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Microcosms of the Skills Ecosystem: Building Communities of Practice (CoPs) to Tackle Food Insecurity and Youth Unemployment in Northern Mozambique

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Abstract

This article reflects on a capacity-building project co-designed with two universities in northern Mozambique to strengthen partnerships in the educational sector in addressing local issues of youth unemployment and food insecurity. The project focused on building communities of practice (CoPs) around the three secondary-level schools delivering agricultural education and training with the participation of universities' lecturers from agricultural universities as well as students and rural communities. These three CoPs became collaborative networks foregrounded in participatory action research that allowed for a joint production of knowledge. Because of this, we propose to frame these CoPs as microcosms of an expanded skills ecosystem that exists on a territorial level and encompasses diverse forms of knowledge. Despite the impacts of the COVID-19 pandemic, CoPs created opportunities for students to do practical work that is often lacking in training and, especially, to encounter entrepreneurship possibilities that can facilitate education–work transitions. With this experience in mind, we ask ourselves, how can CoPs harness skills development towards the education–work transition for youth in agriculture? Our insights into this question are based on three years of project implementation (2021–2023) and, hopefully, will contribute to better understand the role of vocationally trained youth for Mozambique's agricultural development.

Keywords: communities of practice; agricultural training; entrepreneurship; participatory action research; skills ecosystem; joint knowledge production

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1. Introduction

The first vocational education and training (hereafter VET) institution in Mozambique, the *Escola de Artes e Ofícios* (School of Arts and Crafts), was created under Portuguese colonial ruling in the beginning of the 20th century. It responded to the skills void in the main urban centre, then the capital Lourenço Marques, but soon it became embedded in the educational antagonisms at the heart of the racially segregated society colonialists built in Mozambique. While most Africans living in rural areas were subjected to forced labour and allowed only four years of education in rural schools under the Catholic church's administration—also known as 'rudimentary education', Portuguese settlers tapped into the very few opportunities to pursue formal education in Mozambique. However, according to Gasperini (1989, p. 21), one of the fundamental contradictions of colonial education was the dichotomy between education through labour for colonised indigenous masses

and education through non-labour for middle and upper classes of coloniser, both in charge of leading the colony in a capitalist direction. This antagonism not only served to consolidate the division of labour in the colony, but also between education and labour—to the detriment of skills-based education and the contemporary VET.

After 1975, attention to vocational education remained low, as the newly independent state neglected skills-based education. Moreover, the sixteen-year war interrupted public services in many areas and destroyed Mozambique's infrastructure, including schools in the countryside. In the wake of the 1992 peace process, the government established the national education system, thus becoming the main financer and supplier of various modalities of formal VET, complemented by non-formal training provided by non-governmental organisations. In rural areas, where most Mozambicans live and work, formal VET in agriculture is delivered at high-school-level state institutions under the national curricula, in the agrarian institutes. These institutes function as boarding schools situated among rural communities and surrounded by agricultural land that is meant to train students while increasing schools' self-provision.

In 2014, Mozambique introduced the Vocational Education Law that established the National Qualification Framework (NQF) and the National Profession Education Authority (ANEP) to regulate and certify VET schools. The law also created the National Profession Education Fund to which industries are required to contribute up to 1% of their payroll in support of VET's development. The measure is yet to be regulated but is already facing opposition from the private sector, arguing that funding VET brings no direct benefits to their activities and will financially harm the business community (Mozambique 360 2022). Overall, VET remains underfunded and somewhat marginalised by public opinion vis-à-vis high education.

In terms of quality, Mozambican VET remains wanting, with an abundance of lecture-based teaching and less practical training. This inadequate pedagogical approach overlaps with low morale among students who often fall short on core competences that are expected from trained technicians. Like other parts of the African continent, VET in agriculture also encounters several structural challenges leading to general levels of 'dislike' among youth who picture training in agriculture as a 'second choice' (Tukundane et al. 2015). Many students undergoing agricultural training in the agrarian institutes participating in this project expressed their desire to pursue further education in areas other than agriculture during informal conversations.

Aiming to change these trends, current VET practices in Mozambique are shifting towards practice-based environments by developing curricula and diversifying funding while establishing partnership with companies. Costa and Singo (2013) frame these initiatives as 'informal collaborative learning', forming networks in the educational sector and bringing opportunities for students' internships, teacher training, and lifelong learning. This is in line with other contexts in Sub-Saharan Africa, whereby collaborative interventions reiterate workplace learning as a pillar of vocational pedagogy (Jjuuko et al. 2021).

The establishment of communities of practice (hereafter CoPs) engages a wide range of stakeholders in collaborative efforts to pursue the common goal of making VET more relevant to both trainees and the labour market. Outcomes of collaborative processes within CoPs can orient the development of a practical pedagogy with youth transition to the labour market as the main goal of vocational training. Complementarily, other modalities of training taking place outside the national curricula can also support youth's transition into work. Overall, the growing interest in collaborative learning networks show the relevance of VET for Mozambique's social and economic development. With increasing economic activity, the skills gap in agriculture as well as in other sectors has become evident—a scenario that tends to worsen with the rapid incorporation of new technologies.

Since agriculture is the most important sector of Mozambican economy, delivering effective agricultural training to youths can help unlock economic potential, especially in northern provinces where industrial development is rather incipient. Unlike recent policies of privatisation of land and natural resources, honing the youth's agricultural competences could not only boost local economies but also bring abundance for family farmers. As most local youths engage in small-scale agriculture, skills development would impact other indicators of well-being such as food security while empowering young people economically vis-à-vis investors operating under the logics of extractivism. Moreover, in the architecture of subsistence agriculture, the burden of work tends to be insidiously heavy on women who combine making their *machambas* (agricultural plots) with household tasks such as fetching water and firewood as well as cooking and caring for young and elder members of the family. In this sense, developing skills across the agricultural sector also means taking gender realities seriously to create opportunities for women's emancipation.

The idea of a skills development framework that considers social, historical, and economic realities such as that of Mozambique has gained ground responding to education urgencies to sustain promising futures for individuals and communities while taking care of the planet. In a holistic way, skills development environments can be understood through the 'ecological metaphor' proposed by Spours (2024), according to whom metaphors allow one to approach the unknown from the perspective of familiar objects or concepts. In this vein, the idea of an ecosystem suggests that participants of a system are interdependent to one another. This is precisely the lenses through which Spours (2024) envisions processes of learning: as ecologies emerging from environments of interdependence. The foundations for these ecologies are the contributions of individuals and institutions striving to establish horizontal relationships.

In line with the ecological metaphor, Spours (2024) proposes the model of 'social ecosystems for learning and skills' as 'an evolving, place-based social formation that connects the worlds of working, living and learning with the purpose of nurturing inclusive, sustainable economic, social and educational development in diverse communities, localities and sub-regions' Spours (2024, p. 6 op cit.; Hodgson and Spours 2017, p. 15). Although the model is flexible to accommodating sociocultural and economic differences across the global north and south, its overarching application to contexts in the global south demands local proactivity to design an environment in which the model's ambitions can be achieved.

Designing interventions serves to examine, question, and reform the social ecosystems for learning and skills. That is precisely what the VET Africa 4.0 Collective (2021)[1] set out to do to further adapt these concepts to African contexts. Taking the examples of four ecosystems in South Africa and Uganda, their project discussed not only the usage of these concepts but also ways to harness ecosystems to cater for the needs of local communities and the particularities of their economy. They arrived at the concept of 'expanded skills ecosystem' to describe processes whereby vocational education institutions attract partnerships with universities and other local institutions as well as private stakeholders to both develop their organisational capabilities and deliver relevant skills to the communities in which they are embedded.

Building partnerships towards improving education—particularly VET—has been a priority in international agendas working alongside the sustainable development goals (SDGs) as well as informing national education reforms in Mozambique. It appears among the targets of SDG 4, that is, to 'ensure inclusive and equitable quality education and promote lifelong learning opportunities for all' and SDG 2 to 'end hunger, achieve food security and improved nutrition and promote sustainable agriculture.' Behind the importance of partnerships to improve education in agriculture is the acknowledgement of the global

climate crisis as a transdisciplinary challenge that requires day-to-day action to protect future generations from an environmental collapse.

Partnerships for skills development have also been articulated at the academic level, responding to an epistemological need to break away from individualistic approaches to theory and practice in VET. Lotz-Sisitka and McGrath (2021) argue these individualistic approaches stem from neoliberal tendencies in discourse and the practice of skills development which paint learners as the sole recipients of knowledge and divorced from other social dynamics. This call for the type of horizontal partnerships that Zeelen (2015) refers to as 'bowling together' towards lifelong learning, that is, alliances that not only acknowledge the position of learners as relational vis-à-vis social, economic, cultural, and ecological dimensions but also recognise learners' agency to engage with a diverse range of messages and make well-informed choices to stimulate lifelong learning trajectories.

Equal to the epistemological concern in VET research is the question of methods. The current paradigm of transformative VET agglutinates different ontologies and life experiences, as well as goals towards changing individual and collective realities. Engaging with this paradigm means going beyond periodic assessments that policy advisors conduct in evaluation and monitoring routines. It requires a participatory approach that is underpinned by the agencies of teachers and learners, as in the experiences of schools and classrooms turned loci for experimentation through participatory action research (Baumfield et al. 2008; Thiollent and Colette 2014; Beekman 2021; Jjuuko 2021). Using participatory action research (hereafter PAR) to tap into ever-shifting cultural and intergenerational expectations should be the axis of co-designed interventions. That is why, from a VET research perspective, a renewed interest in PAR has articulated interventions increasing community ownership under the principle of '*joint knowledge production*' (Van der Linden 2015).

While orienting institutional partnerships towards a joint knowledge production, one might steer and funnel the expanded skills ecosystem into a certain direction that implicates locally referenced changes in practices. In doing so, building CoPs is not only a way to inspire change, but also acknowledge current practices as workable. As informal networks in which everyday practices are nested in situated relationships based on shared values and with common goals (Wenger 1998), CoPs allow partnerships to grow in familiar terrains moving existing cooperations to find new common grounds.

By levelling the playing field of relationships traditionally underpinned by hierarchies such as that of teachers and students, CoPs also reaffirm the pedagogical value of agency and freedom. In alignment with PAR, this brings back one of its exponential contributors from Latin America, the Colombian sociologist Orlando Fals-Borda in collaboration with Muhammad Anisur Rahman (Fals-Borda and Rahman 1991, p. 15), who advocates for a 'experiential methodology', later coined as '*vivencias*', to represent the return of legitimacy of knowledge production to the people. Considering this, educational partnerships developed as CoPs represent social innovations that harness expanded skills ecosystems motivating a web of individuals and institutions—particularly learning institutions such as VET schools and universities—to articulate themselves with other local actors to, in this case, create knowledge around VET in agriculture that contributes to bettering the youth's livelihoods and ensuring food security in the region.

Based on this theoretical discussion, we turn to this article's contribution. Keeping in mind that achieving food security remains one of the most urgent challenges of our time coexisting with massive youth unemployment, particularly in regions like Sub-Saharan Africa, there is an acute need for participatory interventions. In Mozambique, the stakes are particularly high, as 80% of the population cannot afford an adequate diet and, despite the country's large young population, most youngsters have no prospects of getting formal jobs.

Transforming the landscape of vocational training in agriculture is not only essential for the survival of rural communities, but it can also provide much-needed work opportunities for youths along agricultural value chains.

In 2020, an international cooperation project joined institutions from the Netherlands, Portugal, and Mozambique using participatory action research (PAR) to build communities of practice (CoPs) meant to address youth unemployment and food insecurity in northern Mozambique. CoPs were anchored in three Agricultural Education and Training Institutes across Niassa and Nampula provinces. These hubs actively engaged lecturers, teachers, students, local farming associations, and rural communities at large with a strong emphasis on empowering youth, women, and minorities, and to combat food insecurity and malnutrition while boosting food production. The objective was to create a microcosm of a 'skills ecosystem' (Ramsarup and Russon 2023) that would allow VET students to confront real-life challenges as a part of their learning trajectories while providing rural communities with opportunities to address low agricultural production and food insecurity.

As microcosms of a skills ecosystem, CoPs went beyond developing innovative agricultural practices. They tailored solutions to specific environmental needs assessed through participatory methods, thus incorporating elements of experimentation towards joint knowledge production. By systematically developing, implementing, and evaluating interventions to address the challenges of rural communities, CoPs developed sustainable approaches to fight poverty and hunger and created a learning environment that fostered resilience and entrepreneurship. These initiatives show how community participation can ignite transformation and build a sustainable path for youths transitioning from education to work.

Between 2021 and 2023, this international cooperation project trained a total of 89 lecturers and VET teachers in PAR (65 male and 25 female); provided opportunities to conduct practical work for 254 students (150 male and 104 female); and benefitted 413 family famers in rural communities (254 male and 159 female[2]). In this article, we reflect on the concepts underpinning the project's idea, that is, to build CoPs as microcosms of a skills ecosystem and assess the methodological suitability of PAR to achieve such goal. This reflexion is inspired by the following question: how can CoPs harness skills development towards the education–work transition for youth in agriculture? Answering this question, we believe, contributes to better understand the role of vocationally trained youth for the development of Mozambican agriculture, thus bringing insights to other relatable contexts in the global south.

2. Materials and Methods

This article is derived from a capacity-building project with the University of Groningen in the Netherlands as the main proponent, and others such as the Agrarian School of Coimbra (ESAC) in Portugal, Lúrio University, and the Catholic University as Mozambican partners. The project consisted of using PAR to build CoPs in the educational sector and, through them, articulate workshops in VET institutes and in rural communities. The materials used to achieve these goals varied immensely, from basic workshop hardware (a flipchart, pens, and post-its for in-person encounters and versions of these in online environments) to research devices used in interviews such as voice recorders and a camera to take photos and record videos.

The origin of this project as an international cooperation initiative implied that the positions of the authors of this paper, two Mozambican professors—one acting as project coordinator and the other as steward of one of the CoPs—and a Brazilian consultant with expertise in agricultural education on behalf of a global north's educational institution, were relatively distant from the reality of prospective beneficiaries. Therefore, the team made efforts to distance itself from political and economic hierarchies and to create hori-

zontality between professionals and institutions by holding periodic project meetings and co-designing activities on both conceptual and logistical levels. Secondly, as a project in agricultural education, epistemological diversities vis-à-vis the scientific method within the team needed to be accommodated to value each and every colleague's inputs. Third, the struggle to foster project ownership, particularly among communities and students, faced the extra challenge of the COVID-19 pandemic and ways around it, as we shall discuss in closing, which made the local team remarkably stronger.

Building CoPs through PAR reflects our understanding of PAR as an approach as opposed to a set of methodological tools to reach certain goals either in research or in practice. This means that despite using qualitative methodologies organising several focus groups in the beginning and throughout the project, as well as interviewing VET students in the end, this article is a reflection on the process of using PAR to create a conversational process (Feldman 1999) whereby people share interpretations of reality. Reflecting on processes is a fundamental part of the systematisation that corroborates knowledge production in PAR (Tripp 2005). Moreover, reflecting on processes allows us to situate the agencies of people transforming practices and mobilising towards a joint knowledge production (Van der Linden 2015). In fact, the agency aspect in PAR and in this project is in dialogue with broader ideas of social transformation such as the pedagogy of liberation of Paulo Freire (Freire and Shor 1987).

The project was designed together with universities in Mozambique assuming that, in the absence of national surveys on VET students' expectations and the achievements of alumni, they were best suited to identify the challenges of youth transitioning from education to work in the northern region. Overall, access to vocational education remains low from basic vocational literacy (Popov and Manuel 2016; Manuel et al. 2016) to professional agricultural training. In rural Mozambique, school trajectories reveal a constellation of structural challenges that go from food insecurity in boarding schools to the lack of internet access—and sometimes even electricity—on the premises. Moreover, scarce prospects of transitioning from education into the labour market erodes students' confidence and discourages incoming trainees. While there is vast land to cultivate, the lack of investments in the region, particularly in the maintenance and repair of transportation infrastructures, makes it difficult for farmers to market their produce, thus leading to dwindling economic development in rural areas.

This scenario was expected to change dramatically with the discovery of oil and gas on and offshore in the province of Cabo Delgado. Many hoped that the implementation of large-scale extractive projects in that province would move northern Mozambique entirely into a virtuous cycle of economic growth by creating not only direct employment for many but also huge demands for agricultural produce that would later be purchased by catering enterprises to feed technicians working in the oil and gas platforms. Since 2021, however, extractive activities have been halted due to an armed insurgency that threatens the stability of the entire northern region (Feijó 2020; Bonate 2022; Blanes et al. 2023; Ntaka 2023). In this context of insecurity and uncertainties, youth have been turning to self-employment in attempt to circumvent these and other equally enormous challenges.

Considering this scenario and the small number of private companies in the northern region with only a handful dedicated to agriculture, Mozambican partners suggested that focusing on self-employment would be crucial to support youths' livelihoods and promote an effective transition from education to work. In their view, this transition should not only prepare youths to expect finding a job but to be proactive in the journey of learning for and through work. This went hand in hand with the expertise offered by the University of Groningen in lifelong learning. For students, practicing lifelong learning would mean continuously (re)assessing and (re)adapting their attitudes towards training, catching up

with new approaches and technologies in agriculture, thus better equipping them to identify and pursue self-employment opportunities. Moreover, fostering lifelong learning would also strengthen capacities among university lecturers and VET teachers to gear teaching and research towards the needs of students and rural communities.

Similarly to Thiollent and Colette (2014), who use PAR for teacher training in contexts of diversity, the capacity-building component of this project consisted of training university lecturers and teachers at vocational institutes in PAR not only to become stewards of the CoPs but to use PAR principles in their roles as teachers and researchers towards joint knowledge production. Each community of practice was rooted in one VET institute, that is, in the Agrarian Institutes of Lichinga, Majune, and Ribáuè, gathering lecturers from both Lurio University and the Catholic University, teachers from each respective agrarian institute, members of the project team at the University of Groningen and at the Agrarian School of Coimbra, members of the local communities, and VET students. Following up on the validation of the needs and opportunities assessment, university lecturers in each CoP were offered training in PAR, during which they were asked to elaborate action plans together with VET teachers. These action plans included the goals of each respective CoP considering local realities and scheduled workshops at each institute and in rural communities.

While offering workshops in VET institutes would increment VET curricula, trained students were expected to join workshops in rural communities to expose themselves to real-life challenges. These students' experiences out of classrooms would familiarise rural communities with techniques that could be used to protect crops, increase yields, and generally mitigate the effects of climate change on local food supply. The gain of such exposure for students was not only to leverage their possibilities to transition from education to work but also raise their confidence in producing knowledge together with rural communities. This joint knowledge production departs from the principle of developing a relationship for which earning trust and respect from rural communities is essential. These relationships could be helpful later in students' lives, for instance, while requesting land from a chief or from an elder to set up their own *machamba* (agricultural plot, as it is known in Mozambique). In return, communities could count on having a trained technician working side by side with them in the field.

Joint knowledge production was at the heart of this project's acknowledgement that rural communities are endowed with ways of knowing oftentimes neglected and erased by academic practices. This epistemological consideration stems from the project's inspiration from PAR, and its interpretation that knowledge creation must be foregrounded in social practices. From an educational perspective, this standpoint also echoes the global south's epistemes of adult education in Freire and Nyerere (Zeelen 2002, op cit.; Zeelen et al. 2014) and, in a broader sense, philosophers such as John Dewey ([1938] 1976), who stressed the importance of social interaction as constitutive of experiencing phenomena. Hence, the project sought to harness communities' ways of knowing by reinstating their practices as subjects of inquiry. This meant, among other things, that experiments developed by university lecturers, for example, drew on the common practices of the communities, such as the use of a pepper (piri-piri) concoction as a bio-insecticide and alternative chicken feed developed with locally sourced ingredients. Inquiring into these practices was not to in/validate their effectiveness, but to exercise the practice of inquiring itself as well as jointly reflecting on what constitutes an object of inquiry.

However, action plans elaborated by the CoPs were particularly affected by the COVID-19 pandemic and the following lockdown imposed across the world. The capacity-building component of the project was affected by the impossibility of internationals travelling to Mozambique. Although a solution could be worked out online, restrictions around

assembling made it difficult to reach more people than the ones who were already involved with the CoPs. Plus, the partial closing down of schools during the pandemic significantly limited the number of students that could be engaged in the CoPs. For instance, both in agrarian institutes and universities, only students close to graduation were allowed to continue attending classes. As a result, the three CoPs had to find ways to work in a very different scenario than initially conceptualised. But if, on the one hand, the pandemic affected the project dramatically, on the other, it opened possibilities for university lecturers to become more active in stewarding the CoPs. In the absence of internationals who could only offer methodological guidance online, they became responsible for planning and delivering workshops in the three agrarian institutes and in rural communities—a testament to project ownership. In line with Macário et al. (2010), our experience indicates that CoPs can also exist in and through online environments.

3. Results

In the process of building the three CoPs, key stakeholders in each respective agrarian institute were invited to select goals concerning local needs, especially to tackle the challenges of the youth's transition into work and food insecurity in the region. To achieve these goals, CoPs organised activities with students, local communities, and some of the key stakeholders in each region. For instance, CoP Lichinga pointed at chicken production and horticulture while working with a local stakeholder, the Poverty Alleviation Association (*Associação Alívio à Pobreza*); CoP Majune was inspired to invest in business incubation for VET students and issues of sustainability; and CoP Ribáuè aimed at increasing food production and food processing. These interventions had to include a dimension of experimentation with demonstrations and workshops that would popularise techniques among students and encourage them to disseminate these techniques in local communities.

In this perspective, CoP Lichinga worked with the community of Lussanhando, near the Faculty of Agriculture of Lúrio University, in activities such as the improvement of soil fertility using organic composting and vermicomposting, responding to farmers complaints that soil productivity is in decline and that most people cannot afford fertilisers. This activity was linked to increasing food production and tackling mismatched demands for vegetables, potentially through direct sales to consumers—a resourceful alternative during COVID-19 lockdowns. Together with the Poverty Alleviation Association, CoP Lichinga purchased small chicks to support the production of broilers and address low protein intake in the community. Like fertilisers, chicken feed tends to be expensive in the region, leading the CoP to experiment with alternative low-cost chicken feed based on locally sourced ingredients. As a result, the Poverty Alleviation Association was able to replenish the batch of chicks received from the project with earnings from selling the first round of broilers. These events show not only the ability of Lussanhando community members to manage the association professionally but also indicate a possible path towards sustainability for this intervention.

CoP Lichinga also organised activities with the students at Lichinga's Agrarian Institute. In one of these, a one-week workshop on business management was offered to a varied group, including students from both the institute and the university as well as members of the community, university lecturers, and the institute's teachers. The workshop was developed in partnership with SNV Netherlands Development Organisation, a non-profit partner active in other agricultural projects in northern Mozambique with vast entrepreneurship expertise. The purpose of joining such a diverse group was to create a conversational environment that would enable participants to work across differences and find common ground while creating solutions for local businesses. When it comes to

setting up a business or to entrepreneurship in general, this wide capacity of interlocution is, in fact, a key skill that allows one to be successful.

CoP Majune implemented activities in five rural communities: Matucuta, Luambala, Riate, Malanga, and Malila. These activities involved students of the Majune Agricultural Institute setting up demonstration plots (demo plots) in all respective communities and at the institute's facilities under the supervision of university lecturers. Demo plots served both experimental and food production purposes. Later, they would benefit from solar-panel irrigation systems and operational training to sustain year-round vegetable production. The results of the demo plots established in Matucuta were particularly interesting, with healthy plants due to organic fertilisation and dry straw mulching, which helped to introduce conservation agriculture to local farmers. Students of the Majune Agricultural Institute were also engaged in building silos of the 'Gorongosa type' with local materials in the communities. These silos derived from a student's final-year assignment, who tested the model at the institute to later disseminate it among farmers lacking grain storage technologies.

Moreover, CoP Majune was inspired to promote aquaculture as to diversify local livelihoods in in the region, which is rich in small waterbodies. Under the supervision of an expert from Unilurio, students and technicians dug fish tanks at the Agrarian Institute in Majune to test locally sourced fish feed. Like broiler production in Lichinga, fish farming has been vouched as an option to improve communities' diets, increase protein intake, and address food insecurity. Notwithstanding, fish farming could also become an income generating activity for students and members of the local communities.

In terms of entrepreneurship, often presented as a gateway to youth employment, CoP Majune designed the Owera Project[3], offering entrepreneurship practices for students and short courses on non-agricultural matters such as computer literacy while also aiming to reach out to the communities. Whilst the latter was discontinued due to the lack of interest, the Owera Project attracted final-year students to start businesses from within the agrarian institute.

Under the Owera Project, the institute became an incubator, offering guidance on the technical and managerial aspects of running businesses and helping to find markets for the produce. Groups of six to eight students would submit a business plan followed by a division of work among group members who would take turns in each role within the business structure. At the end of the term, they would reconvene and evaluate each other and be evaluated by the teacher. While some groups of students chose chicken production, others grew vegetables such as cabbages and tomatoes. Both the chicken and the vegetables were sold at Majune's local market. Students demonstrated enthusiasm with the prospect of 'learning about the entire process', that is, the technical and the social aspects of running a business—as one student remarked at the end of the project. The learning results were also satisfactory on the technical side. Regarding chicken production, for instance, students recorded only 26 deaths due to accidents and overcrowding out of 600 birds monitored. Moreover, resource limitations prompted students to be creative and feed chickens with locally sourced ingredients instead of commercial poultry feeds. Yet, the average weight per chick at 21 days was 0.80 kg, attesting the effectiveness of these practices compared to the standard 0.85 kg at 21 days in commercial poultry farms.

CoP Ribáuè worked with four communities (Muatala, Nahipa, Napasso, and Marrocane) besides developing activities at the agrarian institute. These activities included the implementation of demonstrations and experimentation plots under the supervision of university lecturers. In these demo plots, lecturers tested bio-insecticides based on a pepper (piri-piri) concoction and organised training in soil and water management in partnership with Agrarian School of Coimbra (ESAC). Workshops in Ribáuè focused on food

processing and food security responding to concerns of local stakeholders. Lecturers built low-cost fruit and vegetable driers, processed cassava into different types of flour, produced soya milk and tofu, distributed fruit trees while training students and the communities in grafting, and introduced moringa for water purification purposes. Moreover, CoP Ribáuè introduced conservation agriculture practices such as revegetation through green fences that function as windbreaks and building composts to produce organic fertilisers. As part of the relationships between CoP Ribáuè and rural communities, sites of intervention were frequently revisited to stimulate communities' appropriation of new techniques.

In Ribáuè, there was intense participation in food-processing workshops, thanks to many nearly graduated students being allowed to proceed their studies despite COVID-19 lockdowns. Food processing proved to be a very popular subject among these students, as they saw the potential of making new products such as different types of cassava flour and tofu to sell at the local market with relatively ordinary and low-cost raw materials. Moreover, rural communities engaged with CoP Ribáuè were relatively close to the institute's premises, allowing the CoP's motivated stewards to regularly visit the demo plots in these communities. All in all, this recurrent contact strengthened the ties between universities, institutes, local communities, and eventually other stakeholders towards improving vocational education in agriculture and food security in the region. In fact, one of the lessons learned during this project is that when local communities participate actively, interventions are more likely to be sustained.

All CoPs were supported by groups of university lecturers and VET teachers who were trained in PAR due to the capacity-building component of this project. The team at the University of Groningen and the Agrarian School of Coimbra facilitated three online workshops in which Mozambican colleagues were exposed to participatory methodologies and its possible uses among rural communities. For instance, researchers at ESAC showed examples of maize participatory breeding in Portugal (Mendes-Moreira et al. 2017) and the benefits of participatory plant breeding (PPB) to sustainability at large. In line with this, Mozambican colleagues were motivated to integrate both social and technical aspects to address agricultural issues in northern Mozambique. Lecturers were encouraged to engage with rural communities and farmers as capable actors and collaborators in joint knowledge production, and despite some initial scepticism—possibly due to different scientific paradigms in social and natural sciences—they felt comfortable with this approach. Participatory experiences among rural communities resulted in the publication of a scientific article in a Mozambican journal which analysed the results of a joint assessment on food insecurity and malnutrition in the district of Ribáuè (see Daniel et al. 2024)—plus helped to collect data that may support other publications.

4. Discussion

The implementation of CoPs linking education institutions in northern Mozambique offered critical insights into what we have conceptualised as a microcosm of the skills ecosystem, which should be an object of further investigation beyond this reflection piece. These insights provide valuable lessons for future initiatives aimed at improving agricultural education and training for the benefit of the youth's transition into work and to ensure communities' food security. One of the most significant achievements drawing on the skills ecosystem model was strengthening the collaboration among learning institutions (universities and agrarian institutes) and local communities liaised by lecturers and students who became extensionists de facto. This collaborative approach created trust among participants and increased the adoption of sustainable practices such as composting and organic fertilisation by communities' members. It should be emphasised that this kind of active involvement of stakeholders allowed for joint knowledge production. In fact,

insights in joint knowledge production throughout the implementation of CoPs suggest reframing the dissemination of agricultural techniques as a social process.

On the technical side, the use of sustainable practices like vermicomposting, mulching, and the planting of grafted fruit trees brought relevant benefits to local communities. For instance, in Lussanhando, an increase in soil fertility through organic composting led to higher yields in vegetable gardens. Similarly, in Muatala, where five compost piles were established, grafted fruit trees fertilised with the compost manure captured the community's attention, as they grew much faster than usual. These results underscore the immediate return of participatory approaches to address agricultural challenges. Situations like these played a pivotal role in building consensus around the idea of sustainability, as people learned about new uses for often-disregarded resources from respected professionals and experienced positive results directly. For instance, in Majune, demonstration plots showcasing conservation agriculture practices became resourceful sites for training, thus enabling farmers to witness the benefits of organic fertilisation with the chicken manure they had at home. Such hands-on interventions facilitated by VET students empowered farmers and contributed to students' realisations that they too had something to share and to learn with farmers.

As for the entrepreneurship component of the CoPs, its practical implementation faced some obstacles. Although training was offered by university lecturers and guests in CoP Lichinga and the Owera Project of CoP Majune became a particularly interesting locus of practice for students running their own businesses, the lack of institutional funding and the timeframe of the project—only two years, later receiving a one-year non-budgetary extension to make up for the impacts of the pandemic—limited its continuity. Though this issue falls into a broader debate about international cooperation, discontinuities like this challenge the mediation that educational institutions assume in such interventions. In this context, Sidney Muhangi draws on Lotz-Sisitka and Pesanayi (2020) to argue that 'different activity systems' Muhangi (2024, p. i)—such as policy, training, extension, and farming—need to be articulated through formal institutions to organically engage and nurture the interdependence among stakeholders on a territorial level. In our context, given that poultry and vegetable production demonstrated economic viability, it would have been crucial for the agrarian institute in Majune to seek other partnerships to invest in the sustainability of the Owera Project. This way, practical experiences in entrepreneurship could be incorporated as an extra-curricular activity, thus supporting new groups of students every new term. Despite the efforts of institutes' staff, this lack of financial means proved to be part of the structural challenges experienced in other agrarian institutes.

Besides issues concerning entrepreneurship, the maintenance of things provided by the projects was challenging in some instances. In Muatala, for example, the lack of affordable materials to build fences made it difficult to protect fruit saplings. In fact, only 10 out of 27 plants were adequately protected. Without fences, plants were exposed to animal grazing, reducing their survival rate and growth. In other areas, animal interferences were even more acute. In Luambala, for example, hippos destroyed vegetable gardens. Time sensitive as it is, vegetable production was also compromised in Riate, where misunderstandings among association members led to the loss of seedlings. The case called for some mediation from the president of the local association, who recommended the working group to be restructured should difficulties in sharing tasks persist—which was not necessary after all. In a way, these challenges expose tensions concerning interpersonal relations that are sometimes hard to navigate within the CoPs.

When it comes to convincing local communities about techniques proposed by the CoPs, some issues emerged. In Marrocane, for example, the lack of interest in composting, with only two compost piles established, highlighted the importance of more dialogue

and resource support. Limited results in this community contrasted with promising ones in Muatala, which suggests that more capacity building could have been rewarded in Marrocane. The emergence of environmental risks, such as hippo attacks in Luambala, call for contingency planning vis-à-vis community–wildlife conflicts, which recurrently impact food security in northern Mozambique (e.g., Foloma 2005). Moreover, although the impacts of droughts could be minimised by solar pumps facilitated by the project, soil and water conservation remain key issues in the region, with traditional agriculture practices such as intensive soil tillage contributing to soil erosion. Additionally, funding constraints and the high cost of inputs, especially during the pandemic when prices generally soared, compromised the scalability of some CoPs' initiatives such as broiler production. In response to this, CoPs experimented with alternative chicken feed both at the agrarian institute in Majune and with the Poverty Alleviation Association in Lussanhando.

All in all, the CoPs demonstrated that collaborative and community-centred approaches are important instruments to address two great challenges in northern Mozambique: youth unemployment and insufficient agricultural production leading to food insecurity. While the results in the communities indicate that sustainable techniques proposed by the CoPs had a positive impact on food production with more outputs coming from the fields, VET students were exposed to learning about these techniques during workshops at their institutes and, subsequently, practicing this knowledge together with farmers. In these circumstances, they would discover that they also had a lot to learn from farmers. For instance, when lecturers at CoP Ribáuè proposed an experiment with the pepper (piri-piri) concoction often used as a bio-insecticide by farmers, it was an opportunity for students to realise that knowledge creation can be a bottom-up process and that universities, VET institutes, and rural communities are all elements in what has been termed by the VET Africa 4.0 Collective as an expanded skills ecosystem. Similarly to the VET Africa 4.0 Collective, CoPs functioned in this project as small-scale representations – or microcosms, as we proposed to name it – for designing interventions amidst the complex realities that shape the expanded skills ecosystem.

On the community side, our insights reveal that consistent and tailored training programmes can increase the adoption of sustainable practices like composting and revegetation to increase food production. Moreover, regular follow-ups and sharing experiences among peers (as in the peasant-to-peasant methodology discussed by Bernal et al. (2023), which is also somewhat connected to PAR) can multiply experiences of joint knowledge production and ensure the long-term transformation of rural communities in northern Mozambique. However, improving basic infrastructure such as fencing agricultural fields against animal invasion and using irrigation systems to mitigate the impacts of climate change are critical to ensure year-round food production. Adapting to environmental challenges requires flexible planning and government proactivity to share information and resources that can reduce risks of crop failure. For example, identifying safer areas for horticulture and integrating risk assessment into agricultural zoning can help farmers to make informed decisions and enhance resilience.

Concerning VET students, tackling their transition into work proved to be a complex challenge that was only partially addressed by this project. Although their experiences with the project have been discussed in detail elsewhere (see Rodrigues and Van der Linden 2023), it is relevant to mention that structural challenges such as the surplus of trained youths vis-à-vis the size of the private and public sectors in northern Mozambique suggest that many youths, including those who participated in this project, will transition into work by engaging in entrepreneurship. Hence, addressing skills and knowledge gaps, strengthening entrepreneurial support in and outside school, and ensuring consistent capacity building are critical to raise the youth's chances to engage in gainful work, that is,

one that uses and rewards their skills. While this project opened a window of opportunity for 254 VET students to carry out practical work in and outside the institutes, achieving long-lasting results in entrepreneurship will depend on their individual circumstances. What this experience shows is that future projects should go beyond training and allocate more time and resources to mentorship, which is key to supporting students morally and intellectually through business development. Moreover, establishing microfinance mechanisms in partnerships with local enterprises helps sustaining initiatives like the Owera Project.

5. Conclusions

This article reflected on our experiences in a capacity-building project involving the construction of CoPs to strengthen skills development in vocational education in northern Mozambique. In doing so, our goal has been to frame the three CoPs that emerged from the project intervention as microcosms of an expanded skills ecosystem agglutinating educational institutions (universities and VET institutes) but also rural communities and, especially, local youths. Whilst educational institutions can dictate a certain knowledge regime, their direct collaboration with other actors within the CoPs contributed towards joint knowledge production. Amidst the global impact of the pandemic, which was expected to hinder the project efforts, this joint knowledge production ended up sustaining the CoPs locally. Plus, the capacity-building component represented by online training on PAR propelled the CoPs into the online environment, where they could be maintained and expanded. After all, the online environment functioned as a niche of capacity building for everyone engaged in the project at that point—sowing seeds towards other joint knowledge productions.

CoPs proved to be methodologically suitable to deal with the complex realities of building partnerships in agricultural education in northern Mozambique, because they created spaces for people to engage in conversations that may lead to collaborative networks. Building institutional partnerships in the educational sector has also been the goal of other projects across the African continent (as in the projects in Uganda and South Africa studied by the VET Africa 4.0 Collective) and particularly in Mozambique as Eicker (2017) described for the Vet-Net – another international cooperation project dedicated to training VET teachers. Overall, these interventions are responding to recent shifts in VET policies but will hopefully lead to a societal change towards valuing VET trainees in the labour market. To achieve this, our approach sought to incorporate training in PAR to systematise individual and collective experiences conflating into joint knowledge production within each CoP. To reclaim the ecological metaphor of Spours (2024) amended by the practical and conceptual work of VET Africa 4.0 Collective (2021), mobilising collective agencies conferred a metabolic role to CoPs developing, strengthening, and disseminating new practices across a territory-wide expanded skills ecosystem. Inspired to become social innovations, CoPs worked as microcosms of this expanded ecosystem of skills.

On the limitation side, however, CoPs did not become institutional arrangements in both the agrarian institutes and universities as some might have wanted. There are many reasons for this. On the one hand, the length of this project and the consecutive lockdowns due to the COVID-19 pandemic significantly reduced the team's expectations of what the project could achieve—a change that was acknowledged by the funder—reorienting the project towards more pragmatic outcomes. On the other hand, the concept of communities of practice itself as coined by Wenger (1998) lends meaning to types of relationships for which strength resides precisely in the informality that affords its high levels of flexibility. Proof of this strength was the continuous exchange between CoPs' members after the end of this project leading other organisations to reach out and develop other projects that

built on the legacy of our approach. This experience permits a more critical consideration of institutionalisation. Even when it is not possible or desirable, that does mean that experiences and relationships developed within CoPs were in vain. They might become spin-offs to other processes.

The youth's transition from education to work in agriculture was one of the most pressing issues the CoPs aimed to address. As we sought to clarify, work as synonymous with formal employment considerably reduces the realm of possibilities for alumni in a context where there are few private sector employers and even fewer job opportunities in the public sector. In this context, entrepreneurship skills were thought to mobilise youths' agencies beyond the goal of finding a job, thus searching for workable resources at the local level to transform social, economic, and ecological realities in northern Mozambique. CoPs aimed to harness entrepreneurship skills by presenting local practices as resourceful possibilities to foreground experimentation as well as becoming gainful work. This could be said about building fruit and vegetable solar driers, selling baked tofu in the market, and many other ideas that emerged from students' minds. These possibilities can materialise around and through social and institutional relations constructed within the CoPs. In this spirit, CoPs' initiatives such as the Owera Project in Majune could serve as spin-offs for individual and collective projects by VET alumni.

For students who participated in the project while graduating, CoPs should continue to be a network of support through which they can, quite literally, put their ideas to work. Reaffirming their commitments to the sustainability of the CoPs as microcosms of the expanded skills ecosystem, approachable and experienced professionals such as university lecturers and vocational teachers have taken on the responsibility to remain available to share their expertise with youngsters. Exchanging impressions with experienced mentors helps to navigate the uncertainties surrounding self-employment in a socially and ecologically changing environment. Having this backup could support youths' capability to build a livelihood as agricultural entrepreneurs. In return, lecturers can continue to conduct experimental participatory action research together with rural communities through the projects of former students.

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Abbreviations

The following abbreviations are used in this manuscript:

CoPs	Communities of Practice
PAR	Participatory Action Research
VET	Vocational Education and Training
ESAC	*Escola Superior Agrária de Coimbra*—Agrarian School of Coimbra

Notes

[1] 'VET Africa 4.0 Collective' stands for a group of researchers and practitioners based in the global south and engaged with north–south cooperation in vocational education and training (VET). The group has the right to be credited authorship according to copyright rules in the United Kingdom.

[2] These figures belong to the quantitative report of the project submitted and approved by the funding institution, Nuffic. The document is available upon request.

[3] In the local language, Makua, the word 'Owera' means 'to win', 'to conquer', and 'to be successful at something'.

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