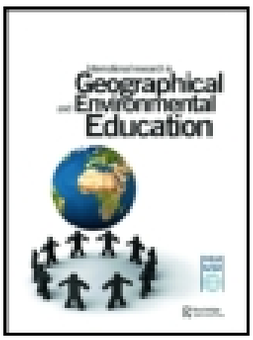

International Research in Geographical and Environmental Education

ISSN: 1038-2046 (Print) 1747-7611 (Online) Journal homepage: https://www.tandfonline.com/loi/rgee20

Environmental awareness- using non-formal education to impart skills and knowledge to improve crop yield: the case of manyeledi community, South Africa

Florah Moleko Teane

To cite this article: Florah Moleko Teane (2020): Environmental awareness- using non-formal education to impart skills and knowledge to improve crop yield: the case of manyeledi community, South Africa, International Research in Geographical and Environmental Education, DOI: 10.1080/10382046.2020.1788777

To link to this article: https://doi.org/10.1080/10382046.2020.1788777

Published online: 05 Jul 2020.

INTERNATIONAL RESEARCH IN GEOGRAPHICAL AND ENVIRONMENTAL EDUCATION
https://doi.org/10.1080/10382046.2020.1788777

Environmental awareness- using non-formal education to impart skills and knowledge to improve crop yield: the case of manyeledi community, South Africa

Florah Moleko Teane

Adult Basic, Education and Youth, Development Department, University of South Africa, Pretoria, South Africa

ABSTRACT

This article sheds light on how non-formal education was used as a tool to provide knowledge and skills for Manyeledi community members who are engaged in subsistence farming, to improve their crop yield. Manyeledi is a rural village in the North-West province, which, like most rural areas, is experiencing environmental degradation caused by the depletion of natural resources, and poor farming practices. The environmental challenges experienced by this community include among others, the less arable land, changing climatic conditions and poor rainfall. . A growing number of Manyeledi households live in abject poverty, where subsistence agriculture is the only source of livelihood. The community lacks the advanced farming skills needed to deal with the arid land and an acid soil. The paper provides insight into a community engagement project spearheaded by Bokamoso Impact Investment (BII), a non-governmental organisation that works to increase the crop production of marginalised groups. Through the above project, the environmental awareness campaign was launched to impart skills and knowledge that helped the Manyeledi community to deal with the environmental challenges. The training which the project members received through Non-formal education developed a heightened sense of awareness, of the need to improve their farming methods in order to enhance their livelihood sustainability. The study was qualitative in nature and observation and a one-on-one and focus group interviews were employed to collect data. The finding was that the skills and knowledge imparted by the NGO and the University of South Africa, improved the community's farming methods, which boosted crop production.

KEYWORDS

Livelihoods; manure; non-formal education; non-governmental organisation; skills development; subsistence farming

Introduction

South Africa's credit rating was recently lowered to junk status by rating agency Standard and Poor (S&P) Global (BBC News, http://www.bbc.com/news/business-39476903). The above status, inclusive of the 27.7 percent South African

CONTACT Florah Moleko Teane teanef@unisa.ac.za Adult Basic, Education and Youth, Development Department, University of South Africa, Pretoria, South Africa

unemployment rate, has had a devastating effect on the lives of all South Africans, including the community of Manyeledi in the North-West province. The state of the economy has rendered a high percentage of South Africans helpless, thus perpetuating cycles of poverty. The study focusses on using non-formal education to impart knowledge, skills and attitudes for the impoverished Manyeledi community aiming at the alleviation of poverty through the practice of subsistence farming. Due to impoverished economic background caused by a high rate of unemployment, the Manyeledi community engaged in crop farming to earn a livelihood, but due to climatic changes, soil texture, drought, and poor farming methods, harvests tend to be poor. The Manyeledi community members who are practicing subsistence farming constantly face the challenge of having to deal with less arable land, changing climatic conditions, as well as poor rainfall. In some areas, the soil has an acidic PH, and this affects the germination and growth of seedlings and plants (Kļaviņa & Osvalde, 2017, 45). Given such deprived socioeconomic backgrounds, it becomes difficult for individuals to make ends meet. This calls for the implementation of resilient agricultural practices aimed at increasing crop production, which, in principle, is one of the mechanisms espoused in the 2030 Agenda for Sustainable Development (World Health Organization, 2015).The evidence on how non- formal education programmes called agricultural extension education were used to eradicate poverty is widely reported in the literature (Ihejirika, 2012; Katega & Lifuliro, 2014; Patrick & Ijah, 2012). These studies indicated the impact made by the literacy programmes facilitated by NGO's in improving the lives of the impoverished communities using Participatory Rural Appraisal (PRA) as a strategy. PRA is a strategy which according to Genc (2015, p114) it involves project-based learning where some members of the community come together and produce creative ideas. The use of community projects as a form of activity based learning (Wu & Otsuka, 2020) enlighten community members on methods to deal with environmental challenges such as climate change. Genc (2015) indicated how using project-based learning helped prospective teachers in putting the theory into practice, something which helped them to successfully impart knowledge to school children. Since climate change is a global problem, the need to infuse environmental education in school subjects and colleges is widely reported in literature (Eze, 2020; Higde, Oztekin, & Sahin, 2017; Mead et al., 2012). To out of school or colleges community members, dealing with the climate challenges becomes a problem because according to Wi (2019) governments are not collaborating with citizens on measures to mitigate climate change challenges and thus individuals are not motivated to take part in activities geared towards bringing solution to the environmental problems. There is currently little research on the role played by NGOs in imparting skills and knowledge to bring solutions to climatic conditions. The research study is bridging that gap by focusing on the role played by an NGO, Bokamoso Impact Investment (BII) in collaboration with the University of South Africa (Unisa) to improve on crop production for the Manyeledi community members who practiced subsistence farming using non-formal education. BII funded and empowered members of a project initiated by the Manyeledi community with skills and knowledge of how to deal with the less arable land to improve production. Unisa empowered the project members using literacy campaigns that taught community members

how to write, read and count as well as entrepreneurial skills. Through the interaction with the BII and Unisa, the project members were able to acquire three objectives of environmental education as espoused by (Singh, 2019) namely awareness, knowledge and skills to deal with climatic conditions at their place to improve crop production.

The study followed a qualitative approach. Participants in the aforementioned Manyeledi community were selected according to the convenience sampling technique and the data were collected using observations, one-on-one and focus-group interviews. The findings of this study revealed that the skills and knowledge imparted by the NGO, supported by the University of South Africa, improved the community's farming methods, which boosted crop production.

Theoretical framework

Defillippi's (2001) theory of project-based learning provides the conceptual framework by which this study is underpinned, and sheds light on how adult learning, through projects, can enhance social and interactive skills that culminate in improving the socioeconomic conditions of households. Since this study presents a descriptive case study, the theory will be used to cover the important aspects as they relate to the community under study (Yin, 2014). According to Defillippi's theory, project-based learning involves action learning, action science, action research, and reflective practices. DeFillippi (2001) defines action learning as learning that results from the interaction of programmed instruction (of the type found in coursework and task performance). It is in the integration of theory and practice that learning takes place, by utilising real-world work assignments on time-limited projects. Since the project under investigation here was used to address real community issues and problems, it can also be referred to as service learning (Dixon, 2011, p45). Project-based learning also encompasses action science, where project participants engage in self-reflection under the guidance of a skilled facilitator. The facilitator establishes a positive learning environment and supports learners in developing key skills (Chang & Lin, 2012, p138). Policy-Driven for Lifelong Learning and Its Effects: Experiences of Working Adults in Taiwan. *Online Submission*.) such as personal and interpersonal skills and self-reliance. Apart from establishing a conducive learning environment, the availability of resources will enhance the learning process (e.g., human resources/facilitators who provide theory and guidance to participants). Cotton (1995) posits that using learning support groups, individuals find assistance and encouragement as they work collaboratively on learning tasks. Project-based learning also involves action research, whereby learning arises through an interactive process of research and action to implement what was learned during the research (Dickens & Watkins, 1999, p130). Adult learners are self-regulated; therefore, the learners themselves decide exactly what needs to be learned. It means that an adult learner will take the initiative to determine the needs of his/her society and work towards resolving related issues. In this regard, project-based learning becomes a way of addressing community-based challenges, by doing an in-depth study of the problem and then applying knowledge and skills to solve the problem. Finally, project-based learning involves reflective practices or means by which project participants make sense of their project

experience and determine its meaningfulness. The positive outcome of the project enables participants to share and preserve those experiences for reference in future project work.

The theory is relevant to the current study in the sense that adult learning in general, and learning specifically through community projects, are means of enhancing adult competencies, which may culminate in job creation. Developing community projects is a way of providing learning opportunities for adults and developing skills such as teamwork, communication, self-management, critical thinking and problem solving (Jackson, 2013, p102) which are key for anyone wishing to compete in the global world. Adults, as self-directed learners (Tennant, 2006, p7), must first identify any gaps in their education and then source external support: Pedler (1991) declares that forging partnerships with other organisations expands opportunities for learners. In the study on which the current paper is based, support came in the form of workshops presented by an NGO to equip the target community with the knowledge and skills needed to improve their agricultural practices. The study is based on the premise that out-of-school adults can still engage in activities aimed at continuous education, to acquire knowledge, which will make them competent in an age marked by rapid change. The outcomes of project-based learning are dependent on how community members collaborate to identify mutual needs, and how they source external help in order to enhance their knowledge and skills. In the community under study, it was hoped that the new knowledge and skills acquired through this activity would enhance farming methods that would spread throughout the village and improve the socioeconomic status of the community as a whole.

Literature review

Non-formal education in the form of skills development and improved households

The 2010 G20 summit meeting in Washington made recommendations to prioritise education, lifelong learning, and skills development (International Labour Organisation, 2010) to eradicate the scourge of poverty. For the impoverished communities, agriculture became a means of providing food and income for households (Trpeski & Cvetanoska, 2018; p119). Most families practiced subsistence farming, and productivity was reduced (Katega & Lifuliro, 2014) due to lack of expertise in dealing with soil structure, climate change and the process of farming in general. Climate change education or environmental awareness tend to be the tool to improve individual environmental knowledge, skills and attitudes (Choe, Kim, & Ri, 2020). Learning about how to deal with environmental challenges can take place outside school (Falk, 2005) through informal educational settings (Ballantyne & Packer, 2005) whereby community based organisations take the initiative to bring solutions to climate change climate (Saribas, Kucuk, & Ertepinar, 2017). A wide literature suggests the use of non-formal education in providing farming skills and knowledge to improve production (Alhaji, 2008; Gasperini, 2000; Ihejirika, 2012; Patrick & Ijah, 2012; Trpeski & Cvetanoska, 2018). Some authors refer to

this type of education as agricultural education or agricultural extension education (Alhaji, 2008; Ihejirika, 2012) and it involves training in basic literacy, numeracy and life skills. Acquisition of such skills makes farmers to be more productive (Gasperini, 2000) and that culminates in improved livelihoods. Since environmental education was not included in school curricular in most countries (Chang, 2015) agricultural training became the initiative of Non-Governmental Organisations (NGO) (Patrick & Ijah, 2012) who introduced effective skills development strategies (Dunbar, 2013, p13). In the South African context, the research conducted by Chang and Pascua (2017) indicated that most teachers were not taught environmental education during their training hence their knowledge about the topic was limited. In Nigeria the Community Development Foundation (CDF) engaged in non-formal education to reduce the scourge of poverty (Patrick & Ijah, 2012). It became evident that illiteracy contributed much in causing poverty, thus the NGO's developed programmes that helped the communities to be what Ihejirika (2012, p28) termed "functionally literate". Even though some countries saw the act of providing support to poverty-stricken communities as a means to enter into a country 's economic and political system (Rahman & Giessen, 2017, p255), there were still other private sectors whose support was driven by having interest in education (informal and non-formal) and skills development of adult learners (Choudry & Vally, 2018, p1). In communities with poor socio-economic backgrounds, the above private sectors provided foundation skills, which are the ability to read, write, and use numbers etc (Dunbar, 2013, pvi) based on the premise that there is a close correlation between poverty and low education (Romero, Hall, Cluver, & Steinert, 2018, 2). The black population is mostly stuck by poverty because there is a high percentage of school drop-outs due to low-quality education and other socioeconomic factors (Fleisch, Shindler, & Perry, 2012). The private sectors target such communities and train them on the sustainable use of natural resources to generate income for their households (Rahman & Giessen, 2017, p257). In the study conducted by Rahman and Giessen (2017), one of the training strategies, which Bangladesh received, was dealing with the climatic changes, which left many households without food or income. In line with the G20 summit, the donors shifted from offering the Bangladesh community food/commodity to projects. The projects which were developed were as posited by Dunbar (2013, pvi) second-chance opportunities which became an access route to education and training opportunities for adults. Most of the drop-outs who lived in low-income households were catered for (Branson, Hofmeyr, & Lam, 2014). Progress through school and the determinants of school dropout in South Africa. *Development Southern Africa*, *31*(1), 106-126.) and were empowered with skills which helped them to get employment. The research done by Newell, Dale, and Roseland (2018) indicated that climate action strategies could yield "co- benefits" which are community benefits that occur from acting on climate change. The study focus on applying agricultural practices by Manyeledi community in an area with depleted natural resources. According to Newell et al. (2018, p10). Such projects bring increased social interaction and the benefits has built stronger social capital ties in that particular community.

Research questions

The main research question focused on here is what is the impact of non-formal education offered by the NGO's on the level of poverty of Manyeledi households who practiced subsistence farming?

Sub-questions

- Which skills were imparted by the NGOs to improve the agricultural produce of the Manyeledi community?
- How did the project members applied such skills to solve the climate change problems?
- How did the acquisition of skills and knowledge imparted through non-formal education change the livelihoods of the Manyeledi households?

Methodology

This study investigated the impact of using skills and knowledge acquired through non-formal education to improve crop yield for the Manyeledi project members who practiced subsistence farming. The researcher used a qualitative method of inquiry because the views of the participants who are the Manyeledi project members could be known only through dialogue. This approach created an environment where direct interviews took place which helped the researcher to collect as much information as possible.

Population and the research site

The site of this study was Manyeledi village, in a building specifically used as the project laboratory. Manyeledi is situated in the North West province (South Africa) in Kagisano Moloto district municipality. The researcher sought for permission to conduct the research from the CEO of BII. The visit took place during September month in 2017 which was the date agreed upon between the CEO of the project and the Unisa staff. The target population for this study comprised all Manyeledi project members, the facilitators, CEO of BII and four Unisa staff members. The researcher used the non-probability sampling approach, whereby they had no means of ensuring that each of the elements of the population would be represented in the sample. In this study, a convenience sampling technique was used to source information-rich participants who included 20 Manyeledi project members, eight Kha Ri Gude graduates, four Unisa team members and three project facilitators.

Instruments

The researcher used focus groups, individual interviews and observation to collect data. Using focus groups discussion revealed new perspectives on issues around project-based learning, because during these discussions participants challenged, persuaded and influenced one another and that brought more insight into how the non-formal education impacted on their livelihoods. Two focus groups were held

Table 1. Presentation of focus groups discussions, individual interviews and observation.

Day	Data collection instrument	Time in Hours
1	Focus group interviews	
	Group 1 (8 members)	Between 30 and 40 minutes
	Group 2 (10 members)	Between 30 and 40 minutes
	10 Individual interviews with participants who had shared good practices with other community members who had not formed part of the project	Between 20 and 30 minutes
2	Individual interviews with 3 project facilitators	Between 20 and 30 minutes
	Observation (the sieve pipe, manure, vegetables)	Hour

Source: Data collection instruments used by the researcher.

comprising of project members who attended the Kha Ri Gude literacy campaign and the group which was actively involved in the farming of crops respectively. The majority of those who did not attend the literacy class were literate and their level of education ranged from Grade 9 to 12. Unlike focus groups discussions, individual interviews provided an in-depth information about how individuals viewed the outcome of the project-based learning provided by NGOs. The individual interviews were held with ten participants who had shared good practices with other community members who had not formed part of the project, and with the three project facilitators. The researchers made notes in a journal and used a tape recorder as a back-up. The focus groups interviews lasted between 30 and 40 minutes, while individual interviews lasted between 20 and 30 minutes each. Observation of the crops and the self-made manure and irrigation system was done as an evidence of what participants said. The data collection process took place for two days as indicated in the schedule below (Table 1).

Schedule of research

Data analysis

Data analysis was done throughout the data collection process. Using Saldana method (Saldana, 2016) of qualitative analysis, codes about the skills and knowledge acquired through project-based learning were developed by identifying patterns. Similar codes about the use of such skills in mitigating the environmental challenges were grouped together and data was transcribed. Three themes emerged guided by the research questions namely, types of skills acquired through project-based learning, implementation of skills by project members, how project members' livelihoods were improved through acquisition of such skills (Figure 1).

The research site

Findings

Data collection techniques used in this study were individual interviews, focus groups discussion and observation.

Observation as a data collection technique was used to evidence the new technologies invented by the Manyeledi project members to mitigate environmental challenges. It took place in day 2 of the visit to the site by the Unisa team and lasted for

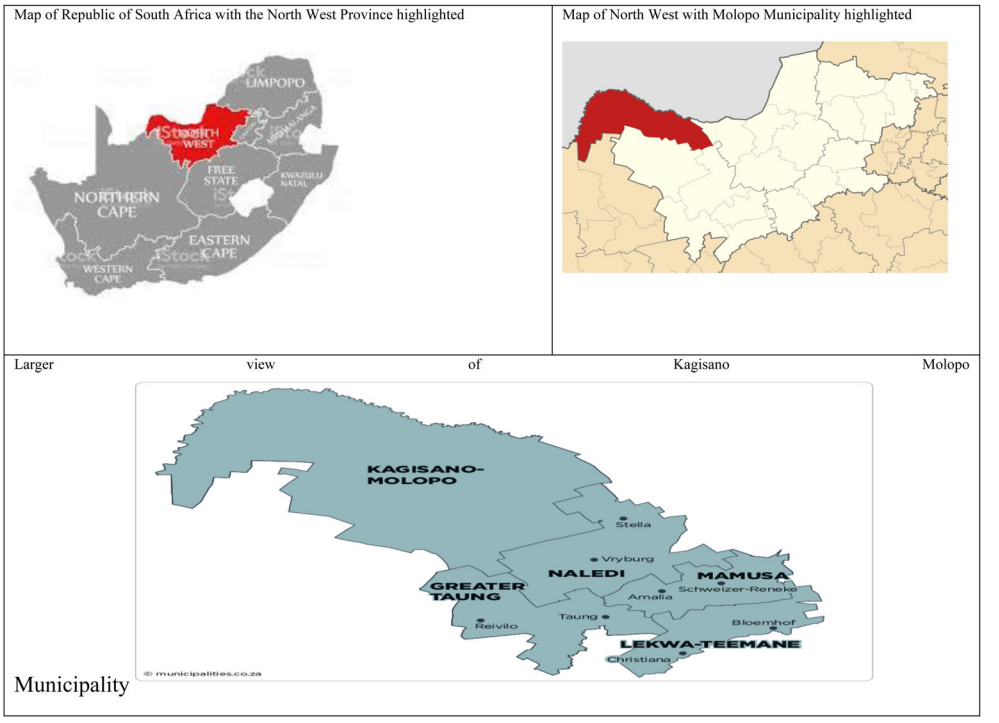

Figure 1. The map of South Africa indicating the North West Province with the Molopo Municipality where Manyeledi is situated highlighted. *Source*: Researcher using google.

an hour. The unisa team also observed the garden of fresh vegetables which the Manyeledi project members started.

The findings below emerged from the two focus groups discussions and individual interviews held with the project members. An interview guide was developed to direct the interviews. During these interviews participants were asked open-ended questions on the impact of non- formal education in helping them to deal with environmental challenges to improve their crop yield. Participants' answers from the individual interviws and focus groups discussions and subsequent evaluations are given below.

Question 1: Which skills and knowledge have you acquired from the workshops offered by the NGOs (BII and Unisa)?

Findings indicated that some of the project members were illiterate, and prior to engaging them in rigorous workshops on new farming techniques, they needed to learn basic literacy, numeracy and life skills. The Manyeledi project spear headed by BII with the assistance of Unisa was identified as a centre where the literacy campaign (Kha Ri Gude) reached the people of Manyeledi. Kha Ri Gude – Venda words which means "let us learn" – became part of the package received by those who had initiated the project, which predominantly focused literacy skills. Participant A: "*We have learned a lot from Unisa interventions. Kha Ri Gude taught us basic Maths, we are now able to count the vegetables and money. I am now 61 years old and did not attend school. But with the help of our facilitators, I am able to write my name, read*

and count my crops." More community members were attracted to be part of the project because of the literacy campaign motivated by the acquisition of basic skills . One of the facilitators commented: Participant B "*This semester we have received new members in the project who also want to be taught [] literacy skills. Most of the project members have graduated and they are able to read and count their crops and money*."

The BII facilitators provided three-weeks training for members of the project, which empowered the community in respect to new ways of dealing with Manyeledi's soil, which was not PH balanced. Participant E said: "*We were taught to develop the irrigation pipe with sieves so that the water taken to the crops do[es] not have [a] high solute concentration. We also created some joints in the pipe where after a certain period of time we open[ed] them to release other chemicals which could be a hazard to the crops.* Findings indicated that part of the education received by project members, was on how to develop their own manure to enrich the micronutrient-deficient soil. The manure, developed from the excreta of both cattle and chickens, was used to form what they called *kunsmis* and permaculture. One project member Participant F) said: "*We were taught about using 'motshutelo' (liquid manure formed with cow dung and water) and 'kunsmis' (chicken waste). We put cow dung inside a drum, then add some water [and] leave it for a week. Add some more water and leave it for another week, then it will be ready for use. You can follow the same procedure using chicken waste.*" Unisa provided training on entrepreneurial skills, where project members were taught how to start and sustain small businesses. The project members appreciated the entrepreneurial skills taught by the Unisa staff, and most claimed they wanted to gain more knowledge of business management. A 60-year-old male participant (H) said: "*Had I known how to start and manage a business during my youth days I could have gone very far. But I still thank the facilitator for the knowledge because I have bigger plans to engage in, even though I am old*."

Question 2: How did the skills and knowledge you acquired helped you to deal with the environmental challenges you experienced?

The knowledge gained during the workshops empowered project members to invent new ways of farming. With the help of BII, project members managed to secure a borehole to irrigate their crops. Knowledge acquired during the workshops enabled them to come up with a convenient mechanism for dealing with Manyeledi water, which had a high solute concentration. They employed technology to design an irrigation pipe, which allowed the chemicals, which usually affects the crops to be sieved. As one participant." The applied technology improved crop production, as reported by participant D: "*In our village water is very scarce and we could not cultivate enough crops for our families. We thank the NGOs for the borehole and the workshops which enabled us to develop ways to irrigate our crops*" Participant E added: *We were taught to develop the irrigation pipe with sieves so that the water taken to the crops do[es] not have [a] high solute concentration. We also created some joints in the pipe where after a certain period of time we open[ed] them to release other chemicals which could be a hazard to the crops.*" The workshop also taught the project members how to enrich the less arable land. *Participant E* said: "*We do not have enough money to buy manure*

for our crops, so we collect the chicken waste from our homes and from our neighbors to form 'kunsmis' which is very good for making the soil fertile to produce [the] fresh crops that you see here." In as far as permaculture is concerned, one facilitator (Participant A) had this to say: *when we apply it to our crops, it leads to high production of fresh and healthy crops.* Most of the project members alleged they used the skills and knowledge to open small businesses. Participant (D) stated: "*the business skills I acquired helped me to open some business outlets even outside Manyeledi community.*

Question 3: How did the acquisition of skills and knowledge and subsequent high crop yield changed livelihoods of households?

Findings indicated that the project members engaged in small scale businesses which earned them income to fend for their families. Retail outlets were created in a number of places, to sell the crops. Participant C said: "*I sell the fresh vegetables that I produce from the local clinic to patients and that improves their health status. I take half the money that I gain from selling the vegetables to the clinic*". The knowledge acquired during project based learning was transferred to community members who had not attended the workshops. One participant (Participant C) said: "*I went to my two neighbors and helped them with starting a vegetable garden. They planted sweet potatoes and they are as big as the head of cattle.*" Some members confessed that they produced more than enough for their personal use, and thus shared with those who were lacking. One participant (Participant D) said: "*Early this year I planted watermelons, and they were so many that I shared with my neighbor.*" Empowerment expanded to other community sites: for instance, Participant (F) said: "*I went to a local primary school and asked the school principal to start a vegetable garden. The crops are so eye-catching that some school governing body members requested me to provide them with information about how to produce such good stuff."* The development of gardens was rolled out in other villages, which means that the knowledge the initial participants acquired was spread to others outside of Manyeledi village. This is what one participant (Participant G) said: "*I have developed 2 gardens in the northern cape- to help improve people's livelihoods."*

Discussion

Findings from this study are in agreement with Ihejirika's (2012) findings that illiteracy is one of the causes of poverty. Most of the Manyeledi project members came from poor backgrounds (Romero et al., 2018) and the Kha Ri Gude literacy campaign reduced the level of illiterates in the Manyeledi community. In this study, the project spearheaded by BII in collaboration with UNISA provided the foundation skills (reading, writing, and counting) and second-chance opportunities (Dunbar, 2013, Vi) to empower dropouts and over-aged adolescents (Romero et al., 2018) to improve their livelihoods. The Manyeledi adults' acquisition of literacy skills was an important milestone, since adult literacy goals are enshrined in most of the United Nations Educational Scientific and Cultural Organisation (Unesco) plans of action, including

Education for All (EFA), the United Nations Literacy Decade (UNLD) and the Literacy Initiative for Empowerment (LIFE) (Unesco ILL, 2010). The reading, writing and counting skills, which the Manyeledi project members acquired, laid the foundation, which enabled them to understand the content the facilitators delivered during the imparting of new agricultural skills. The outcome of lifelong education in the form of skills development for the Manyeledi community supports what Ballantyne and Packer (2005) said about education that it must continue even in informal settings. The comment by a 60 years old man (participant H) clearly indicated that the recommendations to engage adults in lifelong learning and provision of environmental education in the form of project-based learning had far-reaching consequences. The study sheds light to donors to use education as a tool to make the living standards of poverty-stricken communities to improve. It also encourages individuals of all age groups to invest in education so that their lives can change.

Apart from the literacy skills imparted through the Kha Ri Gude campaign, the training by BII on new agricultural practices to deal with the soil structure and the climatic conditions, the project members started putting theory into practice (Genc, 2015) by developing an irrigation pipe with sieves (observed by the researcher) to eliminate extra chemicals towards their crops. The Manyeledi project members became "functionally literate" (Ihejirika, 2012:28) in that the knowledge they acquired helped them to deal with the environmental challenges they faced on daily basis. Findings from this study agreed with literature that NGOs' initiative to improve the livelihoods of communities are more effective than government led programmes (Patrick & Ijah, 2012; Dunbar, 2013) because the latter are more top-down than bottom up. The non-formal education offered by the BII developed in the project members an environmental awareness and imparted skills and knowledge (Singh, 2019) necessary to deal with the environmental defects of the soil so as to improve production. By developing manure from cow dung and chicken excreta (which were observed by the researcher), the project team members engaged in the sustainable use of natural resources to generate income for their households (Rahman & Giessen, 2017, 257). It emerged from this study that using project-based learning to acquire new skills and knowledge to improve crop production is a priority for communities who practice subsistence farming. The project based learning, which is normally practiced by out of school learners (Falk, 2005) has enlightened the Manyeledi project members on how to deal with the climate change problems they faced (Wu & Otsuka, 2020).

The findings also shed light on the importance of Participatory Rural Appraisal whereby the community members themselves come up with suggestions and take the lead in dealing with their problems. The study affirmed the importance of community members taking the initiative to solve problems (Saribas et al., 2017), because such a 'community-initiated' action also referred to as project-based learning (Genc, 2015) developed positive attitudes on project members towards improving livelihoods. Through the Participatory Rural Appraisal, the Manyeledi project members developed competencies related to teamwork, communication, self-management, critical thinking and problem solving, which are key for anyone wishing to compete in the global world. Such employability skills, which refer to the general and non-technical

competencies required to perform any kind of a job (Ju, Zhang, & Pacha, 2012), have been identified as critical in the current global job market (de Guzman & Choi, 2013; Robinson, 2000). Employers who, in a rapidly changing world, need to cater to global demands value such skills. The Manyeledi project members demonstrated such skills e.g., they collaborated well as team and shared opinions in taking decisions about what can work for their project. Unlike government-initiated programmes, that dictates what people must do to improve their lives, the strategies used by the NGO promotes ownership of actions hence they are always successful.

The improved crop production led to improved livelihoods. The new agricultural methods acquired were extended to project members homes' where backyard gardens were developed. Participants indicated how the backyard gardens led to improved livelihoods of project members and people in their neighborhood. Most of the project members were women and the notion that when you teach a woman you teach a nation became visible because from the participants' point of view, the project members taught their neighbors the new farming skills and some went to an extent of going to their neighbors' homes to help them start the vegetable gardens. The empowerment, which the Manyeledi marginalized community received and the subsequent improvement of livelihoods is similar to the decision taken by Bangladesh foreign donors to shift from supplying them with food to engaging them in projects (Rahman & Giessen, 2017, 257). The idiom "do not catch a fish for a person but teach him/her how to catch a fish" became a reality for the Manyeledi community. The Manyeledi project benefited the project members i.e., The strategies they used to deal with environmental challenges led to 'co-benefits" which resulted in improved livelihoods (Newell et al., 2018). Findings also indicated that the increased crop production bred some business outlets, which earned project members and the community at large income to fend for their families. The entrepreneurial skills gained from the Unisa team helped the community members to run small businesses of selling vegetables in Manyeledi and outside Manyeledi as posited by participant D. Initially, the project was meant to feed individual households, but later these adults were motivated to take it to another level, something which the most donors practice namely, capacity building and motivation (Rahman & Giessen, 2017, 262). The community members used the counting skills acquired through Kha Ri Gude to deal with cash they received from their clients. Findings also indicated that extending the development of vegetables gardens to social institutions such as schools and clinics, not only increased the number of business outlets for the project team, but it also promoted healthy living. The selling of vegetables to community members improved diet and prevented the community from acquiring diseases borne from not eating proper diet.

Conclusion

The study focused on a relatively less explored area about how non-formal education in the form of project-based learning was used to equip one of the South African community which practiced subsistence farming with skills and knowledge to improve crop yield. The NGOs more than government emerged to be the facilitators of such trainings which culminated in improved livelihoods of the Manyeledi

community in the North West Province. Literacy campaign, acquisition of entrepreneurial skills and the acquisition of skills and knowledge to deal with the less arable land were found to be essential in sustaining the lives of those communities who practiced subsistence farming. The use of excreta to develop manure and irrigation system to solve the problem of drought appeared to be one of the strategies to prepare the soil with a low PH for a high crop yield. Evidence was provided to suggest that there are benefits to community projects aimed at enhancing learning, which aligns with the theory of project-based learning. I suggest project-based learning to be used as a tool for community empowerment initiatives aiming at dealing with climate change problems. Few studies were conducted to investigate NGOs supported community members initiatives to deal with environmental challenges as it was indicated in literature that the government did not take initiatives in addressing climate change problems (Wi, 2019). I believe that this study could contribute to the body of knowledge on strategies to mitigate environmental challenges for communities who practice subsistence farming. The study also brought evidence for the importance of literacy campaigns (enshrined in Unesco, EFA and UNLD goals) for out of school youths and adults in acquiring basic skills and knowledge to improve livelihoods. The Manyeledi project members used the reading, counting and writing skills to engage in more rigorous trainings which imparted environmental education needed for the improvement of crop yield. Directions for future research is that the study is undertaken in other cases since the focus of this study was in one province. The conduction of the study in other cases will improve the credibility and trustworthiness of the findings.

Disclosure statement

No potential conflict of interest was reported by the author(s).

References

Alhaji, I. H. (2008). Revitalizing technical and vocational education training for poverty eradication and sustainable development through agricultural education. *African Research Review*, *2*(1), 152–161.

Ballantyne, R., & Packer, J. (2005). Promoting environmentally sustainable attitudes and behavior through free-choice learning experiences: What is the state of the game? *Environmental Education Research*, *11*(3), 281–295.

Branson, N., Hofmeyr, C., & Lam, D. (2014). Progress through school and the determinants of school dropout in South Africa. *Development Southern Africa*, *31*(1), 106–126.

Chang, C. H. (2015). Teaching climate change–a fad or a necessity? *International Research in Geographical and Environmental Education*, *24*(3), 181–183.

Chang, C. H., & Pascua, L. (2017). The state of climate change education – Reflections from a selection of studies around the world. *International Research in Geographical and Environmental Education*, *26*(3), 177–179.

Chang, D. F., & Lin, S. P. (2012). Policy-driven for lifelong learning and its effects: Experiences of working adults in Taiwan. *US-China Education Review B*, *1*, 138–144.

Choe, J. H., Kim, C. H., & Ri, G. H. (2020). An investigation on the environmental knowledge and attitudes of senior middle school students in the Democratic People's Republic of Korea. *International Research in Geographical and Environmental Education*, *29*(2), 146–162.

Choudry, A., & Vally, S. (2018). Learning from, in, and with independent community and activist archives: The past in our present and future. *Education as Change*, *22*(2), 1–9.
Cotton, J. (1995). *The theory of learning: An introduction*. London, UK: Kogan Page Limited.
DeFillippi, R. J. (2001). Introduction: Project-based learning, reflective practices and learning. *Management Learning*, *32*(1), 5–10.
de Guzman, A. B., & Choi, K. O. (2013). The relations of employability skills to career adaptability among technical school students. *Journal of Vocational Behavior*, *82*(3), 199–207.
Dickens, L., & Watkins, K. (1999). Action research: Rethinking Lewin. *Management Learning*, *30*(2), 127–140.
Dixon, G. (2011). Service learning and integrated, collaborative project management. *Project Management Journal*, *42*(1), 42–58.
Dunbar, M. (2013). *Engaging the private sector in skills development*. Oxford, England: HEART (Health & Education Advice and Resource Team), Oxford Policy Management.
Eze, E. (2020). Sociographic analysis of climate change awareness and pro-environmental behaviour of secondary school teachers and students in Nsukka local government area of Enugu State, Nigeria. *International Research in Geographical and Environmental Education*, *29*(1), 89–105.
Falk, J. H. (2005). Free-choice environmental learning: Framing the discussion. *Environmental Education Research*, *11*(3), 265–280.
Fleisch, B., Shindler, J., & Perry, H. (2012). Who is out of school? Evidence from the statistics South Africa community survey. *International Journal of Educational Development*, *32*(4), 529–536.
Gasperini, L. (2000). From agricultural education to education for rural development and food security: All for education and food for all. SD Dimensions.
Genc, M. (2015). The project-based learning approach in environmental education. *International Research in Geographical and Environmental Education*, *24*(2), 105–117.
Higde, E., Oztekin, C., & Sahin, E. (2017). Turkish pre-service science teachers' awareness, beliefs, values, and behaviours pertinent to climate change. *International Research in Geographical and Environmental Education*, *26*(3), 253–263.
Ihejirika, J. C. (2012). Utilization of adult and non-formal education programs in combating rural poverty in Nigeria. *World Journal of Education*, *2*(3), 25–31.
International Labour Organisation. (2010). *Report with substantive contributions from OECD to the meeting of G20 labor and employment ministers 20–21 Apr 2010*.
Jackson, D. (2013). The contribution of work-integrated learning to undergraduate employability skill outcomes. *Asia-Pacific Journal of Cooperative Education*, *14* (2), 99–115.
Ju, S., Zhang, D., & Pacha, J. (2012). Employability skills valued by employers as important for entry-level employees with and without disabilities. *Career Development and Transition for Exceptional Individuals*, *35*(1), 29–38.
Katega, I., & Lifuliro, P. (2014). *Rural non-farm activities and poverty alleviation in Tanzania* (Research Report 14/7). Dar es Salaam: REPOA.
Kļaviņa, D., & Osvalde, A. (2017, April). Comparative chemical characterisation of soils at Cypripedium Calceolus sites in Latvia. In *Proceedings of the Latvian academy of sciences. Section B. Natural, exact, and applied sciences* (Vol. 71, no. 1–2, pp. 43–51). Poland: De Gruyter.
Mead, E., Roser-Renouf, C., Rimal, R. N., Flora, J.A., Maibach, E. W., & Leiserowitz, A. (2012). Information seeking about global climate change among adolescents: The role of risk perceptions, efficacy beliefs and parental influences. *Atlantic Journal of Communication*, *20*(1), 31–52.
Newell, R., Dale, A., & Roseland, M. (2018). Climate action co-benefits and integrated community planning uncovering the synergies and trade-offs. *The International Journal of Climate Change: Impacts and Responses*, *10*(4), 1–23.
Patrick, J. M., & Ijah, C. N. (2012). Adult and non-formal education programmes of nongovernmental organizations for poverty alleviation in Nigeria: What can be learnt from the practice. *Journal of Education and Practice*, *3*(11), 1–6.

Pedler, M. (1991). *Action learning in practice*. Aldershot, England: Gower.
Rahman, M. S., & Giessen, L. (2017). Formal and informal interests of donors to allocate aid: Spending patterns of USAID, GIZ, and EU forest development policy in Bangladesh. *World Development*, *94*, 250–267.
Robinson, J. P. (2000). What are employability skills? [Electronic version] Alabama Cooperative Extension System. *The Workplace*, *1*(3), 1–3.
Romero, R. H., Hall, J., Cluver, L., & Steinert, J. (2018). Socioeconomically disadvantaged adolescents and educational delay in two provinces in South Africa: Impacts of personal, family and school characteristics. *Education as Change*, *22*(1), 1–33.
Saldana, J. (2016). *The coding manual for qualitative researchers*. Britain: Ashford Colour Press Ltd.
Saribas, D., Kucuk, Z. D., & Ertepinar, H. (2017). Implementation of an environmental education course to improve pre-service elementary teachers' environmental literacy and self-efficacy beliefs. *International Research in Geographical and Environmental Education*, *26*(4), 311–326.
Singh, S. A. (2019). *Climate change education: Knowing, doing and being*. In C. C. Hung (Ed.) (p. 172). Abingdon: Routledge. ISBN: 9780415787345.
Tennant, M. (2006). *Psychology and adult learning*. Abingdon: Routledge.
Trpeski, P., & Cvetanoska, M. (2018). The impact of the main determinants and changes in agricultural labour productivity in Macedonia. *European Scientific Journal, ESJ*, *14*(10), 119.
Unesco Institute for Lifelong Learning (Unesco ILL). (2010). http://www.unesco.org/en/confintea.
Wi, A. (2019). Citizen participation as a key enabler for successful public education policies in climate change mitigation in Singapore. *International Research in Geographical and Environmental Education*, *28*(1), 53–69.
World Health Organization. (2015). *Health in 2015: From MDGs, millennium development goals to SDGs, sustainable development goals*. Switzerland: World Health Organization.
Wu, J., & Otsuka, Y. (2020). Pro-climate behaviour and the influence of learning sources on it in Chinese adolescents. *International Research in Geographical and Environmental Education*, 1–15.
Yin, R. K. (2014). *Case study research: Design and methods (applied social research methods)*. Thousand Oaks, CA: Sage publications.