Evaluating Boundary Crossing Social Learning in Vocational Education and Training: A value creation approach

Heila Lotz-Sisitka, Lawrence Sisitka, Gamuchirai Chakona, Mandilive Matiwane, Rhodes University Environmental Learning Research Centre, South Africa; **Chamu Matambo,** Fort Cox Agricultural and Forestry Training Institute, South Africa

Abstract

This article focuses on the development and application of an evaluation model and approach for evaluating boundary crossing social learning in a Vocational Education and Training (VET) learning network in South Africa, with an emphasis on a Training of Trainers (ToT) course that helped to catalyse and strengthen this learning network via two iterations of the course over an eight-year period. The article shares how we adapted the value creation framework (VCF) of Wenger, Traynor and De Laat (2011; Wenger & Wenger-Traynor, 2020) in the evaluation of a VET Training of Trainers (ToT) programme and learning network that focussed on the uptake and circulation of rainwater harvesting and conservation (RWH&C) knowledge in a particular formal and informal VET context in the Eastern Cape, South Africa, where smallholder farmers were struggling to find water for producing food. The evaluated ToT course was catalytic in establishing a boundary crossing social learning network approach in a VET context that linked formal and informal VET (Lotz-Sisitka et al., 2016; Lotz-Sisitka et al., 2022; Pesanayi, 2019); hence we found it important to develop adequate tools for its evaluation. The focus of this article is to share how we developed an evaluation approach to this work. We share insights on the indicators developed for different types of value created, and also insights gained into the use of this evaluation approach in a boundary crossing VET social learning project that took a ToT course as focus. In short, evaluation findings show that the boundary crossing ToT course offers strong immediate, potential and applied value that can lead to realised and reframed value, especially if supported by ongoing learning network activities that follow the initial engagement in the boundary crossing ToT course. This leads, over time, to transformative value which is important in achieving the overall objective of such social learning, namely making knowledge more co-engaging, accessible and useful in the context where improved food security via better use of rainwater harvesting and conservation amongst smallholder farmers and household food producers is a necessary form of sustainable development. Orientation value, and enabling value were found to be vital for the emergence of other kinds of value. The evaluation model also allows for the lifting out of strategic value which points to wider uptake potential. All this creates the

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possibility for indicator development that can help inform iterative development of boundary crossing VET courses used to stimulate the co-construction of learning networks and ongoing social learning for sustainable development.

Keywords: *Vocational Education and Training, evaluation, social learning, value creation framework*

Introduction: The project and site of the evaluation

This article focuses on the development and application of an evaluation model and approach for evaluating boundary crossing social learning in a VET[1] learning network (the Imvotho Bubomi Learning Network/IBLN). This VET learning network was catalysed and supported in a Water Research Commission (WRC) research project focussing on creating a social learning model for knowledge uptake and use in South Africa (Lotz-Sisitka et al., 2016; Lotz-Sisitka et al., 2022; Pesanayi, 2019). More popularly known as the 'Amanzi for Food' project (www.amanziforfood.co.za), the IBLN learning network and a Training of Trainers (ToT) course was developed between 2014-2021 to support the uptake and circulation of rainwater harvesting and conservation (RWH&C) knowledge in a particular formal and informal VET context, where smallholder farmers were struggling to find water for producing food. The course was a boundary crossing course, in that both formal educators (lecturers) and students, as well as farmers, and extension service officers, NGOs and other government partners involved in supporting smallholder farmers in the area completed the course.

The course applies a situated, reflexive learning model (Lotz-Sisitka et al., 2022), and assignments included: 1) contextual profiling to find out what people knew about rainwater harvesting and what challenges farmers were facing to bring water to smallholder farming plots, 2) collaborative productive demonstration site development in which course participants chose a new rainwater harvesting and conservation practice to demonstrate to others in a productive farming plot, and 3) collective review and evaluation of the practice to decide whether it was viable to take forward as a local farming practice.[2] The content of the course was informed by materials produced by the Water Research Commission on 26 rainwater harvesting and conservation practices, made accessible via a 'navigation tool'[3] and a shared website (www.amanziforfood.co.za).

During the eight-year life of the Amanzi for Food project, the ToT course was run twice in the Eastern Cape Province, once in Mpumalanga, and once in the North West. The focus of this article is only on the Eastern Cape Province ToT course, with data generated in the rural Eastern Cape, in the Nkonkhobe municipal district. Fort Cox Agricultural and Forestry Training Institute (FCAFTI) and Rhodes University were collaborating partners supporting the ToT programme, with lecturers and students from these institutions also participating in the ToT and the learning network. Table 1 below provides an overview of the contextual aspects of the course.

Table 1: *Contextual aspects of the ToT course – Eastern Cape*

Province/location/ catchment	Eastern Cape Fort Cox Agricultural and Forestry Training Institute (FCAFTI) Predominantly Amathole District Municipality with some participants from Buffalo City Metropolitan Municipality
Course modality and assignments	3 x 1½ days, 3 individual and 1 group assignment The first course was completed in 2015, and a second course in 2017
Participants	Farmers, agricultural advisors (extension officers), NGO personnel, staff and students from FCAFTI and Fort Hare University Local economic development officials
Implications for learning network development	Imvotho Bubomi Learning Network established the first running of the ToT course. This expanded through the second course, including NGO personnel. Network is centred on FCAFTI but with a strong and active farmer constituency, and comprises representatives of all stakeholder groups offering a good set-up for boundary crossing VET (formal and informal learning boundary crossing context).
Productive demonstration site development out of ToT assignments (significant for boundary crossing VET learning)	Productive demonstration sites established at FCAFTI and on farmers' lands out of first course. Added considerably between courses and during and following the second course. Course graduates sharing their experiences with others, using their own gardens and farms as demonstration sites. Strong links to the WRC Climate Smart Agriculture (CSA) project, and towards the end of the project productive demonstrations sites had increased from three initially to over 30.

The Eastern Cape ToT course was complemented by other social learning approaches such as use of social media and community radio, change laboratories and learning network meetings to strengthen the social learning, with the productive demonstration sites becoming a key feature of the boundary crossing social learning model (Lotz-Sisitka et al., 2016; Lotz-Sisitka et al., 2022; Pesanayi, 2019). Supported by the boundary crossing ToT course, over time the IBLN developed into a social skills ecosystem (Lotz-Sisitka et al., 2022; Lotz-Sisitka & McGrath, 2023; Ramsarup et al., 2022; Wedekind et al., 2021). The wider context of the project is that it contributes to small-scale farming and household food production addressing the problem of household food insecurity in South Africa, which remains a national challenge (Hart, 2009; Labadarios et al., 2011; Wenhold and Faber, 2008 in Backeberg and Sanewe, 2010).

Concepts of sustainable VET

As indicated above, our interest was to identify and test an appropriate evaluation methodology for the ToT programme in the VET learning network. There is a long history of evaluation research (Patton, 2010; 2018; Pawson & Tilley, 1997) which we will not repeat here. When searching for an evaluation approach, we turned to identifying suitable evaluation frameworks for social learning, with the Value Creation Framework (VCF)

of Wenger, Trayner and De Laat (2011) and Wenger and Wenger-Trayner (2020) being specifically developed for this purpose. As will be shown below, we adapted the value creation framework (VCF) of Wenger et al. (2011) and Wenger et al. (2020) to the context, and by applying data emerging from the Eastern Cape ToT course in the VET learning network (Lotz-Sisitka et al., 2016; Lotz-Sisitka et al., 2022; Pesanayi, 2019).

Social learning, as understood by Wenger et al. (2011) and Wenger et al. (2020) takes place in both communities of practice and networks. Communities of practice are defined as "a learning partnership among people who find it useful to learn from and with each other about a particular domain" (Wenger et al., 2011, p. 9). Social networks are defined as a set of connections among people who have personal reasons to connect for information flow, joint problem solving and knowledge creation (Wenger et al., 2011). Communities and networks have different effects on learning potential. The learning value of a community is the "ability to develop a collective intention to advance learning in a domain" (Wenger et al., 2011, p. 10). Wenger et al. (2011, p. 10) argued that "over time, a joint history of learning also becomes a resource among the participants in the form of a shared practice – a shared repertoire of cases, tools, stories, concepts and perspectives". Learning in a network can also become a resource to extend repertoires, tools, perspectives and practices on a landscape of practice. In our research, both were in focus as the ToT helped to consolidate the shared practice of rainwater harvesting and conservation via productive demonstration sites, and the learning network helped to expand these practices in the landscape of practice.

The VCF is a nuanced evaluation framework, specifically designed for evaluating social learning processes over time and in landscapes of practice. It is located more in the hermeneutic tradition, but can also be used within a co-construction model of evaluation, and can be deepened with a developmental and/or a realist approach that asks questions about what works for whom under what conditions (Pawson & Tilley, 1997). In designing the monitoring and evaluation (M&E) framework for the Amanzi for Food programme, we chose to work with the VCF, but needed to adapt it to the particular project context and mediation processes. We also aimed to underlabour it with realist questions such as 'what works for whom under what conditions' in a second phase of the evaluation, and were also interested in generative mechanisms that produce these conditions (see below). We focused adaptation of the Value Creation Framework for M&E of the Amanzi for Food project, with an in-depth analysis of the ToT course as this was the most catalytic of the social learning processes. We also undertook VCF analysis of the other social learning mediation processes, but with less in-depth analysis. This article therefore focuses on the ToT but links to other mediating processes.

Methodology: An adapted Value Creation Framework (VCF)

The following questions, adapted from Wenger et al. (2011) framework were useful for guiding the evaluation design of the ToT programme in the VET learning network and the associated knowledge dissemination and uptake processes, where the knowledge dissemination was directly linked to practical interests:

- What is the value within the activities and interactions themselves?
- Does the learning network result in creation of knowledge and practice that can be shared?
- Are members able to leverage that knowledge and practice?
- What is the impact of knowledge and practice on learning network members' goals if any?
- How does involvement in the Learning Network and the knowledge and practice created and shared cause members to reframe, reconsider and transform their actions or work?
- What insights are gained for expanding the learning networks, for knowledge dissemination, and for managing and supporting such processes?

We drew on these and the VCF to develop a set of more detailed questions to guide the evaluation research (see Appendix A). These helped us to source evaluative insights from different data sources, and to develop value creation narratives. The VCF requires researchers to generate data from a range of different sources, and to develop value creation narratives which are then analysed to identify potentially eight different types of value (see Boxes 1 and 2). Wenger et al. (2011) explained that there are potentially five cycles of value creation in social learning initiatives which could help to establish how knowledge dissemination processes such as that being developed in the Amanzi for Food programme can be created (Box 1). In later work, Wenger et al. (2020) argued that these forms of value are influenced by, and also influence the generation of orienting value, enabling value, transformative value and strategic value, explained briefly in Box 2 (as also applied to the Amanzi for Food study), and as illustrated in Figure 1 below.

Box 1: *Cycles of value creation (Wenger et al., 2011)*

Cycle 1 – Immediate value: whereby interactions and activities are observed and identified as valuable.
Cycle 2 – Potential value: knowledge capital. In this cycle the value is in possessing knowledge that may be useful in the future.
Cycle 3 – Applied value: changes in practices. In this cycle the value is in using knowledge to do something, particularly to do something new or different to what has been done before.
Cycle 4 – Realised value: performance improvement. In this cycle value is observed by noticing that doing something differently as a result of new knowledge has yielded positive results, and has achieved the desired outcomes of the actions.
Cycle 5 – Reframing value: redefining success. In this cycle the value is observed when the participants have developed a new understanding of success and value.

Box 2: *Additional types of value possibly created from the first five cycles of value (adapted from Wenger & Wenger-Trayner, 2020).*

Orienting value: A social learning space always takes place in the context of a broader social-ecological landscape. Locating the social learning in such a space offers important orienting value to a social learning process. In this study we used contextual profiling to establish the orienting value for the social learning process.

Enabling value: This refers to value that is created by the external context (e.g. resources, useful materials etc.), and the internal context (e.g. participants' willingness to learn and work together). The converse of this is constraining conditions (e.g. historical circumstances, lack of access to land etc.). In this study, enabling value is the value that is created by, for example, the WRC knowledge resources, and by the willingness of communities and lecturers and other partners to co-operate.

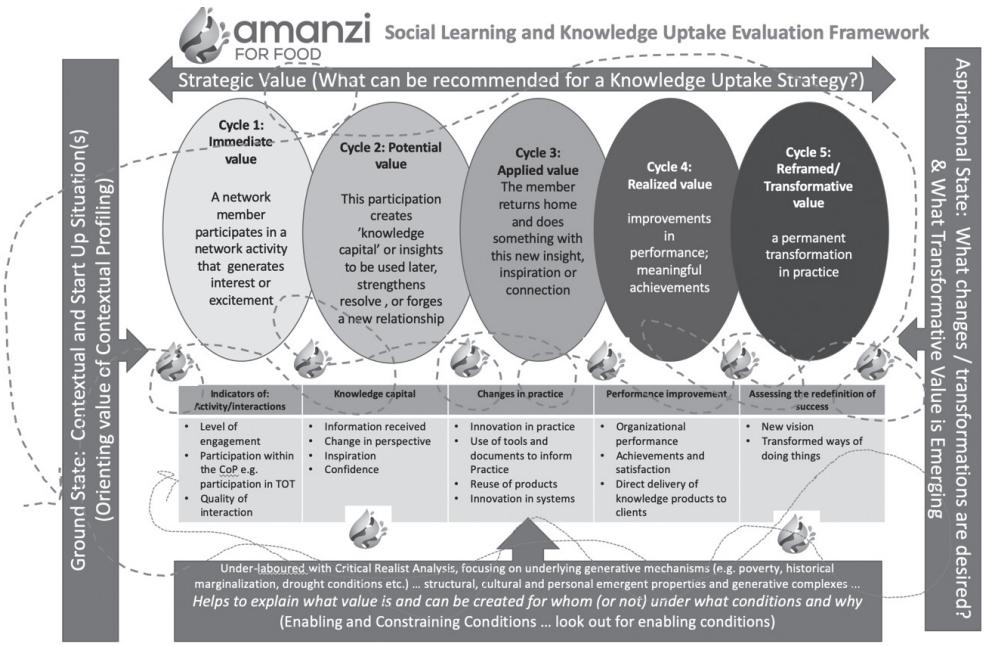
Transformative value: This refers to the value created through significant changes to people, or something in the world – and aligns with 'reframing value' above. This is normally also value that challenges the status quo, or when very substantive, leads to transformation of social structures or deep changes in agent's capabilities. It is value that makes a real difference. In this study, this is signified by the difference that the social learning process is making to people, to farming practices, and to food production.

Strategic value: This refers to value that helps to clarify the direction and usefulness of a social learning space or process. Strategic value is often necessary to elevate the relevance of learning in the mind of stakeholders, organisationally or societally. In this study, this is captured in the findings of the study that were most useful for structuring a Knowledge Uptake Strategy (Lotz-Sisitka et al., 2022) and the associated tools that have been produced for this work going forward with others in other social learning settings.

Value creation stories give meaning to value creation cycles and their complementary indicators shown in Figure 1 below. Wenger et al. (2011, p. 37) articulated this well explaining that "stories substantiate indicators, give them life, and make them more meaningful by connecting them into more extensive processes of value creation". Stories and indicators thus point to and reinforce one another and the data from each cycle needs to be combined with the cross-cycle stories in order to provide an integrated understanding of the value created in communities and networks. If this is not done then an indicator by itself is only suggestive and the story merely anecdotal. In Figure 1 below (which shows the overall evaluation design of the Amanzi for Food programme), this is indicated by the broken lines that show the cycles, and the connections between the cycles of value creation, and how these are influenced and shaped by the orienting and enabling value (and

constraining factors) and by the emerging transformative and strategic value, which in turn then can shape new orienting value and enabling value that helps to create new forms of immediate, potential, applied, realised and reframed value. This framework is very useful for social learning evaluation as it creates a means of monitoring and also reflecting on 'what value is created for whom under what conditions', with the critical realism of Bhaskar and Hartwig (2016) drawing attention to the underlying causality of the 'what conditions', which then sheds light on *how this value is created over time (or not),* not only what value is created for whom. Our ultimate goal of the programme was to inform a strategy for knowledge uptake and use via social learning approaches, hence we see 'strategic value' arising from the overall evaluation and other forms of value contributing to this wider goal as outlined in Figure 1.

Figure 1: *The Amanzi for Food Social Learning and Evaluation Framework, indicating the types of value, and types of indicators that can be developed in a social learning and knowledge uptake process over time (Evaluation framework diagram adapted and developed from Wenger, Trayner and De Laat (2011); Wenger and Wenger-Trayner (2020); Pawson and Tilley (1997) and Bhaskar and Hartwig (2016))*



Important to this evaluation design, is the emphasis that Wenger et al. (2011) placed on cumulative evidence when presenting stories. They explained that from the value creation narratives, and a following of the 'cumulative threads' across the stories, data is then analysed into a matrix – see Tables 2-6 below, where indicators are refined further for each type of value aligned with the different activities that make up the full knowledge dissemination process.

To construct the narratives informing the analysis matrix in Table 2 below, we drew on the following data:[4]

1. **ToT course observations:** Video and photographic data was generated from all course sessions), especially course excursions and practical demonstrations which helped to mediate the content of the WRC materials.
2. **ToT course assignments and assessments** contained information on the 'sense' that course participants made during their participation in the ToT programme. The course assignments (40 in total over two cohorts) also showed participants' plans for change projects, and gave indications on which of the WRC materials were most favoured for supporting their planned change projects.
3. **ToT course evaluations** provided information on how the programme was being experienced, as well as information gained, and value of the course to participants. Course evaluations were generated from all course sessions.
4. **Demonstration site observations via follow-up site visits:** Regular visits to capture evaluation data on the demonstration sites were undertaken over a period of five years. This captured data on the learning, and learning network links, as well as the practical value of the WRC materials and the demonstration sites.
5. **Learning network minutes and interactions on WhatsApp:** Learning network meetings were also documented using minutes, and ongoing interactions in the learning networks were captured on the WhatsApp groups between 2014-2021.
6. **Interviews with co-ordinators of the learning networks:** A series of interviews were done with ToT participants, co-ordinators of the learning networks, and with farmers who were benefitting from the use of the WRC materials (also ToT participants) to probe the value that created, as well as difficulties experienced.
7. **Ongoing contextual data generation including documenting radio, newspaper and website interactions and coverage:** The project continued to generate contextual profile data and document media interactions over the period 2014-2021.
8. **Evaluation questionnaire:** An online evaluation questionnaire was used to 'fill in' any gaps in insights that were not covered via the above-mentioned data sources.

In this article, we demonstrate how we undertook the value creation evaluation analysis based on the narrative data constructed from the above (cf. also Lotz-Sisitka et al., 2016, 2022). The evaluation analysis started with capturing information on the different types of value that were being created for different groups of participants and different types of activity (e.g. farmers, LED officers, lectures, NGOs) in the form of value creation narratives that were written up based on triangulation of the raw data. From here, cumulative narratives on key emerging themes were identified and written up, and these were then plotted into the analytical matrix, to inform the development of indicators which provide more insight into the types of value created via different types of activity via the social learning process. To make sense of the data within a useful evaluation framework for the

project, we needed to 'customise' the generic evaluation framework of Wenger et al. (2011) and Wenger et al. (2020) so that we could offer more meaningful interpretations of the value that was created (or not) in the evaluation work (cf. Appendix A and Tables 2-5 below).

The data to support the analysis was selected from the assignments, the course evaluations and other course records according to the key questions in the framework. The experiences related to some of the questions; many of those associated with Cycle 1, in particular, and some in Cycle 2, were inevitably similar for all participants within a particular course. These were analysed on a generic basis for each course. However, to illuminate aspects of the process with 'thick descriptions' we include extracts from the data sets (see Tables 2-5). The questions associated with Cycles 3 and 4 provided more opportunities for richly textured data to inform the thick descriptions. We integrated Cycle 5 into an overall analysis of transformed value.

Findings from the evaluation analysis

Tables 2-5 provide insight into the value created by the ToT course and associated network activities as revealed by the five cycles of value (Box 1). Tables 2-5 also share the indicators relevant to the types of value identified in the Amanzi for Food programme. Each type of value is briefly discussed. We also recognise that there are often relationships between the types of value and while one type of value may for example be 'immediate value', it can also provide 'potential value'.

Table 2: *Cycle 1 – Immediate value created by the ToT*

Indicators	Evidence and Outcomes
1.1 Undertaking course in collective with others	Participants were already in networks (UFH, FCAFTI) which were extended by the IBLN and farmers and other course participants who joined the ToT courses over the two iterations of the course.
1.2 Gaining access to new information and ideas	Some of the information concerning RWH&C was new to participants. Participants found the new information interesting and valuable, and shared information on other topics, such as seed saving, during the course.
1.3 Collaborative activities	Collaborative activities were strengthened by the group assignment that required work together on productive demonstration sites.
1.4 Initial steps in developing networks	Although there were networked relations already in the context at the start of the course, the ToT course consolidated the IBLN, and brought more people into these networks. The IBLN itself became more self-sustaining, taking on a more activist role with lobbying and advocacy linked to the increasing agro-ecology focus of the group.

Discussion: *Immediate value was created through the IBLN network relations and expansion, as well as access to new information that was presented in the course. This was strengthened by collaborative activity supported via the group assignment, especially the focus on shared development of productive demonstration sites. This later expanded to further collective concepts and work when the notion of 'ilima' was brought into the network (this is a traditional 'working together' isiXhosa practice).*

Table 3: *Cycle 2 – Potential value created by the ToT*

Indicators	Evidence and Outcomes
2.1 Reinforcement and extending existing knowledge	The course reinforced and added new understanding and introduced new knowledge, principles and practices of RWH&C as well as on understanding of indigenous RWH&C practices, such as *'gelesha'* and *'matamo'.* One farmer in the course said, during a field visit to her productive demonstration site, "… before I joined the group I was an agroecologist. Trench beds and agroecology practices I learnt from the WRC books. I was interested in reading the Amanzi for Food books and getting knowledge from these because we are facing climate change issues" (Biko, pers. comm., 2020).
2.2 Gaining new knowledge and skills	The course involved some very knowledgeable and skilled farmers, and less experienced participants gained from their knowledge and skills, in addition to the information and ideas being formally shared through the course processes. For one of the course participants, "Before we went to the training of trainers' course, we did not know anything about the practices so we learnt from these practices, but after we attended the training of trainers course, we were constantly checking the WRC books for information." Development of new skills and the productive demonstration sites were achieved through the course practicals.
2.3 Locating new knowledge into own context	The course is designed to afford participants the opportunity to locate their learning directly in their work contexts, and the assignments are structured to support this process. Participants appreciated taking their new understandings and skills back to their communities, their work and implement new practices. From the evaluation of Module 3: "By telling my friends and other students, ... And when I am home I will tell my parents and other people in the community", and "Through organising farmers' meetings, field trials…, farmers days and visits", and "The information I got I will include in my practices". Perhaps most encouragingly, "During farmers' meetings, in church, in a taxi and the bus". A very specific example of location of knowledge into context was provided during a site visit by one of the farmers: "We chose the tower garden because we work with the elderly people from the community, so it is easier for them to work on the tower garden" (Nomphindiwe Msisiwe, pers. comm., 2018). There is evidence of the change in participant dynamics from the first course to the second where the majority of participants were small-scale farmers and household food producers, who joined through their membership of the IBLN. This new dynamic was very welcome and led to considerable elements of the contact sessions being conducted in isiXhosa. This undoubtedly helped with the of the new ideas and information became internalised by the participants, who later located these in their own context within their households and communities.
2.4 Establishing connections	There were strong interconnections among many participants and these were extended to other participants, leading to a growth in the membership of the IBLN. The connections between farmers, education and training institutions, NGOs, department of agriculture and local economic development agency in this district has been extended to national and continental networks, such as the Rural Women's Assembly (RWA), and the African Biodiversity Network (ABN).
2.5 Increased agency through connections	The well-established IBLN with its growing activist membership and institutional connections is asserting more agency in promoting agroecological and RWH&C practices. Towards the end of the programme, members were engaging closely with the government whenever possible to influence policy or to express their concerns regarding agricultural issues. They also became more connected with national and continental lobby groups, such as the African Biodiversity Network. Large numbers of emerging farmers are being represented within the district, provincially and nationally.

Indicators	Evidence and Outcomes
2.6 Increased understanding of and capacity for learning	The process of learning and how different people learn in different contexts is a core component of the course. Considerable barriers to learning e.g. language, were recognised and the second running of the course in the Eastern Cape was mostly facilitated in isiXhosa (the main language of the group). This enabled participants to engage much more directly in the learning and discussions. Increased understanding of learning was reflected most clearly in the assignments, where participants indicated the different methods they would employ in sharing information. Participants in the formal education sector shared a range of learning approaches including formal presentations, discussions and practical exercises while farmers cited *'ilima'* as a key learning process.

Discussion: *Potential value was created by validating and expanding existing knowledge, including indigenous knowledge, and by creating space in the course for more knowledgeable and experienced farmers and agricultural educators to share their knowledge with all participants, including in their own language. New knowledge from course materials and tools was used to expand existing knowledge. Potential value was also created by participants' interest in sharing the new knowledge with others in their communities via the course emphasis on application of knowledge to practice. Potential value was also created through the relationships and connections that were being built through the IBLN networking activities, including wider networking with relevant agencies, and the policy system. These experiences were brought into the course to share with others, thus also linking more people to wider networks, advocacy and lobbying activities. While there was clear evidence of an enhanced understanding of learning, this was rarely if ever explicitly articulated as such by course participants. Their focus was almost solely on the practical outcomes such as the implementing and sharing of RWH&C practices. More focus on the learning processes used in sharing with others could help to further expand potential value.*

Table 4: *Cycle 3 – Applied value created by the ToT*

Indicators	Evidence and Outcomes
3.1 Changes in curricula/training processes	A number of curriculum changes were proposed in the ToT change project assignments. For example, EC1/4 (assignment) states: "Within appropriate existing curriculum course modules – ideally within mandatory (foundational or core) modules… it is important for RWH&C to be included in the curriculum in order to … increase the knowledge around RWH&C … sustainable use of available resources is the key in agriculture. OR ... as a stand-alone short course… will be helpful to close the gap in literature and in knowledge. Especially for other clients such as farmers, educators and community. Also… As additional resource material ... RWH&C is also needed in the institute as another source of material on top of the information about water harvesting and conservation they have got from the course." Some changes were already implemented by the first course participants in the FCAFTI curriculum. In the second course, a lecturer from FCAFTI who was a participant from the first course presented on the changes introduced to and implementation of her curriculum: Agriculture Programme Exit Learning Outcomes "sustainable agriculture"; cross subject offerings for relationships within a programme e.g. Crop production option: irrigation, soil and water conservation, soil fertility and nutrition, crop production subjects, soil classification, rangeland and pasture management; Individual subject links and topics in vegetable production to RWH&C (Madikiza, pers.com., 2018).

Indicators	Evidence and Outcomes
3.2 Use of new approaches/media	The ToT and the IBLN use a range of media to communicate and share knowledge, materials and photos of RWH&C practices, and agricultural information regularly e.g. WhatsApp, WRC and Amanzi for Food websites, Facebook page and Forte FM (local community radio station). However, not all IBLN members are well connected to the internet, which means that not all ToT participants could remain connected to the IBLN, although those that were connected tend to continue sharing information and knowledge on the WhatsApp network after the ToT (the network is still active at the time of writing). The use of the radio helped to draw some participants into the ToT and the IBLN, and shared valuable information from the ToT into the wider community, but it required continued support and its influence faded by the end of the project.
3.3 Adopting more collaborative approaches	Most ToT participants, including farmers in the area valued collaborations that were established out of the ToT course, especially those emanating from the productive demonstration sites, which have expanded to an increase in *'ilima'* collaborative workdays. These have applied value in terms of increasing food production, and improving strategies for bringing water to food gardens.
3.4 Drawing on information in WRC materials	The WRC materials have become an indispensable tool to support many farmers in their farming, as cited in the ToT assignments and discussions by them, the college lecturers and students. For example, from EC4/4 (assignment): "… the materials that are going to be used will be adopted using the WRC information and that will make it more useful and more practical in implementing these aspects of RWH&C practices. The content followed from the WRC material … will be able to create a platform for farmers to learn, participate and share information", and from an interview: "We consulted the WRC books and we knew we had to read thoroughly to find the information. In the WRC books, you can find each of the rainwater harvesting practices. Practices such as raised beds, tower gardens and furrows can be found in the WRC handbooks." (Dwane, pers.com., 2020)

Discussion: *Evidence of applied value was found in changes in curricula in the agricultural colleges, as lecturers engaged in curriculum innovations drawing on the ToT course materials and processes, including the engagement with farmers. This led to fundamental changes such as introduction of more practical components like productive demonstration sites on campus and in the community, and participation of students in local ilima practices with farmers. This addresses a VET problem of a general reduction in the practical component of courses offered at Agricultural Colleges and Training Institutes over recent years. The opportunity to reverse this trend through the inclusion of RWH&C in curricula via the ToT processes was therefore welcomed. Other applied value was found in the use of social media tools such as WhatsApp and community radio that supported farming practice, as well as relationship building. The practical demonstration sites, and ilima practices were two tools introduced by the course and the IBLN members that had significant applied value in terms of actual food production. Additionally, the information the WRC materials was seen to have applied value as it helped farmers to develop a range of new practices to improve water for food production and improve food production. Applied value from the ToT processes enriched the agricultural and social networking practices of course participants and their family members, neighbours, communities and students.*

Table 5: *Cycle 4 – Realised value created by the ToT*

Indicators	Evidence and Outcomes
4.1 Enhanced and productive collaborations	The idea of collaboration broadened constantly from the early ToT course to after the second ToT course. As one course participant explained during a site visit: "The people involved in the demonstration site at my home are my family, me, my husband, Mrs Madwendile, and lecturers and students from Fort Cox… I would also like to involve the community members in my area. I also have the liberty of involving people from outside my area." (Peter, pers.com., 2020). The IBLN itself became a prime example of ongoing and productive collaboration, as articulated by a network member: "I do not face any challenges in accessing the information because there are many sources of information. I get most of the information from the IBLN where I have been a member since 2014. I also learn from students who have knowledge on these practices. The elderly people also have knowledge and we use their knowledge as well. The Rhodes University team and others also share their knowledge with us. The best place to access information is the learning network … It's good being a member of the IBLN." And further: "I share my knowledge with people; I have shared my knowledge with people from Khayelitsha. I also teach other people on agro-ecology, I have so far assisted three households by teaching them agroecology practices. The tower garden, trench beds, raised beds and mulching were learnt for the WRC booklet on Water Harvesting and Conservation, Volume 2 Part 1." (Biko, pers.com., 2020)
4.2 More effective lobbying	Lobbying is a long-term process. Finding and assessing evidence of its effectiveness is challenging. However as reported on the WhatsApp group, IBLN members are increasingly invited to policy dialogues with the national and provincial government; they make their views known through the partners and wider networks with which they are involved. In particular IBLN members actively opposed the imposition of genetically modified organisms (GMOs) into the food chain, and any moves to restrict farmer seed saving and sharing. They were very involved in lobbying against the Monsanto proposal to introduce "Triple Stacked GM Drought Tolerant Maize", a proposal which the SA government rejected in November 2018, citing lack of credible scientific evidence for its effectiveness and safety. A striking picture of one of the very active members of the IBLN and Rural Women's Assembly, holding a copy of the government's rejection of the proposed GMP seed, was posted on the WhatsApp Group on the day following the decision.
4.3 Recognition of achievements by external observers	Considerable interest has been shown in the activities of the IBLN members, in particular the way they willingly and voluntarily share their learning with others. The Mxumbu Youth Group is very proactive in this respect, and as youths themselves they are powerful mentors for other young people. This was, for example, recognised by a GEF5 Sustainable Land Management Project operating in an area called Machubeni, Eastern Cape. The coordinator requested the help of the Mxumbu youth group in an email as follows: "My thinking was just to expose our team to some CSA (Climate Smart Agriculture) taking place in another communal area to get them excited and encouraged. I had asked the Mxumbu youth team if they could teach them how to do tied ridges, raised bed gardens and then speak a bit about their experiences with intercropping. … They seem to have done some really good work already and I'm sure it'll encourage them to know that they are sharing their knowledge with another communal area".

Indicators	Evidence and Outcomes
4.3 Recognition of achievements by external observers ***(continued)***	Recognition of the IBLN members and their keenness to experiment has also been recognised by another WRC project, on Climate Smart Agriculture, based in Pietermaritzburg, KwaZulu-Natal. Several of the IBLN productive demonstration sites became sites for farmer experimentation with CSA practices and provided the Eastern Cape locus for this project which also operates in Limpopo. Further recognition was afforded by the Mxumbu Youth Group hosting a World Food Day event in partnership with the African Biodiversity Network (ABN). Three members of the IBLN were also invited to the Zimbabwe National Farmers Seed Fair in October 2018, where they presented on the work they are doing to save and share seeds, and experienced the vibrancy of the Zimbabwean food sovereignty networks. This trend continues.
4.4 Productivity of sites	The question of productivity is more complex than it appears. This could be due to unpredictable weather i.e. extended periods of drought experienced in the area in recent years, and also to the fact that many of the new RWH&C practices have been introduced on previously fallow land. The impact of drought has suppressed productivity to a considerable degree, while the cultivation of new areas of land as demonstration sites has inevitably led to increased productivity. Available quantitative data is insufficient to formally assess any changes in productivity but anecdotal evidence suggests that the farmers have experienced that practices such as trench beds, tower gardens, intercropping, and increased water availability are increasing their productivity, in particular through the scope for more intensive use of available land. Some initial quantitative experiments established at Fort Cox AFTI were not conclusive and more such experiments are planned with some in-depth research into site productivity carried by suitable qualified researchers.
4.5 Cascading of demonstration site development	Productive demonstration sites were taken up as course assignments, and learning was shared around a number of different sites. There is some evidence of cascading of productive demonstration sites to new locations and one researcher found a number of new productive demonstrations in different smallholder plots on a site visit to local farmers (Pesanayi, 2019). For example, in one case in Mxumbu village at the Xhukwane primary school, a demonstration site had been established by the principal, Mr Jende, with another site in his own garden, where he also takes learners. He said: "This type of agriculture has been forgotten in schools so I am trying to instil this knowledge so that the school kids grow up with the knowledge." The initial sites demonstrated a far wider range of RWH&C practices which were being added through the interests of the farmers on the sites, lecturers at FCAFTI and were often stimulated through discussions within the IBLN network. These new practices have been introduced and implemented through the *'ilima'* process, which still continues. Some sites, including that at FCAFTI have been expanded to allow for inclusion of further practices. Other sites were developed through the wide sharing of information by IBLN members with their families, neighbours and other communities. For example, the Mxumbu Youth Group, and the Zingisa Education Project are both involved in training farmers in different communities, with the training involving practical demonstrations and the establishment of RWH&C practice sites.

Indicators	Evidence and Outcomes
4.6 Expansion and usage of elements of the ToT course and the WRC materials	There is considerable evidence from all the productive demonstration sites that farmers and lecturers used the information from the WRC materials which formed an integral part of their training processes. Specific WRC materials were cited as being used to support their training with less evidence suggesting other elements of the ToT course itself. However the wide range of sources of information and support cited by the farmers suggests that the fundamental principles on which the course is built are being perpetuated through the sharing between farmers. One course participant and active IBLN member said that the sources of information from which she draws include: "the IBLN, WRC materials, the demonstration site we started in Alice where we went to a village in Memela. We also learn through the Rhodes University ToT course, the website, Google, WhatsApp groups from the discussions." (Peter, pers. com., 2020). The main course elements that are universally practised are the sharing of ideas through discussions, sharing experience, and practical demonstrations, supported by information in the WRC materials.

Discussion: *Collaboration is central to the achievement of realised value. As can be seen from Table 5 above, collaborations have been enhanced by the new ideas and information from WRC materials shared through the ToT course. Most collaborations are around practical activities such as productive demonstration site development and they are essentially productive. The ability to lobby effectively is directly connected to the sense of empowerment or agency felt by individuals or groups. IBLN includes many members who already had strong activist backgrounds, but also others who had little or no direct contact with lobbying activities. Their engagement with the ToT course and the IBLN provided a greater sense of collective empowerment and agency, leading to more direct involvement in farmer activism, including lobbying. The effectiveness of this is less easy to assess, but confidence to enable such engagement has been strengthened. Realised value is also visible in the increasing recognition of the work of IBLN members at local, national and regional levels. However, this is mostly within the wider agroecology networks, and not yet within the mainstream agricultural discourse. For longer term transformative value to emerge from this realised value, wider sharing of the IBLN members work is needed in mainstream agricultural media. An important realised value is the cascading of the productive demonstration sites, but there is a need for more quantitative assessment of productivity associated with the RWH&C practices being implemented at various productive demonstration sites. Realised value is evident from the WRC materials and the social learning system that has supported the uptake and use of this knowledge, including via the ToT course.*

Orienting, transformed, enabling and strategic value

As can be seen from the above, the longevity of the IBLN (enabling value), following two ToT courses facilitated in the Eastern Cape enabled a more in-depth analysis of the impacts and value realised from the ToT course and social learning intervention associated with the WRC materials and the Amanzi for Food project in this province. When compared to the Mpumalanga and North West sites (shorter duration), the Eastern Cape setting provided data for an analysis of Cycle 4 of the VCF, which was not possible in the other areas. Expansion of the IBLN network, especially through the second iteration of the ToT course, brought in a number of new activist farmers and organisations who changed the network dynamic quite considerably. The new energy brought into the network by these members (enabling value) fostered a resurgence of interest in a range of pressing issues, including agroecology, seed rights and food sovereignty, through which alternatives to conventional agricultural practices were highlighted and explored, indicating a commitment to reframed and transformative value. Experience of drought (orienting conditions) also catalysed

ongoing interest in the IBLN and the ToT programmes as farmers were seeking solutions. Within the FCAFTI, a history of teaching monoculture and large-scale irrigation to students (orienting conditions) was increasingly seen to be inadequate to respond to the needs of local farmers, which also contributed to the emergence of transformative value. Throughout the process, farmers, lecturers, LED officers, NGO partners and extension services, sought to extend their knowledge of viable alternatives to use RWH&C practices, to strengthen food production, with the collaboration across these stakeholders producing significant enabling and transformative value. For many farmers, RWH&C became almost the default position in terms of water provision in the absence of regular rainfall and experience of drought periods (orienting conditions). The inherent activist nature of the new members also added to the already strong culture of sharing information and understanding (i.e. strengthened potential value), not only within the network, but beyond into their own and neighbouring communities (strategic value). The impacts of the ToT courses were therefore amplified through the passion and dedication of IBLN members (enabling value).

Tables 2-4 above contain detailed descriptions and analyses in relation to the first four cycles of the VCF, with the relevant indicators showing a strong and lasting impact in almost every area (i.e. sustained value creation). The most compelling areas are certainly the idea and proactive nature of collaboration and sharing (potential value), with a focus on practical activities (applied value), including productive demonstration sites (realised and transformative value), but increasingly focussed on individual farmer practices that are reframed towards more sustainable agricultural practice and improved food production and social engagement (transformative, strategic value). References to the use of the WRC materials have continued for several years after the implementation of the second course, indicating an ongoing engagement with the materials and their strong potential value for applied and reframed/transformative value. This is taken further by clear indications of wide sharing of the information contained in the materials through the social learning model, confirming their potential value for applied, realised, reframing and transformative value. However, we noted that before the social learning process and ToT were instituted, the materials had not been used, thus it is not the materials themselves, but rather the processes that enable contextually and socially relevant uptake and use of the materials that seems to be significant for applied, realised, reframing and transformative value creation.

IBLN members' involvement with activist networks both widened the influence of the IBLN and increased the levels of lobbying and advocacy for agricultural policies (potential value) that are better attuned to the needs of small-scale and emerging farmers and household food producers. There was also greater recognition of the importance of sustainable practices such as RWH&C (contributing to reframed and transformative value creation). Active involvement of lecturers and students led to curricula that are better attuned to the needs of smallholder farmers (reframed and transformative value, as well as increased potential value). These activities have led to greater recognition within and beyond the farming sector of the IBLN and what it stands for, as well as farmer-centred curriculum innovations (strategic value).

One Cycle 4 indicator with which the project has perhaps not been sufficiently engaged is the issue of productivity, in terms of the quantitative outputs achieved by farmers using RWH&C practices. Any serious analysis of this will require focussed research activities conducted in collaboration with agricultural scientists and other specialists going forward. We note that the WRC materials used in the Amanzi for Food programme were written and based on strong scientific understandings of RWH&C practices that were developed over many years by large groups of scientists (i.e. their scientific potential value has already been proven in the early stages of the WRC research), thus it would be helpful to undertake such an evaluation with these scientists, pending their availability.

Conclusion: Insights into evaluation indicators and methodology for boundary crossing social learning in VET

As can be seen by the wealth of evidence in Tables 2-5, and the short discussion above, the VCF approach can provide useful insight into a range of processes and outcomes associated with boundary crossing social learning in VET, when supported via a ToT process that is oriented towards practice, as well as expansion of social learning networking, collaboration and knowledge use and uptake. We summarise the indicators of value creation identified in Table 6 below. In doing this, it is not our intention to prescribe indicators, but rather to share how we have come to develop these indicators from the VCF analysis as described above.

Table 6: *Indicators of value creation in a boundary crossing VET social learning 'Amanzi/Water for Food' network approach to knowledge uptake and use in a rural agricultural setting in South Africa*

Orientation value	■ History of neglect of smallholder farming in agricultural education and training ■ Extension services now empowered to develop social learning approaches to extension ■ Valuable knowledge of water harvesting and its relevance to smallholder farming and household food production not in use ■ Multi-stakeholder interest in working with farmers, and farmers willing to work with each other can support co-learning
Immediate value	1.1 Undertaking course in collective with others 1.2 Gaining access to new information and ideas 1.3 Collaborative activities 1.4 Initial steps in developing networks 1.5 Being able to share own experience and challenges with others in a similar situation
Potential value	2.1 Reinforcement of existing knowledge 2.2 Gaining new knowledge and skills 2.3 Locating new knowledge into own context 2.4 Establishing connections 2.5 Increased agency through connections 2.6 Increased understanding of and capacity for learning

Applied value	3.1 Changes in curricula/training processes 3.2 Use of new approaches/media 3.3 Adopting more collaborative approaches 3.4 Drawing on information in WRC materials 3.5 Participating in productive demonstration site development
Realised value	4.1 Enhanced and productive collaborations 4.2 More effective lobbying 4.3 Recognition of achievements by external observers 4.4 Productivity of sites 4.5 Cascading of demonstration site development 4.6 Expansion and usage of elements of the ToT course and the WRC materials
Reframed/ transformative value	■ Farmers feeling more empowered and able to produce food ■ Social solidarity strengthened in communities ■ Stronger partnerships and networks for collaborative learning, production and marketing ■ Improved use of agricultural water in dryland conditions creating stronger safety nets ■ Farmer-centred curriculum innovations in place reducing dominance of monoculture and large scale irrigation as only way of teaching extension agents
Enabling value and constraining factors *(generative mechanisms – addressing the question: What enables and constrains the learning and knowledge uptake?)*	
Enabling value	■ Relationality (building networked relationships) and co-learning (learning together) ■ Productive demonstrations that benefit farmers, as well as students and educators (mutual-beneficiation from practice-based, engaged approaches) ■ Social media tools (especially WhatsApp) for immediate, easy to apply communications and networking ■ ToT materials, tools, and facilitation processes bringing diverse stakeholders together around a common 'matter of concern' (water for food production) ■ The navigation tool's usefulness in mediating entry into a wealth of materials and ideas in the WRC archive ■ The agency of individuals who are willing to support others in a learning network and share their experience, expertise and knowledge
Constraining factors	■ Droughts, transport, institutional hierarchy, inadequate time and resources, organisational cultures, hegemonic ideas and approaches, network links (e.g. monoculture, large scale irrigation etc.)

In applying the VCF to the WRC Amanzi for Food project, we have also observed the following:

- It was important and useful to adapt the VCF questions of Wenger et al. (2011) to the specific context of our study (see Appendix A). This adaptation enables evaluation of both quantitative and qualitative impacts from the very beginning of social learning and knowledge uptake processes to a time when the impacts have spread beyond the immediate people and activities initially involved.

- We noticed that time was an important factor for the evaluation, especially in relation to the creation of realised value, and that this also affects transformative value. Our data analysis showed that applied value and realised value only emerged after a period of time. The creation of these forms of value were explicitly scaffolded by the practical demonstration site assignment in the ToT course, and the expanded set of social learning tools used, especially also the WhatsApp group, the *ilima* workdays and ongoing sharing of information from the WRC materials.

The evaluation also showed that it is important to develop an understanding of orientation value (through contextual profiling), and to document reframing and transformative value where it emerges. It is also important to look out for enabling value and constraining factors. Enabling value is particularly important as this can be expanded via the social learning process and network as has been shown across this study. The study also showed that it is crucial to produce immediate, potential and applied value as these are catalytic of realised and reframed value which in turn shapes transformative value possibilities and actualisation. These processes occur in cycles and are iteratively related (i.e. not necessarily linear).

In sum, our article has outlined an adapted monitoring and evaluation approach for evaluating boundary crossing VET ToT social learning processes. It drew on a brief historical analysis of the main trends in evaluation research to identify a suitable approach for social learning evaluation, used contextual profiling to establish orienting value, focussed on empirical analysis of Cycles 1-4 in the VCF which offered insight into Cycle 5 reframing/ transformative value creation, and drew on critical realist underlabouring to understand enabling value and constraining factors. The monitoring and evaluation methodology, as applied and developed here, shows potential for further adaptation and development, and has importantly also shown up areas where there are inadequate sources of data to provide perspectives on the indicators. This can therefore also improve the methodological processes for ongoing monitoring and evaluation of initiatives that seek to support boundary crossing VET ToT programmes that support uptake and use of new knowledge in smallholder farming contexts in Africa.

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Notes on Contributors and their Contributions

Lead author
Lotz-Sisitka, Heila
Heila Lotz-Sisitka is Distinguished Professor and SARChI Chair of Global Change and Social Learning Systems at Rhodes University. Her research interests are transformative environmental learning, agency social and education system change.

Co-author
Sisitka, Lawrence
Lawrence Sisitka is an independent Environment and Development consultant. He works on conservation, agrarian and rural development concerns. He is a project associate in the Rhodes University Environmental Learning Research Centre.

Co-author
Chakona, Gamuchirai
Gamuchirai Chakona is a researcher in the Rhodes University Environmental Learning Research Centre. Her interests are maternal and child nutrition and social learning in the agricultural sector.

Co-author
Matiwane, Mandilive
Mandilive Matiwane is a youth activist and researcher-practitioner in the agricultural, cultural and youth sectors. At the time of this study, she was a researcher in the Rhodes University Environmental Learning Research Centre.

Co-author
Matambo, Chamu
Chamu Matambo is an agricultural engineer. At the time of this study, he was a lecturer at the Fort Cox Agricultural and Forestry Training Institute, South Africa. His research interests are agricultural engineering and agrarian development.

Percentage contribution

Areas of contribution	Author	% Contribution per area, per author (each area = 100%)
Conception or design of the paper, theory or key argument	Lotz-Sisitka	45%
	Sisitka	40%
	Chakona	5%
	Matiwane	5%
	Matambo	5%
Data collection	Lotz-Sisitka	0%
	Sisitka	65%
	Chakona	0%
	Matiwane	25%
	Matambo	10%
Analysis and interpretation	Lotz-Sisitka	35%
	Sisitka	50%
	Chakona	5%
	Matiwane	5%
	Matambo	5%
Drafting the paper	Lotz-Sisitka	40%
	Sisitka	35%
	Chakona	25%
	Matiwane	0%
	Matambo	0%
Critical review of paper	Lotz-Sisitka	70%
	Sisitka	10%
	Chakona	15%
	Matiwane	0%
	Matambo	5%

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Appendix A

The VCF Adaptation for Amanzi for Food

Amanzi for Food VCF: Indicators and Questions

Cycle 1 – Immediate Value: *Activities and Interactions*

1.1 Undertaking course in collective with others (individuals, organisations, departments, disciplines etc.)
- People/organisations involved in collective?
- Degree of interactions within collective?

1.2 Gaining access to new information and ideas (WRC materials, others' experiences, input from facilitators etc.)
- Sources of information?
- Types of information?
- Means of access to the information?

1.3 Collaborative activities (group discussions, field visits etc.)
- Types of activities?
- Engagement with the activities?
- Initial outcomes of activities?

1.4 Initial steps in developing networks (or consolidating and expanding networks)
- Locus and membership of networks?
- (Proposed) structure of networks?
- (Proposed) focus for networks?

Cycle 2 – Potential Value: *Knowledge Capital*

2.1 Reinforcement of existing knowledge (including indigenous/local)
- Types of existing knowledge?
- Sources/locations of existing knowledge?
- Applicability of existing knowledge?

2.2 Gaining new knowledge and skills (from WRC materials, course texts, videos, facilitators, other participants)
- Types of new knowledge?
- Sources of new knowledge?
- Applicability of new knowledge?

2.3 Locating new knowledge into own context
- New knowledge located in context?
- Reasons for selection of this knowledge?

2.4 Establishing connections (some overlap with networks indicators)
- Kinds of connections established?
- With whom connections established?
- Purposes for establishment of connections?

2.5 Increased agency through connections/collaborations
- Collaborative activities undertaken?
- Outcomes of activities?
- Evidence of strengthened agency through collaborations?

2.6 Increased understanding of and capacity for learning (from open process of ToT and learning-focused elements within the course), including of notions of curriculum and training processes
- Learning processes engaged in within the course?
- Course elements dealing with learning processes?
- Learning processes drawn on for assignments?
- Learning processes proposed for further sharing of information?

Cycle 3 – Applied value: *Changes in practice*

3.1 Changes in curricula/training processes:
- Curriculum/training process changes identified in assignments?
- Justifications for these changes?

3.2 Use of new approaches/media, including establishment of WhatsApp groups, for sharing information and ideas from WRC materials:
- New approaches/media uses identified in assignments?
- Justifications for these new approaches/media uses?

3.3 Adopting more collaborative approaches through planning for/developing productive demonstration sites and other activities:
- Collaborative processes, described in assignments, for planning and developing productive demonstration sites?
- Collaborative processes associated with other activities?

3.4 Drawing on information in WRC materials (and other sources) to support changes in practice:
- Information used to inform changes/activities?
- Sources from which information is drawn?
- Specific information from specific WRC materials used to support changes/activities?

Cycle 4 – Realised value: *Performance improvement*

Not directly relevant in relation to courses and assignments but some evidence available through more established Learning Network activities:

4.1 Enhanced and productive collaborations
4.2 More effective lobbying
4.3 Recognition of achievements by external observers
4.4 Productivity of sites
4.5 Cascading of demonstration site development
4.6 Expansion and usage of elements of the ToT course and the WRC materials

Cycle 5 – Reframing value: *Redefining success*

Limited scope in most situations at this stage; insufficient data for analysis:

5.1 Previous definitions of success
5.2 Changes in definitions
5.3 Reasons for changes

Endnotes

1 We use the concept of VET here as used by the VET 4.0 Africa Collective (Lotz-Sisitka & McGrath, 2023, p. 8), which encompasses "an expansive view of VET, one that avoids seeing this as only referring to formal provision, more narrowly to public provision, or even more narrowly still to only that provision that falls under an education ministry. This makes us view conventional boundaries between adult/community/lifelong research and vocational as problematic … we see our concerns as having an important ontological dimension".

2 ToT course materials: https://amanziforfood.co.za/courses/online-training-of-trainers-course/

3 https://amanziforfood.co.za/wp-content/uploads/2017/08/New_Navigation-Tool_1.pdf

4 An extensive report on the whole programme including presentation and analysis of all of these data sources is offered in Lotz-Sisitka et al. (2016 and 2022), as well as in the PhD study of Pesanayi (2019), and the M.Ed studies of Weaver (2016), Lupele (2007), Sithole (2018), Matiwane (2020) and Maqwelane (2021). These were not evaluation studies, but rather sought depth of perspective on different aspects of the programme. The studies provided useful insights that also informed the VCF analysis.