practical applications of their studies and understand the value of their education. Such relevance motivates students and prepares them to make meaningful contributions to society.

Moreover, partnership projects between universities and schools nurture future scientists by sharing enhanced information, knowledge, and technology. Through collaborative initiatives for innovation, science fairs, and mentorship programmes, students get exposed to the scientific method and encouraged to pursue their interests in science and technology. Universities provide schools access to advanced laboratory equipment and expert guidance, fostering a culture of inquiry and innovation. These experiences inspire students to pursue careers in science, technology, engineering, and mathematics, thereby contributing to the development of the next generation of scientists and innovators. One of the teachers said that the "project is encouraging creativity and interdisciplinary collaboration within STEMi clubs. Several students showcased their innovations, highlighting the impact of the sensitisation seminars on fostering a culture of creativity and innovation." Specifically, universities benefit from partnerships with schools, as they gain opportunities to brand themselves and utilise these opportunities to execute their core functions. Explaining, one academic said:

> The Smartgirlz programme has enhanced the university's reputation as a socially responsible and community-focused institution, fostering strong relationships with local communities and organisations. The programme also provides university students with opportunities to engage in outreach programmes that strengthen their soft skills, including communication, leadership, teamwork, and problem-solving.

Impliedly, through a partnership project, communities around schools become familiar with universities by name and are receptive to them because they collaborate with local stakeholders to develop the education sector. The information created through such partnerships makes a difference. In the same vein, another teacher said:

> The university benefits from interacting with its potential customers. Today, the students are with us; tomorrow, they will join the university. So, instead of waiting to see secondary school grades before selecting who to enrol, the university sees the very learners who are, in most cases, represented by score marks in their absence.

Implicitly, partnerships partly assure universities' sustainability. Indeed, partnerships provide an opportunity for aspirants of higher education to become familiar with the university and receive information from university officials visiting the upcountry as they implement the activities of their partnerships. Consequently, a university affirms its obligation for social responsibility, as one of the participants opines, that "the SmartGirlz programme enhances the university's reputation as a socially responsible and community-focused institution, fostering strong relationships with local communities and organisations."

Schools that enter into partnerships with universities benefit partly by enabling students to access information and gain knowledge and skills that they could not have acquired otherwise. One participant said:

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> The students in the schools participating in SmartGirlz are trained in Design Thinking and Digital Literacy. They acquire new skills in communication, presentation, design, and critical thinking. Schools are also participating in the commemoration of the International Girls in ICT Day competition.

Thanks to the flourishing university-school partnerships, secondary school students benefit by acquiring many skills from extra teaching. These acquired skills benefit students even after they have completed their studies. Indeed, the partnerships have also enabled primary and secondary school students to venture into business development and software production, developing ICT literacy and other essential skills. This positive outcome is attributable to the range of skills students acquire through participation in partnership projects. Another participating teacher said: "When students participate in interschool competitions that the universities organise, parents and other education stakeholders come to know about these schools because of media coverage of the competitions." The statement reveals yet another participant in the partnership, the media, which is instrumental in making initiated projects known to others. Schools also benefit from the partnerships by getting equipment that could otherwise bring challenges in terms of affordability. One of the teachers expressed satisfaction thusly:

> Schools that perform well in SmartGirlz receive prizes for their technological facilities, such as computers. We have computers for office use and for our students in the library. These make learning technology and other subjects easy.

Likewise, partnerships enhance students' learning outcomes through the sharing of information and knowledge with their teachers, as well as project and collaborative support. Consequently, schools improve the quality of teaching since teachers gain expertise in teaching difficult-to-teach subjects through in-service training, especially in mathematics and science. In this regard, the SITT evaluation report explicates:

> Project outcomes: The improved practice orientation of teacher education at teacher colleges and a well-functioning SITT have led to effective teaching, student empowerment, and improved teaching and learning of mathematics among secondary schools, ultimately contributing to improved student performance in mathematics in Tanzania.

Furthermore, the partnerships benefit schools and students as they become instrumental in improving students' academic performance, as indicated, for instance, in the evaluation of partnership projects implemented in Tanzania. Moreover, the STEMi evaluation report states:

> Following the establishment of STEMi clubs, there has been a marked improvement in student performance in science subjects. Thirty science students were selected to join high schools with specialised science combinations, including the prestigious *VipajiMaalum* [special talents] schools. Outstanding National Examination Results: The performance of Form Two students in the National Examinations has been exceptional. The school achieved first place in Chemistry, second in Physics, and fifth in Biology at the district level in 2023."

Participants also testified during interviews to a significant increase in student performance in science subjects, stemming from students' mentorship integral to partnership projects, due to their ready access to information and enhanced knowledge sharing. This enhancement reflects the effectiveness of the guidance provided. Some schools in the partnerships have achieved high places in Chemistry, Physics, and Biology at the district and regional levels. Thus, establishing partnership projects has significantly contributed to students' academic

success, especially in science subjects, positioning partnering schools as models for exemplary performance in the country. When another collaborative project was evaluated, it was evident that students' performance had improved in the targeted subjects. Using national examination results, the evaluation indicated considerable improvement in the results, as a statement in the report reads:

> To get results, Regional Average Performance (RAPs) for all 10 schools in all five years for each of the project schools in 2022 were compared to RAPs for all control schools in 2022. Findings showed that non-project schools in [region] performed slightly better in 2022 than project schools, with an RAP of 4.7446 compared to a RAP of 4.776 for treatment schools in the same year (STIMS report, p. 24).

In other words, partnerships are instrumental in improving students' achievement through the sharing of enhanced information, knowledge, and technology. The benefits students derive, especially when passing their examinations, justify the existence of partnerships. Given their importance, partnerships need to be sustained and strengthened.

The strengthening of the partnership requires, among other things, enhancing the means through which the partners communicate. In this regard, one of the academics said:

> Yes, we have faced a challenge of timetable collision whereby in some schools, a day or an activity might have collided with the previously allocated time for the program in that school. [To address this, there is a need to] establish strong communication channels with all stakeholders to ensure everyone is informed and involved.

The technical challenge of time can be handled at the school level through, for instance, introducing an extra-curricular activities programme. Participants reported other challenges that need to be addressed, including the need to strengthen university-school partnerships further. Another participant stated: "The lack of guidance for club members has hindered their ability to develop and implement innovative ideas. This underscores the need for a structured support system to facilitate student-led projects." Such a challenge can also be handled internally or at the school level. Schools may, for instance, develop institutional policies to guide partnerships and strengthen them.

Discussion

The study has revealed that university-school partnerships serve diverse purposes, reflecting all the core functions of both universities and schools. The partnerships touch on university teaching, research, and outreach functions. Schools' functions, including implementing national education policies and curricula, learning assessment, staff development, and addressing societal problems, are well-supported by partnerships. Some of the study's findings are consistent with those of previous studies. For instance, findings on partnering for research align with Swick et al. (2021), who suggest that partnerships create opportunities for meaningful research undertakings. Likewise, a finding on partnering to feed each other through research corresponds with Martin's (2013) claim that schools and universities benefit from collaborative teaching, knowledge and information sharing in an action research project between African and American scholars that involved applied research focusing on pedagogical practices in secondary schools. The project enabled an exchange of information, knowledge, and methodologies, thus enriching university research and secondary school teaching practices.

Moreover, the study findings align with those of Msangwa et al. (2016) and Robinson and Feldman (2022), who found that partnerships are crucial for the professional growth of future

educators and the overall improvement of teaching standards, necessitating the sharing of enhanced information, knowledge, and technology. These partnerships, based on the study findings, facilitate professional development. In this regard, Mugisha et al. (2023) found a prevalence of collaborative practices among secondary school teachers in coaching, teaming, and mentoring, which were facilitated by experts from universities. Regarding support for assessments and examinations, previous studies, such as those by Rubeba and Kitula (2024), on assessment literacy for secondary school teachers, also attest to improvements in training and assessment practices resulting from collaborative work. This suggests that partnerships between universities and secondary schools enhance teachers' competencies in student evaluation. Moreover, Mpate et al. (2021) further demonstrate that university school partnerships enable student-teachers to gain information, knowledge, and hands-on experience in classroom settings. The study has also highlighted the significance of partnerships in shaping the teaching experience through the relationship between mentor teachers and college supervisors.

The findings support the tenets of the theory of organisational partnerships by confirming that university-school partnerships have a myriad of dimensions and numerous benefits for both universities and schools. Likewise, the study's findings, which suggest that partnership projects make schools more visible to parents and the public, generally align with the transformational learning community model, as the stakeholders of the partnerships extend beyond the universities and schools involved. The implications of the findings for educational policies that guide relationships between educational institutions are that all functions of universities and schools should be part of collaborative efforts in the education sector. For practices, the findings suggest that partnership can be effectively applied to problem-solving, addressing the challenges faced in the education system, such as the inaccessibility of certain educational levels, gender disparities in specific disciplines, marginalisation of certain communities, resource scarcity, and teaching and learning difficulties. Given its usefulness, it is worthwhile to undertake further research on how to sustain university-school partnerships and mainstream them in national education policies through enhanced information, knowledge, and technology exchange.
The study's findings have implications for policies and regulations that guide practices in universities and schools. Given their numerous benefits and support for learners and the education sector in general, policies and regulations should emphasise the importance of university-school partnerships. Policies and regulations may draw from the findings to inform university and school leaders about the issues for which they can create partnerships.

Nevertheless, this study's findings, particularly regarding the benefits, fall short of being supported by inferences from statistical data that could have helped ascertain the extent to which the partnerships enhance students' academic performance. It is, therefore, essential that further studies be undertaken to assess the long-term impact of the partnership projects examined in this paper.

Conclusion

Overall, university-school partnerships are multipurpose. They impact all core institutional functions and the interests of workers and students that revolve around the sharing of information, knowledge, and technology. These partnerships also present myriad reciprocal benefits and gains for collaborating universities and schools, which exchange information, knowledge, and technology. The study demonstrates the importance of and the need to

enhance university-school partnerships in Tanzania's educational institutions to promote the sharing of information, knowledge, and innovation. Since the partnership projects involved only a few schools and universities, their enhancement can be achieved through project scale-up and other means, benefiting the general well-being of the institutions, their students, and ultimately, human society. Schools in Tanzania and elsewhere must draw lessons from the partnerships based on identifiable dimensions and accruing benefits. The benefits of these partnerships also convey a message about the value that development partners place on universities and schools. Nevertheless, the partners grapple with challenges to sustain the partnerships, including finding internal sources of funding once donor support dries up, or avoiding dependency on donors that could otherwise hinder the sharing of practical information, knowledge, and technology between universities and secondary schools in Tanzania. The partnerships have diverse coverage in national and institutional policies and guidelines, providing more comprehensive coverage of what they should address, the schools involved, and the subjects taught in schools. Indeed, for the partnerships to work well, an MoU should be signed between the partnering schools and universities. After all, enhanced sharing of information, knowledge and technology is pivotal in enhancing university-secondary education in Tanzania.

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