An education and training programme as a strategy to improve consumers' knowledge and operation towards basic water utilization

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(B. Honours in Consumer Sciences)

Mini-dissertation submitted in partial fulfilment of the requirements for the Master's degree in Consumer Sciences at the Potchefstroom Campus of the North-West University

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2010

DEDICATION

I dedicate this study to my husband, Joseph, and two sons Kabo and Modiri, for being there for me throughout my study.

Your love, understanding and support have seen me through this study.

ACKNOWLEDGEMENTS

I would like to thank the following people for their contribution to the study:

- **Dr M.D. Venter**, my study leader, for the professional guidance, support and encouragement throughout the study.

- **Mrs L. van Niekerk**, my co-study leader, for the guidance, support and encouragement.

- **Miss U. Kolanisi,** for all the support and encouragement.

- **Mr T. Mirhentzeni,** for his assistance and contribution.

- **Mr B. Shole,** for the assistance, contribution and mentorship.

- **Water Research Commission,** for funding this study.

- My niece **M. Khalenyane,** for all the support.

- My sister **M. Ntloeakhumo,** for the encouragement.

- The **Mbele family,** for the assistance, encouragement and support.

- **Mr B. Tshabalala,** for the motivation.

- **Prof. L.A. Greyvenstein,** for the language editing.

- All my **friends and family,** for their emotional support.

- All the participants from Madibogo who took part in the programme.

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LIST OF ABBREVIATIONS

DWAF	Department of Water Affairs and Forestry
FAS	Facilitator Assessment Scale
FBWP	Free Basic Water Policy
NWA	National Water Service
NWP	National Water Policy
NWS	National Water Service
NWU	North-West University
RDP	Reconstruction and Development Programme
SALGA	South African Local Government Association
SAS	Statistical Analysing Software
SWTP	Small Water Treatment Plant

UWQI	Universal Water Quality Index
WET-PROGRAMME	Water Education and Training Programme
WRC	Water Research Commission

SUMMARY

Background

The North West Province, especially the rural areas, is known for nitrogenous pollution in their water. The inhabitants of Madibogo were identified as a vulnerable group and, therefore, Madibogo was chosen as a suitable area to conduct a multidisciplinary study.

The findings from the previous studies conducted in the Madibogo area by the North-West University (NWU) revealed that Madibogo consumers have limited knowledge of water-related issues. They experienced challenges on determining the water quality, evaluating water treatment methods, understanding of water policies and their rights as water consumers. The findings of previous studies further indicated that there was no water education and training programme in place. Therefore, there is a need for an intervention such as the Water Education and Training Programme (WET-Programme) to educate the consumers on the mentioned water issues.

The researchers developed the WET-Programme for Madibogo water consumers to address water quality, water quantity, household water utilisation and the Free Basic Water Policy (FBWP) of government.

Aim and objectives

The aim of the study was to determine whether the WET-Programme could influence the consumers‟ knowledge and skills towards water and rural water service provision. The objectives of the study included the following:

- To develop a standardised knowledge questionnaire as a baseline for knowledge measurement.
- To implement the WET-Programme as a way of equipping community members with the knowledge and skills which are necessary to assist them to function effectively in their households within the community.
- To determine the effectiveness of the WET-Programme in:
    - Improving the consumers‟ knowledge and skills as well as the programme.
    - Quality (analyse the impact of the facilitator and facilitation process on the outcomes of the workshop).
- To make recommendations after presentation of the WET-Programme on improvements to be made for further use.

Method

The study employed the intervention research strategy. The study used both qualitative and quantitative research methodology to collect data from the consumers. For the quantitative method, a standardised questionnaire (valid and

reliable) was developed and used as the main data-collecting tool and completed before and after the presentation of the programme. The qualitative research approach used complemented the quantitative approach. The qualitative data from focus groups were recorded and then transcribed and analysed. Participants were allowed to reflect on their learning experience through discussions. The Facilitator Assessment Scale (FAS) was used to measure the quality of the programme.

Results

The knowledge questionnaire was used before and after the workshop to measure change in the knowledge of participants. The participants‟ knowledge improved in a practical reliable manner. It was also clear from the qualitative measurements that their skills improved. The workshop evaluation indicated that the facilitator was good, the learning material was appropriate, learning took place and the course had a positive influence on the participants.

Recommendations

The following recommendations should be considered for further research:

- This study can be repeated in other regions of the North West Province.
- The translation of WET-Programmes to indigenous languages is essential to accommodate all water consumers.
- Information needs to be made available to all role players on local, provincial and national levels.

Conclusion

Education and training must be part of the total water provision process as it can contribute towards the empowerment of the community to function as independent, informed and responsible consumers regarding their water usage.

OPSOMMING

Agtergrond

Die Noordwes Provinsie, veral die plattelandse areas is bekend daarvoor dat daar hoë konsentrasie nitrate in die water is wat potensieel gevaarlik kan wees. Die inwoners van die Madibogo area was geïdentifiseer as ’n kwesbare groep en daarom was dit ’n geskikte area om ’n multidissiplinêre studie in te doen. Resultate van vorige studies wat in hierdie area gedoen is het aangedui dat verbruikers in Madibogo beperkte kennis van waterverwante onderwerpe het. Hulle ondervind probleme om waterkwaliteit te bepaal, om watersuiwerings metodes te evalueer en om waterbeleid sowel as hulle regte as verbruikers te verstaan. Die resultate van vorige navorsing dui ook aan dat daar geen wateropvoedings- en opleidingsprogram in plek is nie. Daar is dus ’n behoefte vir wateropvoedings- en opleidingsprogram om verbruikers oor bogenoemde waterprobleme in te lig.

Die navorsers het die “WET Programme” vir die waterverbruikers in Madibogo ontwikkel om waterkwaliteit, waterbeskikbaarheid huishoudelike gebruik van water en die regering se watervoorsieningsbeleid aan te spreek.

Doelwit en doelstellings

Die oorkoepelende doel van die studie was om te bepaal of die “WET-Programme” verbruikers se kennis en vaardighede ten op sigte van water en landelike watervoorsiening kan verander. Die doelstellings was:

- Om ’n gestandaardiseerde kennisvraelys te ontwikkel wat as basislyn vir kennismeting kan dien.
- Om die “WET-Programme” te implementeer as ’n manier om gemeenskapslede toe te rus met die nodige kennis en vaardighede wat nodig is sodat hulle effektief in hul huishoudings binne die gemeenskap kan funksioneer.
- Om vas stel of die “WET-Programme” doeltreffend is om verbruikers se kennis oor water te verbeter:
    - Om hulle vaardighede rakende watergebruik te verbeter.
    - Om die kwaliteit van die program te bepaal.
    - Om die impak van die fasiliteerder en fasiliteringsproses op die uitkomste van die werkswinkel te analiseer).
- Om aanbevelings te maak om die program vir verdere gebruik te verbeter.

Metode

Die studie het die strategie van intervensie navorsing gebruik en het beide kwalitatiewe en kwantitatiewe navorsingsmetodologie gebruik om data by verbruikers is in te samel. Vir die kwalitatiewe metode is 'n gestandaardiseerde vraelys (geldig en betroubaar) ontwikkel wat voor en na die intervensie (WET Programme) deur deelnemers voltooi is . Die kwalitatiewe benadering is gebruik om bogenoemde te komplimenteer. Fokus groepe is gehou en hul besprekings is opgeneem en gesorteer. Daarna is die data getranskribeer, analiseer en geïnterpreteer Deelnemers is toegelaat om deur middel van groepbesprekings oor hulle leerondervinding te reflekteer. 'n Gestandaardiseerde meetinstrument (FAS) was gebruik om die sukses van die program te evalueer.

Resultate

Die kennisvraelys was voor en na die werkswinkel deur deelnemers voltooi om verandering in kennis te bepaal. Die deelnemers se kennis het op ’n prakties betekenisvolle manier verbeter. Dit was ook duidelik uit die kwalitatiewe resultate dat deelnemers se vaardighede verbeter het. Die kursus-evaluering het aangedui dat die fasiliteerders bekwaam was, dat die leerstof toepaslik was en dat leer plaas gevind het. Die kursus het ’n positiewe uitwerking op die deelnemers gehad.

Aanbevelings

Die volgende aanbevelings behoort vir verdere navorsing in ag geneem te word:

- Die studie kan in ander streke van die Noordwes Provinsie herhaal word.
- Die studiemateriaal moet in die spesifieke inheemse taal van deelnemers vertaal word om alle waterverbruikers te akkommodeer.
- Die inligting moet aan alle rolspelers op plaaslike, provinsiale en nasionale vlak beskikbaar gestel word.

Gevolgtrekking

Opvoeding en opleiding moet deel van die totale watervoorsiengsproses wees en kan ’n bydrae lewer tot die bemagtigingsproses van die gemeenskap sodat hulle as onafhanklike, ingeligte en verantwoordelike verbruikers met betrekking tot hul watergebruik.

CHAPTER 1: BACKGROUND AND PROBLEM STATEMENT

1.1 BACKGROUND

The Water Research Commission (WRC) funded this multi-disciplinary study conducted in the Madibogo village in the North West Province. Researchers from the North-West University‟s Mafikeng Campus‟s Chemistry Department, Hlophe (2006) and Modise (2004) carried out the study focusing on chemical aspects of water. The researchers from the North-West University‟s Consumer Sciences Department, Kolanisi (2005) and Molefe (2008), focused on the social aspects such as knowledge and attitudes of consumers on rural water service provision.

Literature from previous studies in the Madibogo village identified Madibogo village as one of the rural villages in the North West Province where water consumers were a vulnerable group (Francis, 2002:5; Hillie *et al.*, 2008:5). The apartheid government marginalised the rural areas and paid little attention to communities‟ health, economic and social welfare (Noeth, 2006:32). Developmental policies designed were not in favour of rural areas, and this led to insufficient service delivery to communities (Smith & Green, 2005:435). Möller *et al*. (2002:27) state that inequitable services result in rural communities being disadvantaged with regard to education and job opportunities hence poverty became part of rural lives.

In 1994, the new Government of National Unity came into power and it developed new developmental policies to address the inequalities and the injustices of the

past and most of all to improve the quality of life for all South African citizens (Smith & Green, 2005:435). The Bill of Rights states in terms of the Constitution, Act (108) of 1996 Section 27(1) b, that everyone has the right to access sufficient water and the right to an environment that is not harmful to his/her health and well-being. Subsection 27(2) holds the State accountable in ensuring that these rights are respected.

The government introduced the Reconstruction and Development Programme (RDP) with its principles as a key guiding framework for service delivery to ensure that these rights are recognised and catered for South African Local Government Association (SALGA, 2006:2).

Hodgson and Manus (2006:673) argue that even though the South African government modified the laws of the country to adapt to the nation‟s needs and circumstances, there are still backlogs noticed, especially in the provision of basic services. This is more evident in rural areas. With regard to rural consumers, their most important challenge in relation to water service delivery includes the lack of potable water (water quality), water quantity (availability, accessibility and affordability) and household utilisation (Kolanisi, 2005:7). This is an indication that basic household services remain an obstacle to the creation of dignified living conditions in accordance with the government‟s overall programmes and objectives.

According to the Department of Water Affairs and Forestry (DWAF) (2002:3), the majority of rural areas in South Africa mainly depend on streams and ground-

water. Most of the times these sources pose water quality problems such as high mineral content, acid water, contamination by bacteria and pollution. At times, people cause the problems of water quality. Therefore, it becomes important that people, who are users of such water sources, be educated to empower them on how to manage these water sources effectively and efficiently. Subsequently they should be educated with regard to health impacts, types, and costs of water treatment and water service systems.

Noeth (2006:32) supports the importance of education, citing lack of it as disempowering to rural consumers. This situation of disempowerment often leads to vulnerability, whereby consumers accept services without thinking about them reasonably. There are numerous initiatives aimed at addressing the challenges facing the community, however, these initiatives do not raise the level of awareness in communities concerned, or improve their knowledge, hence these result in the initiatives not benefiting them (Noeth, 2006:32).

Different studies indicate that little has been done to ensure that water consumers are provided with education and training to increase their level of literacy for optimal utilization of water (Nala *et al*., 2003:171; Smith & Green, 2005:444; Noeth, 2006:32).

According to Kolanisi (2005:3), consumer scientists can play a major role in ensuring that the quality of life of consumers is improved.

A consumer includes an individual, families (households) and communities. In this instance, quality of life implies addressing factors that make the life of human

beings comfortable and acceptable psychologically, socially, physically and personally. Families and households form the fundamental unit of society, strengthened through imparting useful information and creating awareness of issues such as responsible resource management in fulfilling the needs and requirements of individuals, families, and communities (Boshoff, 1997:6; Erasmus *et al.,* 2001:116; Pennsylvania Department of Education, 2002:1). Kolanisi (2005:2) and Kiamba (1999:15) believe that consumer scientists are skilled to assist communities or consumers to realise and identify their needs.

Furthermore, consumer scientists are able to facilitate the process of addressing consumers‟ needs through strategies such as education that will add value to the lives of consumers. Noeth (2006:45) supports this view and further states that academics, including consumer scientists, should intensify their involvement in rural consumer development. Consumer scientists are able to eliminate challenges consumers face on a daily basis such as water-related problems mentioned in the next section.

1.2 PROBLEM STATEMENT

Madibogo rural water consumers lack knowledge to judge the safety of their water supply. They use physical aspects such as colour, taste and smell as the only determinants of potable water. They do not have knowledge and information about the microbial and the chemical aspects, which are also important for determining water safety (Kolanisi, 2005:90; Hillie *et al.*, 2008:6).

Furthermore, these consumers lack knowledge and understanding of policies, strategies and consumer or human rights. Due to this disadvantage, consumers often suffer and use harmful coping strategies. As discussed in the introduction and background section of this chapter, there is a definite need for a Water Education and Training Programme (WET-Programme) for rural consumers.

Findings based on literature studies by Kolanisi (2005:90) and Hillie *et al.* (2008:6), regarding rural consumer development, indicated the need for education and training in water-related issues. The rural consumers cannot function effectively without being empowered with knowledge on how to deal with water-related issues facing them on a daily basis.

1.3 AIM AND OBJECTIVES

1.3.1 Aim

The aim of the study was to determine whether a water education and training programme (WET-Programme) could influence consumers‟ knowledge and skills towards rural water service provision.

1.3.2 Objectives

The objectives of the study included the following:

- To develop a standardised knowledge questionnaire to use as a baseline for knowledge measurement.
- To implement the WET-Programme as a way of equipping community members with the knowledge and skills that is necessary to assist them to function effectively in their households within the community.

- To determine the effectiveness of the WET- Programme in:
  - Improving the consumers‟ knowledge.
  - Improving the consumers‟ skills.
  - Programme quality (analyse the impact of the facilitator and facilitation process on the outcomes of the workshop).
- To make recommendations after the presentation of the WET-Programme on improvements to be made for further use.

1.4 CONCEPTUAL FRAMEWORK

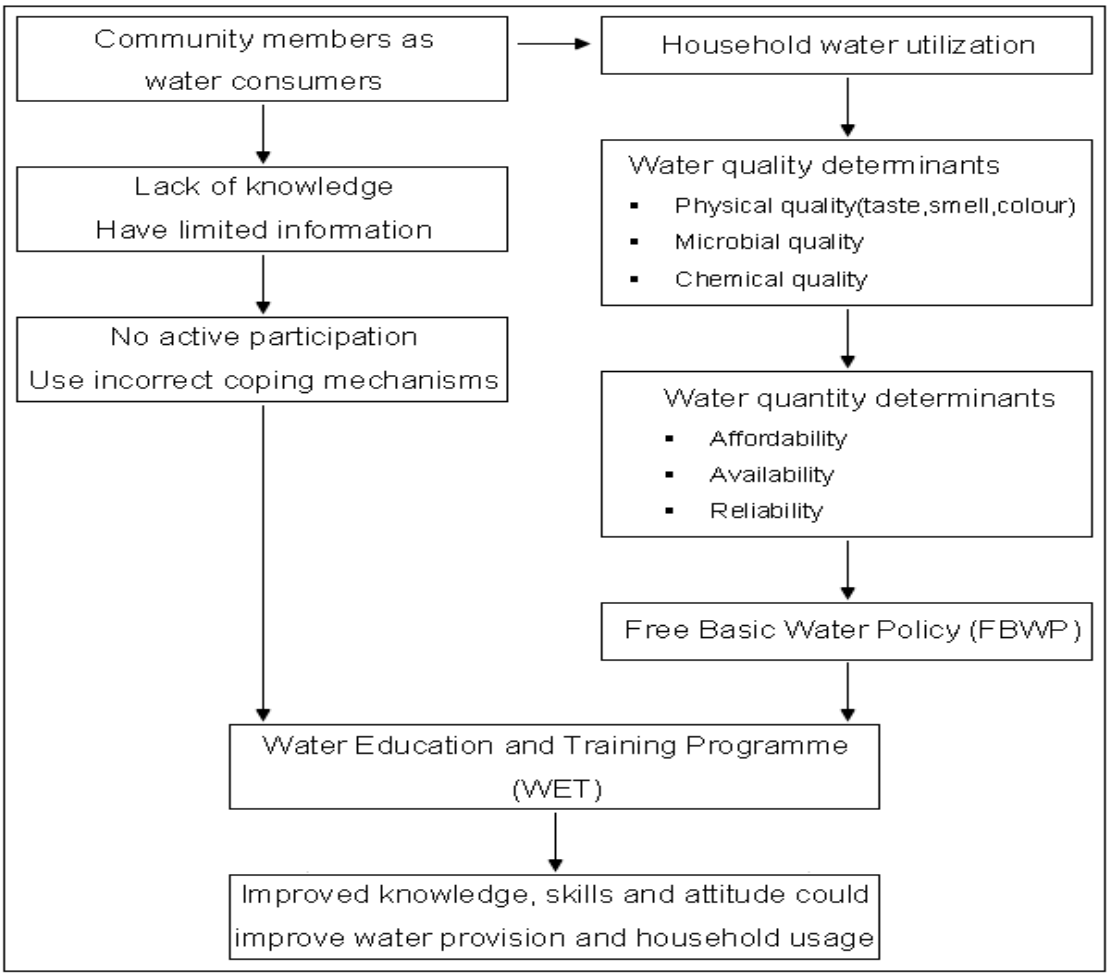

Figure 1.1 A conceptual framework representing the study and the influence of an intervention

Figure 1.1 demonstrates the effect of lack of knowledge and limited information on the Madibogo consumers. They utilise water for different activities, but they are not actively involved in water-related issues because they lack knowledge such as water quality, quantity, and Free Basic Water Policy (FBWP). Additionally, it summarises the water challenges that the Madibogo consumers experience. The objectives and aim highlight the possibility of the WET-Programme in reducing the consumers‟ challenges and improving their knowledge after the implementation of the programme.

1.5 METHODOLOGY

The methodology of intervention research was followed. An education programme (WET-Programme) was presented as a pilot study, adapted and then used for the final study. A standardised knowledge questionnaire was developed and used for a baseline study and the same questionnaire was completed before and after participants attended the education programme.

1.5.1 Sample

The study used a purposeful sample from Madibogo village. The criteria for the participants‟ selection required adults within the Madibogo village who can read, write and are water users. The criteria would enable participants to read and understand the WET-Programme. Adults were a suitable target in this study, as they have a large social network and communication with different age groups in

society. They are practically experienced with water-related problems whilst doing different home chores.

1.5.2 Presentation of the course

After all the preparations were completed, the researcher presented the course. Activities during different sessions included role-play, discussions, brainstorming, games such as balloon game, which demonstrated how one could protect his/her rights. Other creative activities such as whispering the answer to the next person who in turn say the answer loudly and the person who whispered the answer verifies if that is what he/she said. All these activities were done throughout the course to establish whether participants have mastered skills such as listening, application, presentation and knowledge.

1.5.3 Data gathering

The study used both qualitative and quantitative research designs to collect data from the consumers. For the quantitative method, the researcher developed a standardised questionnaire as the main data-collecting tool. In the qualitative research approach, the researcher used focus groups, role-play and discussions as data-gathering tools to complement the quantitative data and to allow participants to reflect on their learning experience through the discussions. The researcher tape-recorded the qualitative data from focus groups.

1.5.4 Analysis and interpretation of data

The Statistical Analysis Software (SAS, 2003) package was used to interpret the quantitative data while the qualitative data were tape-recorded summarised and analysed. The quantitative data from knowledge questionnaire were computerised, captured and statistically analysed using SAS. Qualitative data were transcribed, analysed and interpreted.

1.5.5 Facilitator Assessment Scale (FAS)

The FAS is a reliable tool for the measurement of the effect of the facilitation on the outcomes of the workshop and was used to measure the effectiveness of the programme based on the subscales measuring facilitator aptitude, facilitator presentation, and the learning process, the context of workshop, the relevance and value of the workshop for participants. The quality of the workshop was measured with the FAS-questionnaire.

1.6 ETHICAL ISSUES

The researcher reassured the community members participating in the WET-Programme that the information provided was highly confidential and their contributions and inputs would help in improving the programme. Participants were encouraged to speak freely and participate actively as the aim was to facilitate learning and constructive criticism. An explanation was given that the findings of the research would serve as a report of the academic study. There was no ethical clearance number for this study, but the researcher applied all the

possible measures to ensure the well-being of the participants (refer to Appendices A & B). All participants completed the consent forms.

1.7 DELIMITATION OF THE STUDY

The study confines itself to participants based within Madibogo in the rural area of the North West Province. The study can serve as a reference to advance and stimulate similar studies in other communities faced with the problems emanating from general water utilisation.

1.8 KEY CONCEPTS

1.8.1 Knowledge

Knowledge refers to a range of information and the understanding thereof (Tight, 2000:112). The author further describes knowledge as the level of awareness, consciousness or familiarity gained by experience, learning or thinking. Therefore, it is evident that intelligence, personality, interest, and motivation influence acquisition of knowledge.

1.8.2 Skills

Skills are abilities that enable people to carry out specific behaviours or tasks. They are abilities for adaptive and positive behaviour that enable individuals to deal effectively with the demands and challenges of everyday life (Vince-Whitman, 2001:8; Tight, 2000:113). Examples of practical skills or techniques include competencies such as, in hygiene for example, cleaning water containers used for water storage and domestic water purification.

1.8.3 Empowerment

Green and Nieman (2003:162) define empowerment as a means whereby individuals, groups, and communities are able to help themselves and others by taking control of their circumstances

In addition, Mosai (2004:9) and Gathram (2003:43) see empowerment as an active process, which energises community members to higher levels of capabilities to make decisions when solving their problems. It encourages community members to strive towards developing self-reliance.

1.8.4 Consumer

A consumer refers to an individual, family (household) and community, which identify unmet needs such as water provision leading to the subsequent

consumption of a water product (Gabbott & Hogg, 1998:9; Hoyer & MacInns, 2006:19).

1.8.5 Capacity building

Green and Nieman (2003:164) define capacity building as a process whereby individuals, organisations, institutions and societies gain the abilities to enable them perform certain functions, but also to be able to solve their problems and to set and achieve collective goals. September (1995:8) indicates that capacitating the community or community members assists them to decide how to use and allocate their own resources. This ensures that the community acts to satisfy their fundamental human needs.

1.8.6 Adult

The term “adult” is determined by the specific phase in the lifestyle of a person. Adults are defined as people who are 18 years of older. Adults undergo progression towards the fulfilment of the individual‟s potential and development of balanced judgement about oneself and others and increasing independence. Gravett (2005:7) further describes an adult based on one‟s ability to participate in educational activities that are beneficial to one‟s needs. It is, however, very difficult to define the term “adult” since it is broad and its definition varies between communities.

1.8.7 Water pollution

Water pollution occurs when pollutants exceed the natural purification capacity of water (DWAF, 2005:29). Koren (2000:303) further describes water pollution as the presence of foreign substances that tend to degrade the quality of water.

1.8.8 Water quality

Water quality refers to the proportion of samples or supplies that comply with guideline values for drinking water quality and minimum criteria for treatment and source protection (Obi *et al*., 2007:229; Koren, 2000:96). In the consumer context, Kolanisi (2005:16) defines water quality as eradication of impurities to make it fit for consumption.

1.8.9 Water quantity

This is the average volume of water used by consumers for domestic purposes. This average water volume is expressed as litres per capita per day (DWAF, 2005:29). According Earle *et al*. (2005:25), the government provides 6000l free water per household every month under the FBWP to cater for the average volume used by consumers.

1.8.10 Ground water

This is water stored underground in rock crevices and in the pores of geologic materials that make up the earth‟s crust. The water is usually accessible through

springs and boreholes and is vulnerable to pollution (DWAF, 2005:8, Hillie *et al.*, 2008:35).

1.8.11 Education programme

An education programme equips the communities with knowledge and encourages them to gain a better understanding of the processes required for the provision of safe drinking water. An example is the WET-Programme (Bontsa, 2001:20).

1.8.12 Basic water supply service

A basic water supply service is defined as the infrastructure necessary to provide 25 litres of potable water per person per day within 200 metres of a household and with a minimum flow of 10 litres per minute (Earle *et al*., 2005:25).

1.8.13 Potable water

Potable water is water that is acceptable for humans to drink and use for other domestic purposes such as food preparation and bathing. It should not contain any harmful concentrations of chemical or microorganisms and should ideally have a pleasant appearance, taste and odour (DWAF, 2005:29).

1.9 STRUCTURE OF THE DISSERTATION

The mini-dissertation comprises five chapters. The chapter allocation is as follows:

- **Chapter 1: Background and problem statement**

  This chapter provides the background information. The problem statements, aims, objectives, delimitation of the study and key concepts are discussed.

- **Chapter 2: Literature review**

  This chapter comprises of the relevant literature reviewed for the purpose of this study. Aspects that are discussed include Madibogo as rural water consumers, water services, consumer behaviour as well as an education and training programmes as a tool towards knowledge creation.

- **Chapter 3: Methodology**

  Chapter 3 focuses on the methodology used for this study. The study employed the intervention research strategy.

- **Chapter 4: Results and discussions**

  Results are discussed in detail in this chapter.

- **Chapter 5: Conclusion and recommendations**

  This chapter summarises findings of the study and provides recommendations for further study as well as the conclusion.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

This literature chapter aims to address the available literature concerning the three core areas of the study. Firstly, Madibogo, the area of this study as a rural community and its role as consumers, secondly an education and training programme as a tool towards knowledge creation and finally, government water policies and basic human rights to water in South Africa will receive attention.

2.2 MADIBOGO AS A RURAL COMMUNITY

Madibogo is a rural village located 90 kilometres from Mafikeng in the Ditsobotla district in the North West Province (Van Vuuren, 2007:14). It is sub-divided into 11 sections, namely: Tlhaping, Morolong, Dikgatlong, Bosotho, Seloja, Leganeng, Phahameng, Moetgaan, Mosetlhane and Ramabisa. Like most of the rural communities in South Africa, Madibogo is poverty-stricken with limited natural resources, such as water, agricultural land and natural vegetation (Francis, 2002:6). The village uses groundwater as its main water supply. The municipality provides the infrastructure such as reservoirs, borehole pipes and taps.

The community accesses the water at communal taps. The taps are at a range of more than 200 metres from the houses in all of the 11 sections. Modise and Krieg (2004:viii), Kolanisi (2005:5) and Hillie *et al*. (2008:5) state that though the community sees ground water as usually "clean", it is not necessarily safe for drinking. In addition, Sami and Murray (1998:11), Modise and Krieg (2004: viii) and Pietersen (2005:26) argue that ground water contains nitrogenous pollutants, chloride, fluoride, calcium and magnesium ions. It is, therefore, imperative to have knowledge of the characteristics of this community in order to gain an insight into their lifestyle.

2.2.1 Characteristics of the Madibogo community

The following characteristics give an insight into Madibogo community‟s lifestyle. They are divided into three categories namely: demographic factors, socio-economic factors and governance structure.

2.2.1.1 Demographics

According to Hillie *et al*. (2008:35), the Madibogo village with all the 11 sections combined has a population of approximately 40 000 individuals. The average household size is about eight to ten members (Earle *et al*., 2005:17). The level of education is low, with limited employment opportunities.

The low education level results in the majority of women working as domestic workers and most men as seasonal workers on the neighbouring white farms earning low income. As a result, the majority of the population in the village consists of old people, youth and children. Some of the youngsters press on and

complete their matriculation certificate, while others give up and drop out of school due to lack of parental supervision (Francis, 2002:6). Socio-economic factors also play a major role in determining the lifestyle of the community, hence the discussion in the next section.

2.2.1.2 Socio-economic factors

Madibogo community experiences social as well as economic challenges. There is a general lack of infrastructure, health services, poor education and few employment opportunities (Francis, 2002:6).

Francis (2002:6) discovered that the Madibogo community lacks a strong economic base. Community members cannot rely on livestock farming or food production to provide for their families or to uplift the economy of the village (Francis, 2002:4). This is due to shortage of grazing land and little space to keep livestock or grow crops hence their household income lags far behind due to limited additional sources of income (Francis, 2002:4).

Economic challenges forced some of the community members to migrate from Madibogo in search of employment (Francis, 2002:4) to neighbouring white commercial farms around Delareyville, Vryburg and Lichtenburg, while others went farther to Johannesburg, Rustenburg and Klerksdorp to seek jobs.

Those who remained at home relied on activities that generated little income, such as small-scale trading and providing services such as the building of houses. The elderly depend on government grants as the major source of

income. Francis (2002:4) and Kolanisi (2005:45) agree that these economic challenges make it impossible for the community to pay for the on-going operation and maintenance of the local infrastructure such as water.

2.2.1.3 Governance structure

Tribal authority comprising the chief and his councillors as well as the local government shares the Madibogo village governance (Francis, 2002:5). This sometimes poses challenges in the planning process, as the leadership might not have common vision and shared values for the community (Phaswana-Mafunya, 2006:21; Francis, 2002:5). Another challenge arising from the governance structure is that of community participation being limited due to insufficient knowledge on most social issues such as leadership hierarchy, and following protocol on water-related issues. Phaswana-Mafunya (2006:21) and Noeth (2006:45) suggest that strategies such as information exchange by local leadership, awareness campaigns and workshops should be utilised on issues affecting the community directly, such as water issues.

The information exchange strategies will ensure that the community members acquire knowledge and skills to enable them to participate effectively in their communities.

2.3 CONSUMER BEHAVIOUR

According to Du Plessis and Rousseau (2003:10), Hoyer and MacInnis (2006:3) and Hawkins *et al.* (2007:6), consumer behaviour includes the behaviour patterns

of decision units, which precede, determine and follow on the decision-making process and the acquisition of needs satisfying products and services. In this situation, the Madibogo consumers‟ behaviour pattern becomes evident in their decision-making process when acquiring water as a basic and essential need. Engel *et al.* (1995:98) see these behaviour patterns as involving mental, emotional and physical processes that the consumers use to select, obtain and evaluate products or services they expect will satisfy needs and wants. Considering the low level of education amongst Madibogo consumers, it is very difficult for them to select or evaluate products and services. Limited information and knowledge, therefore, challenges their problem solving skills. This leaves them vulnerable to embark on coping mechanisms that are based on traditional knowledge systems such as norms, values and beliefs of their culture to cope with their daily challenges (Kolanisi, 2005:62).

The discussion on service delivery as a challenge to consumers and its effects on consumer behaviour follow in the next section.

2.3.1 Consumers as water users and service delivery

The 1997 White Paper on a National Water Policy (NWP) for South Africa (1997:8) places obligations on all three spheres of government, namely: national, provincial and local government, to promote the right of access to basic water services through information and service delivery.

In the South African context, according to the RDP, basic and adequate water supply is defined as 25 litres per person per day (Earle *et al.*, 2005:14). The White Paper on NWP (1997:8) further states that the facilities that provide water must be within safe physical reach for all sections of the population. This policy targets vulnerable and marginalised groups of the community. Furthermore, the government must ensure that all individuals have economic access to water. This implies that the cost of accessing water should be at a level that would ensure all the people are able to gain access to water.

Contrary to the Water Services Act no.108 of 1997, Section 3(1) about water provision, most rural communities are still without basic services. Most South Africans do not have access to clean drinking water (SALGA, 2006:6). Literature reveals evidence that 12 million people in South Africa are still living without adequate water supply and 20 million without adequate sanitation services (DWAF, 2002:1; Earle *et al.,* 2005:13). SALGA (2006:6) confirmed that 2.2 million households in South Africa are without potable water while 3.92 million households are without proper sanitation.

Lack of access to water supply and sanitation is posing serious challenges to vulnerable groups such as rural consumers since they have to fetch water from a source outside the home (Hodgson & Manus, 2006:673). These authors further state that the quality of the water from the outside sources is not purified in most cases. The distribution of water facilities such as taps and tanks are inconsistent since in most cases, they are not enough or they are broken.

Long queues at water points are a problem including the maintenance of taps, tanks, and boreholes (Hodgson & Manus, 2006:673). Earle *et al.* (2005:17) and DWAF (2002:34) state that the introduction of the FBWP was an attempt to eliminate the economic inaccessibility of water for all South Africans, especially households in remote rural areas served by small local systems. However, Hodgson and Manus (2006:673) argue that FBWP is still not addressing the rural water consumers‟ problems. This is due to many rural water consumers still receiving water through a communal standpipe that disadvantage them from benefiting from the FBPW policy.

The rural consumers do not have in-yard or in-house water connections, hence the FBWP only applies to urban consumers who have in-house water connections. Smith and Green (2005:435) state this puts the urban consumers with in-yard taps at an advantage to receive 6000kl per month per household free. This being considerably unfair to the rural consumers who are unable to access the same benefit.

In Kolanisi‟s study conducted in Madibogo village about consumers‟ perceptions and household utilisation of a rural water service in the Madibogo rural community, Kolanisi (2005:66) agrees that rural water service provision needs attention. Her focus was specifically on water components, namely: water quality, water quantity, the FBWP and household water utilisation. The study revealed that the consumers shared communal taps with animals, which is hygienically unsafe.

Earle *et al.* (2005:13) point out that vandalism; tap leakages and faulty pumps usually exacerbate the problem of water accessibility and degrade water quality. Table 2.1 by Kolanisi (2005:45) gives an insight into water service provision in Madibogo.

Table 2.1 Basic services available in the Madibogo Village

Water-Infrastructure	**Services available for 11 sections of Madibogo community**
1. Borehole	5
2. Reservoirs	2
3. Standpipes	86

Table 2.1 confirms the challenges experienced by consumers in the Madibogo rural community. From the table, it is evident that running water is not available to all households in the area. It is also evident that standpipes are the most common form of water supply. This means animals also have to drink from the same source. The community members have to travel a long distance to access water. Ncube and Schutte (2005:40) depict the gap that still exists in the North West Province regarding the provision of water quality in rural areas in Table 2.2.

Table 2.2 Dependency of North West rural communities on ground water for domestic use

Source	**Communities**	**People**
Ground water	1063	1411707
Surface water	221	2099461
Combined source	13	108593

Total	**1297**	**3619761**
Supply potential		
Poor	160	48733
Low	207	330061
Moderate	266	122101
High	323	1620011
Very High	341	400855
Total Communities		**3619761**
Total Potential		**3619761**

Rural communities employ various domestic purifying methods to address the general quality of water. The domestic purifying methods include: boiling, filtering, sedimentation and bleaching by using of disinfectant, which will, consequently, receive attention.

2.3.2 Domestic purifying methods

The WRC (2002:2) suggest that water should be treated to make it fit for domestic use. Purifying methods utilised by households include boiling, filtration, sedimentation and disinfection. They are explained briefly as follows:

- **Boiling**

  According to DWAF. (2005:29), rapid boiling of water prior to drinking is the most accurate domestic method of killing all pathogens and microorganisms to ensure that water is safe for use. Venter *et al.*

(2008:20) recommend that after boiling water, it should be allowed to bubble for 5 to 10 minutes in order to kill all germs and then left to cool.

- **Filtration**

Filtering water does not purify it, but it is a practical method, which removes some of the impurities such as worm‟s eggs and pathogens (Venter *et al.,* 2008:19). Momba *et al.* (2004:70) encourages filtering because it improves the taste of the water. According to Venter *et al*. (2008:19), the use of this method usually involves using of any porous material including clothing items such as a sock, shirt or sari cloth. To filter dirt from spring water containing sediment, the water is passed through the filtering material into a container and allowed to stand for a couple of hours before use. Venter *et al.* (2008:19) further suggest that other purifying methods need to be applied with filtration. Although the water appears to be clear there can still be harmful substances in the water unseen by the human eye.

- **Sedimentation**

Sedimentation is the process where water stands for a while within a container, allowing the sediment to separate and settle at the bottom of the container (Venter *et al*., 2008:19).

Other purifying methods need to be applied with sedimentation because although the water appears to be clear, there can still be harmful substances in the water unseen by the human eye.

- **Disinfection**

  There is always occurrence of contamination in water; therefore, application of disinfectant is important (Venter *et al.*, 2008:20). Chlorine is a commonly used disinfectant for water purification. According to Momba *et al*. (2006:717), chlorine in a powder form is a powerful oxidising agent and reacts with inorganic and organic substances sometimes present in water. Sometimes it dissipates quickly in water and leaves high levels of organic residue. Its effectiveness depends on maintaining an adequate residual, usually 0.2 mg/l over a period of not less than 30 minutes (Momba *et al.*, 2004:72).

  In the absence of chlorine, the use of household bleach is a good substitute. One teaspoon of bleach added to 25 litres of water makes water safe for human consumption. The water should stand for two hours (Venter *et al.,* 2008:20) for best results. Van Vuuren (2007:14) warns that inadequate disinfectant in the water will cause quality deterioration and pose potential risks of infections to consumers.

2.3.3 Water storage

Nala *et al*. (2003:171) indicate that water storage in containers including plastic, glass or any other containers for household utilisation, is also a potential cause of water quality deterioration.

Water hygiene improves by the regular cleaning of water containers using disinfectant before adding water to be purified as well as after water storage. Washing of hands before purifying water and handling water and containers after visiting the toilet before handling water can maintain the water quality.

Despite the challenges of poor water provision in rural areas, consumers still have the responsibility not to engage in actions that could pose a danger to their health, such as not washing hands after using the toilet and handling water afterwards. Additionally, using wrong chemicals for water purification may also prove to be potentially harmful to human consumption. Responsible water usage consequently includes limited wastage of water (Venter *et al.,* 2008:54). Establishing a culture of responsible water consumption can be achieved through improving consumers‟ knowledge on water-related issues. Education and training as a tool for improved knowledge regarding water related issues is discussed in the next section.

2.4 EDUCATION AND TRAINING AS A TOOL TOWARDS KNOWLEDGE CREATION

Rural communities experience poverty, unemployment, lack of access to basic infrastructure and lack of resources, as well as general inefficiency due to lack of education and empowerment (Van Niekerk, 2006:15). These results in a lack of training opportunities brought about by cultural factors, time constraints, distance to facilities and other factors such as financial constraints. Education and training

as a capacity-building tool, brings about development and empowerment especially to rural communities (Nel, 2006:106). This brings positive change by enhancing social, political, economic and physical environmental aspects of the community‟s life (Hodgson & Manus, 2006:675). All these difficulties require stakeholders to play an active role in empowering the community through education and training (Mosai, 2004:90).

Stakeholders‟ level of involvement is, as a result, essential in ensuring that education and training programmes identified address the rural community consumers‟ lack of knowledge and information regarding water-related issues.

Water education and training programmes are furthermore essential tools to educate the consumers on how water conservation practices impact on their health and regarding the costs of water treatment and provision.

Buckle (2006:82) warns that serious attention to the value and benefits of quality drinking water needs to be brought to rural water consumers.

Water should be appreciated as a scarce resource. Once water consumers become aware of this fact, they could become actively involved in water quality and treatment issues. Before embarking on a water education and training programmes, it is essential to study the characteristics, learning styles and hindrances of water consumers who will interchangeably be referred to as adult learners.

2.4.1 Characteristics of adult learners

The literature differentiates adult learners from adolescent learners based on the characteristics they possess. These characteristics include the urge to change, uniqueness, life experience and knowledge, motivation, self-directedness and proficiency (Rogers, 1992:24; Honingfield & Dunn, 2006:15; Green, 2002:16).

2.4.1.1 The urge to change

Gagne *et al*. (1992:1) and Green (2002:16) indicate that adult learners have the urge to take charge of their lives and, therefore, learn voluntarily as they realise the future benefits for themselves and future generations. The type of education programme designed for these adult learners should correspond with their psychological, cultural, and emotional growth.

It is, therefore, important that the skills and information they will gain from the programme in this study should address the water-related issues and empower them to use the information and apply skills gained in making educated daily consumer decisions.

2.4.1.2 Uniqueness

Adult learners usually have different expectations towards what they will gain from a training and education programme (Dwyer, 2004:80). Honingfield and Dunn (2006:14) and Kiely *et al*. (2004:21) support this statement and further state that every individual is unique and, therefore, every adult learner has the expectation that the programme he or she engages in will meet his or her needs. Kiely *et al.* (2004:21) further state that the programme needs to be sensitive and should promote autonomy and self-direction of individual adult learners in order to

be successful. The structuring of the programme should accommodate the differences and ensure independence of adult learners. Programmes addressing this uniqueness should be outcomes-based, meaning adult learners need to know which information, skills and values regarding water issues they will acquire at the end of the programme and whether what they will acquire relates to their uniqueness. Dwyer (2004:80) confirms that once this expectation is fulfilled they are able to practice what they have learnt to interact successfully with other adult learners and the community in general.

2.4.1.3 Life experience and knowledge

According to Russell (2006:350), Kasworm and Marienau (2003:06) and Wickett (2005:155), adults have a greater wisdom and variation in the quality of previous life experience. Adult learners learn by integrating formal academic and informal knowledge with their personal experience in their unique life context (Green, 2002:16). They filter information obtained in a formal or informal environment through reflections on their experiences and understandings of the past, present and on their current actions (Kasworm & Marienau**,** 2003:8). Adult learners gain informal knowledge when they participate through interacting with fellow community members such as attending meetings called by various community structures to address issues affecting their lives directly such as water (Kiely *et al.,* 2004:24). The daily experiences of daily life issues such as water also add on to the rich, personal and uniquely structured knowledge that adults bring to the learning environment. This enables them to judge the relevance of instructional content actively in terms of their personal learning.

In the same context, Lieb (1991:1) and Kelly (1996:20) indicate that this wealth of experience provides a foundation for adult learners to add an additional component by making the connection between new and existing life experiences. Furthermore, Green (2002:15) suggests that the emphasis of these programmes should be based on individual teaching and learning strategies. Adult learners are regarded as the richest sources of information for many kinds of learning experiences.

Experiential training techniques are as a result utilised, including group discussions, problem-solving activities and peer-assisting activities. Adult learners generally experience life in different ways and, therefore, they interpret reality differently. When these adults learn or interact there can be a common understanding as they learn from one another, enhancing profound transformation.

2.4.1.4 Motivation

According to Lieb (1991:3), learning cannot occur without the motivation to learn. He further indicates that an adult learners motivation represents the urge to satisfy both physiological and psychological needs through knowledge acquisition. According to Russell (2006:350) and Green (2002:16), learning could be potentially inefficient and harmful if it lacks prior readiness. This means motivation can, therefore, be associated with readiness to learn. On the same note Leith (2002:17) and Kelly (1996:4) indicate that learning should have intrinsic or extrinsic motivation such as competence, job enrichment, a need to maintain old skills and learn new ones, a need to adapt to changes, boosting of self-

esteem or improvement of quality of life. Facilitators need to be aware of the reasons why adult learners have decided to engage in learning to be able to enhance their lives.

Reward is a strong motivator for adult learners (Lieb, 1991:3). Reward does not need to be in the form of money, but can be benefits to be gained from learning (Lieb, 1991:3; Kelly, 1996:4; Green, 2002:10). These are various motivational strategies employed to assist learners to recognise the benefits obtained from the education and training programmes. Facilitators need to employ the most familiar theory of motivation according to Maslow‟s hierarchy of basic needs (Hoyer & MacInnis, 2006:56). The learners have to understand that acquiring knowledge will enable them to satisfy needs that are physiological, for example having knowledge to tackle environmental issues such as water and water purification, security including save drinking water and social issues such as interacting with fellow learners, stakeholders and self-esteem such as becoming a responsible consumer (Honingfield & Dunn, 2006:14). This will enable them to increase their performance and the benefits will last longer.

2.4.1.5 Self-directedness

Adults exhibit a tendency towards self-directed learning. Russell (2006:350) describes self-directedness as “a process in which individuals take the initiative with or without the help of others, in diagnosing their learning needs, formulating their learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies and evaluating learning outcomes based on acceptable norms and standards”. This definition

implies that self-directed learners are able to engage voluntarily in the learning experience and tend to learn independently (Knowles, 1980; Lieb 1991:1; Russell, 2006:350).

Trotter (2006:9) indicates that adults become more reflective about their lives and situation, and are generally able to make informed decisions regarding their future. They make informed decisions based on the pool of knowledge and information they have to make these kinds of decisions. Adults should, as a result, be able to evaluate the skills they require realistically such as problem-solving skills to enable them to apply these skills to solve their daily challenges. The skills include improving water quality, using the correct strategies and identifying the type of resources applied to satisfy a number of water-related needs. Water consumers will, as a result, also identify the resources they need to cope with difficulties they are facing in their communities. Water is what adult learners use on daily basis. Therefore, learning about water-related issues will connect with their lives (Green & Nieman, 2003:162).

Learning becomes powerful when it is grounded and connected to the content and meaning of an adult‟s life. Meaningful content such as information about water is learnt better and retained longer than less meaningful content. Anon (2007:83) emphasises that learning should fit the socio-cultural setting of adults. Adults are a diverse group with widely differing preferences, needs, backgrounds and skills. Green (2002:14) finds that learners learn voluntarily if what they learn addresses a particular issue that concerns them. They want to use the information acquired when dealing with their problems.

Training and education facilitators serve as mentors, assisting learners to obtain their learning goals. The facilitator is encouraged to design a learning environment in such a way that specific needs can be satisfied. Adult learners need to be equipped to solve their everyday life challenges. Facilitators also guide the learners in the pursuit of knowledge, rather than supplying them with knowledge. Adult learners, as a result, become less dependent on the facilitator and learn to depend on group dynamics and individual self-directed activities. Self-directedness is achieved by allowing learners to assume responsibility for presentations and group leadership to encourage critical thinking and creativity. The facilitator as a result facilitates the learning process (Leith, 2002:16). Table 2.3, outlined by Leith (2002:16), indicates how facilitators assist learners to move from dependency stage to self-directedness.

Table 2.3 Shift from dependency to self-directedness (Leith, 2002:4)

Dependency Stage	To	Self-directness
Dependence	To	Autonomy
Passivity	To	Activity
Subjectivity	To	Objectivity
Ignorance	To	Enlightenment
Few responsibilities	To	Many responsibilities
Focus on particulars	To	Focus on principles
Imitation	To	Originality
Impulsiveness	To	Rationality
Narrow interests	To	Broad interests

2.4.1.6 Proficiency

According to Green and Nieman (2003:162), adults have the ability to perform satisfactorily when given the opportunity. Although adult learners engage in learning activities to enhance their proficiencies, this is determined by personality-related characteristics, such as values, interest and self-concept.

Dwyer (2004:80) advises that adults differ from children according to the way they acquire, process, store and retrieve information. Adult learners have different individual learning and cognitive styles for processing information. They tend to be slower in learning and have a shorter retention capacity than children. This is the reason they cannot be in the learning environment for a long time. It is, therefore, vital for the facilitator to focus more on quality of information rather than the quantity of information. The facilitator must ensure that the amount of work that he/she gives must be suitable for the level of the adult and, furthermore, support the learning process.

2.4.2 Learning styles

Green and Nieman (2003:17), Truluck and Courtenay (1999:223) and Honingfield and Dunn (2006:15) describe learning styles as overall patterns that provide direction to learning and teaching. The authors further describe the learning styles as sets of behaviours and attitudes that facilitate learning for an individual in a given situation. How adult learners respond and process information is influenced by their intelligence, age, formal education acquired and their previous experience (Green & Nieman 2003:163). The learning styles of adults are mostly

rooted in their childhood learning patterns. A person‟s aptitudes and abilities are shaped by individual differences and early learning experiences, which are continually influenced by experience and training throughout childhood (Russell, 2006:352). The various learning styles of the adult learner will be discussed for further understanding.

2.4.2.1 Kinaesthetic learning

Russell (2006:352) and Cartney (2000:612) describe kinaesthetic learning as the ability of the learner to use movement. Truluck and Courtenay (1999:233) identify older adult learners to prefer this learning style than younger adults learners do. The authors further observed older learners to prefer active participation and gaining hands-on experience. According to Cartney (2000:612), learners with this preferred learning style enjoy the challenge of the new experiences and are quick to move into action. They enjoy learning best when they are involved or participating in an active manner. Kinaesthetic learners require movement during a lecture, hands-on learning, role-play and frequent breaks.

2.4.2.2 Auditory learning

Russell (2006:352), Truluck and Courtenay (1999:223) and Vincent and Ross (2001:41) describe auditory learning as the ability of the learner to think, speak and listen. Learners who prefer auditory learning generally have highly developed auditory skills and are generally elegant speakers.

Auditory learners prefer verbal presentation of information such as lectures, discussions, stories, verbal cues, music and oral reports.

2.4.2.3 Visual learning

Russell (2006:352) and Truluck and Courtenay (1999:223) describe visual learning as the ability of the learner to perceive the visual. These learners learn specifically through watching and listening. Learners in this category tend to think in pictures and need to create vivid mental images to retain information. Visual learning prefers graphic illustration, colour, maps, written material, charts, gestures and notes.

2.4.2.4 Thinking/Cognitive learning

Leith (2002:17) defines cognitive learning as the acquisition of information and concepts related to course content, which includes the ability to analyse content and apply it to situations. According to Evans *et al.* (2006:59), learners engage in reasoning when they encounter some information in their lives and deduce their own conclusions regarding the information relevance and its importance. Cartney (2000:612) further states that learners with this preferred learning style, prefer to act quickly and they involve all mental activities as they work to solve problems or cope with situations.

2.4.2.5 Feeling type/affective learning

Feeling type or affective learning is described by Leith (2002:16) as the type of learning that involves the formation of attitudes, feelings and preferences. Affective learners in this category put more emphasis on the subjective and emotional components in a learning situation. They usually base their decision on insight and emotions.

Gravett (2005:7) advises facilitators to offer educational activities that are responsive to the learning style. They need to select a variety of relevant and helpful materials and activities to facilitate the learning process. This will help to motivate learners and enable the adult learners to select preferred learning styles, which will broaden the way in which they learn effectively.

Truluck and Courtenay (1999:224) suggest to facilitators to vary the learning activities to enable diverse ways of learning and flexibility among learners. This will improve adult learners‟ self-concept and increase their achievement.

Hindrances towards adult learning will consequently be discussed.

2.4.3 Hindrances towards adult learning

Biel (2004:16) identifies a number of challenges or hindrances adult learners face, and these are social roles and health issues among others. The social roles and health as the common hindrances that adult learners face are briefly discussed in the next section.

2.4.3.1 Social roles

According to Kelly (1996:83), adults have responsibilities that require the individual‟s presence at a specific time and place. These responsibilities are usually task-related including raising and caring for children, managing the home and achieving social responsibilities such as attending meetings and taking part in income-related activities such as „stokvels‟ (Green, 2002:17), to engage in learning activities. The educational activities should be conducted at times that

are conducive to adults and the duration of classes should not be too long. Kiely *et al.* (2004:21) indicate that these social responsibilities sometimes make it difficult for adult learners to engage in educational programmes that take too much of their time or become part of long-term projects. Facilitators need to consider these aspects to ensure that adults are able to fulfil their responsibilities as well as have time.

2.4.3.2 Health

Green and Nieman (2003:165) and Knowles (1980:55) indicate that the aging and health deterioration process reduces adults‟ ability to learn. According to Knowles (1980:55), adult learners experience a decline in vision acuity, reduction in speed of reaction as well as a decrease in certain functions such as hearing. Furthermore, fatigue brought by low levels of energy and chronic illness are rife in older adults and they hinder effective learning.

The environment, which is mostly rural, does not make it any better for adult learners because of lack of health facilities and economic stability. As a result of these factors, addressing adult learners‟ constraints becomes difficult (Kiely *et al.,* 2004:21; Francis, 2002:6). Facilitators need to be very sensitive with regard to these matters. They should engage learners in low impact movement activities and the learning material should accommodate these health barriers. The facilitator needs to frequently reassure adult learners of their progress and frequently support them.

2.5 TEACHING METHODS AND LEARNING ENVIRONMENT

Facilitators need to be aware that adults have not been exposed to formal education for a number of years, possibly due to limited opportunities for structured learning (Dwyer, 2004:41). The role of a facilitator is to provide learners with strategies and tools that enable the learners to carry out learning activities by them. The facilitator needs to be sensitive to adults‟ slower learning rate and inability to concentrate for long periods. The facilitator needs to lead adult learners in the learning process, moving at their pace, otherwise they can become frustrated and withdraw from learning because the learning environment is not conducive (Kelly, 1999:83).

Adults are generally afraid to engage in educational activities if the environment for learning is not accommodative and welcoming (Gravett, 2001:7). A comfortable and supportive climate for learning, therefore, needs to be introduced. The conducive learning environment can be created when the facilitator introduces him or herself to learners and learners to others in a friendly way and encourages teamwork amongst learners. This will boost the self-esteem of the adult learners, put them at ease and make learning more meaningful (Gravett, 2001:7).

Learning styles determine the teaching strategies applied for adult learners taking into consideration their characteristics as well as their learning barriers. Relevant teaching methods include, among others, that the lesson should be more learner-centred than teacher-centred. Interaction should, therefore, be established and is

generally referred to as active. Active learning assists learners to interact with learning content as they are engaged in active thinking; they solve problems and share responsibilities. In this method, the facilitator only acts as a guide while learners take charge of their learning. Communication as a result plays a vital role as learners interact and share experiences. Dwyer (2004:82) advises facilitators to engage learners in group discussions, brainstorming, role-playing, games and debate, which will be addressed in the next section.

- **Group discussion**

  Group discussion starts with the class examining a problem or topic of interest with the goal of better understanding an issue or skill (Vince-Whitman, 2001:16).

  During the group discussion learners are awarded an opportunity to express their ideas freely to reach the best solution through mutual agreement (Anon, 2000). The learning method is fit for adult learners to discuss issues that affect them directly such as water. It enables them to generate a broad variety of ideas and boost their self-esteem and limits selfishness (Anon, 2000). Furthermore, Vince-Whitman (2001:16) recommends group discussions based on the benefits adult learners acquire in this teaching method. The benefits of the group discussion enable learners to deepen their understanding of the topic and personalise their connection to the task.

  Group discussion assists the learners to develop skills in listening, assertiveness and empathy. The method further allows learners to generate their ideas quickly and spontaneously and use their imagination to break loose from fixed patterns of response. Group discussions

accommodate a variety of learning styles, and provide alternative ways of learning that strengthen learner-teacher relationships and improve the classroom climate. Group discussions ensure maximum participation similar to brainstorming. However, a slight difference has been identified as brainstorming is briefly discussed in the next section.

- **Brainstorming**

Vince-Whitman (2001:16) and McCarthy (1992) describe brainstorming as a teaching method that stimulates creative thinking and encourages group participation if conducted in a suitable environment. McCarthy (1992) and Vince-Whitman (2001:16) further unfold the procedure of this method as follows:

  - According to Vince, the issue or the problem is posed and the facilitator asks for ideas.
  - Learners may suggest any idea that comes to mind.
  - Ideas are not discussed when they are first suggested.
  - Ideas are then recorded in a place where everyone can see them, for example on a flipchart.
  - Thereafter, ideas are reviewed through adding, deleting and categorising.

Though brainstorming has a significant advantage of involving many learners in the lesson, time needs to be limited to avoid loss of focus. Instructions from the facilitator need to be clear from the beginning to avoid criticism and evaluation of ideas from other learners (Anon, 2000). Similar

to brainstorming, role-play is also one of the teaching methods that makes learning fun and will be briefly discussed.

- **Role-play**

  According to Vince-Whitman (2001:16) and Dwyer (2004:82), role-playing involves application of cognitive, affective and psychomotor learning. Furthermore, it provides a dramatic representation of a problem situation and provides learners with the opportunity to assume other roles to develop another viewpoint. Before role-playing can take place, the facilitator needs to describe the situation to be role-played, allow the group to select role players, give instructions to role players and then the play can start. Dwyer (2004:82) emphasises the importance of feedback to ensure that skills that were developed and the message of the play are not missed. McCarthy (1992) finds this teaching method suitable for small groups and not for overly self-conscious learners.

- **Games**

  According to Vince-Whitman (2001:16) and Claire *et al.* (1997:19), games as a teaching method involve learners playing games as activities focusing on the learning content. Critical thinking, problem solving, decision-making, review and reinforcement of the lesson occur (Dwyer, 2004:82). Benefits of this method include maximising learners‟ input. This allows learners to get to know one another and increases the likelihood that they will consider how another person thinks. It also helps learners to hear and learn from their peers. Games promote fun, an active learning environment and rich discussion in the classroom, as learners work hard to prove their points or earn points (Claire *et al.,* 1997:20). Games require the combined

use of knowledge, attitudes and skills and allow learners to test out assumptions and abilities in a relatively safe environment.

- **Debate**

  Vince-Whitman (2001:16) points out that in a debate, a particular problem or issue is presented to the class, and learners must take a position on resolving the problem or issue. The class can debate as a whole or in small groups. Debating as a teaching method provides learners with the opportunity to address a particular issue in-depth and creatively. Water issues fit this method perfectly. Learners can engage in a debate, for instance, whether receiving potable water free is a right or not. It also allows learners to defend a position that may mean much to their learning and offers a chance to practise higher thinking skills. It can help learners think about local problems and develop critical thinking skills.

  Vince-Whitman (2001:16) further suggests the following strategies to be employed by the facilitator during the lesson to reap all the benefits from debating as a teaching method:

  - Allow learners to take positions of their choice. If too many learners take the same position, ask volunteers to take the opposing point of view to develop debating skills.
  - Provide learners with time to research their topic.
  - Do not allow learners to dominate at the expense of other speakers.

- Make certain that learners show respect for the opinions and thoughts of other debaters.
- Maintain control in the classroom and keep the debate on the specific topic.
- Be sure the topic relates to the lives of the learners.

A well-designed education and training programme may assist adult learners to function effectively within their community. Learners are empowered with knowledge and information, which could be utilised to participate actively in addressing community issues such as water provision and quality. The WET-Programme is designed to empower, capacitate and equip the community with skills and knowledge to be in a position to participate actively in addressing water-related issues in a community.

The benefits of participation, empowerment and capacity building will be discussed in the following section.

2.5 PARTICIPATION

Gathram (2003:42) defines participation as the manner in which people involve themselves, to a greater or lesser degree, in an organisation directly or indirectly concerned with decision-making and the implementation of development. Hussein (2003:273) supports the idea and emphasises that active involvement of people at the grassroots level in the choice, execution and evaluation of programmes

designed to improve their livelihoods is essential. The role of the community is crucial because they act as their own agents of change to ensure sustainability and human development. Vince-Whitman (2001:5) and Dwyer (2004:82) outline the advantages of participatory learning, which is discussed in the next section.

Structural transformation at the community level, for example social system changes and development, can take place when learning and experience acquired by individuals is achieved through problem-solving situations (Molapisi, 2006:116; Van Niekerk, 2006:107). These authors state that participation transforms participating individuals‟ awareness including their consciousness and enables the individuals to take control of their lives.

According to Van Niekerk (2006:107), Marais *et al.* (2001:325) and Cook (1995:280), participation in self-help activities mobilises available community resources such as talents and skills, leadership, human and capital resources. Participation ensures that problems are diagnosed and defined appropriately and clearly. Being involved and actively participating in problem solving allows for a wider range of possible-solutions and consideration of the practical aspects of implementing them. Participation in decision-making ensures successful implementation, due to people being more agreeable to the various issues they identified during decision-making (Van Niekerk, 2006:108). Training and education programmes tend to be sustainable once community members are actively involved in decision-making. They sense pride and personal learning benefits during the learning process. Cohen (1993) and Van Niekerk (2006:108) state that participation ensures fair and equitable distribution and access to

resources for effective community development. The need for empowerment will be discussed in the next section.

2.6 EMPOWERMENT

Green and Nieman (2003:162) define empowerment as a means whereby individuals, groups and communities are able to help themselves and others by taking control of their circumstances. It is also an active process whereby community members are energised to higher levels of capabilities towards decision-making and problem solving. Empowerment indicates that people strive for developing self-reliance and internal strength, helping them to form alliances and organisations (Dali, 2004:98). According to Green and Nieman (2003:162), Dali (2004:98) and Babbie (2001:288), empowering the people through training and education enables the community to understand the reality of their environment, and act effectively by themselves to bring about changes to improve their situation. Gathram (2003:43) further emphasises that institutions and organisations wishing to become involved in rural community projects with empowerment and development goals, have to resist imposing their own views and agenda. Building networks and alliances should be the main objective, sharing goals and responsibilities.

Dali (2004:98) and Green and Nieman (2003:164) add that education and training programmes need to liberate rural communities such as Madibogo from mental and physical dependence and should provide these communities with necessary

knowledge, skills and attitude to enable them to stand independently, think progressively and plan and implement changes systematically. It is important that behaviour and attitude of role-players in development projects be focused on the individuals who benefit from the training and education programmes.

Empowerment creates an increase in energy and motivation among individuals and group members (Green & Nieman, 2003:163). Green and Nieman (2003:163) continue that participants‟ coping, problem-solving skills and decision-making power and skills improve while a positive feeling of self-esteem and self-sufficiency, which enables them to participate actively in-group discussions, is developed. They are also able to interact with strangers and people in authority as well as being able to control resources to ensure that they are used for the benefit of the community (Hart, 1998:1). Capacity building as a related concept to education and training, participation and empowerment will be discussed.

2.8 CAPACITY BUILDING

Green and Nieman (2003:164) and Dali (2004:97) define capacity building as a process whereby individuals, organisations, institutions and societies gain the abilities to enable them to perform certain functions, but also to be able to solve their problems and to set and achieve collective goals. Capacity building within communities implies that they know how to use and allocate their own resources, satisfying their fundamental human needs (Green and Nieman, 2003:164; Dali, 2004:97; Van Niekerk, 2006:107).

Apart from the fact that most of the community members have insufficient knowledge to control their lives, disadvantaged people living in rural communities often cannot participate effectively in community development activities (Noeth, 2006:32). This is due to a lack of understanding as to what needs to be done in their communities to address development issues. The WET-Programme develops and equips the community with the necessary skills and further provides knowledge and attitude for self-development. Its participatory approach allows the participants to undergo a training and learning process, which is flexible, capacitating, sustainable and enhances individuals and collective potentials in order to address the problems of their communities and to be self-reliant (Van Niekerk, 2006:107; Marais *et al.,* 2001:325; Cook, 1995:280). Self-reliance changes the way in which the community perceives its own potential and capabilities. It will additionally give them a sense of value and self-worth. Capacity building lessens economic dependence and fosters participation and creativity. Furthermore, it will stimulate and reinforce cultural activity through an increase in self-confidence and will encourage self-management amongst community members (Cook, 1995:2; Van Niekerk, 2006:108).

In the following section, aspects of legislation that regulate the provision of water to the consumers and protect the rights of citizens will be discussed.

2.9 WATER POLICIES AND HUMAN RIGHTS TO WATER

Legislation that protects and regulates provision of water includes the following Acts:

The National Water Act (NWA) 36 of 1998, the Water Services Act (WSA) 108 of 1997, RDP (1994) and Bill of Rights of the Constitution of the Republic of South Africa. These will in turn be given attention to.

2.9.1 National Water Act of 1998

The National Water Act of 1998 categorically stipulates that the National Government have the overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest.

2.9.2 Water Services Act, 108 of 1997

Section three (1) of the Water Services Act, 108 of 1997, states that everyone has a right to access basic water supply and basic sanitation. De Visser *et al.* (2003:34) define basic water supply as the prescribed minimum standard of water supply services necessary for the reliable supply of a sufficient quantity and quality of water to households, including informal households to support life and personal hygiene. In the same manner, the Municipality System Act of 2000 is aligned to the Water Services Act, 108 of 1997 and clearly applies this Act by stipulating that basic services should be accessible, available, affordable and convenient and should top the agenda of service delivery in the municipalities.

Briefly, services should be provided in an effective, efficient, equitable and optimal manner (Reddy *et al.*, 2005:49).

2.9.3 Reconstruction and Development Programme

The RDP (1994) plays a major role in addressing South Africa‟s skewed Service Delivery Legacy (Smith & Green 2005:435). The RDP recognised the right of all South Africans to access clean water and adequate sanitation for the attainment of household water security. The right to access of water as stated in the RDP guidelines was translated into the National Legal Obligation (Smith & Green 2005:435).

2.9.4 Bill of Rights

The Democratic Government of South Africa binds all organs of government, including municipalities, to provide basic services enshrined in the Bill of Rights of the Constitution of the Republic of South Africa Act, 1996 (Act 108 of 1996). The aim of the government is to accelerate service delivery to communities (Nel 2006:106). This right was reflected in the South African Constitution 1996, which states that everyone has the right to access sufficient water in the Republic of South Africa (RSA, 1996).

2.9.5 Free Basic Water Policy (FBWP)

According to Smith and Green (2005:438), the South African Government announced that from February 2001, a basic supply of free water would be extended to all households. The primary target of all free basic water policy was

for poor households. Households for who free basic services represent a significant poverty alleviation measured and poor households would benefit the most from affordable basic water supply (Department of Water Affairs and Forestry (DWAF), (2002:7). The policy stems from the Constitution and the Water Services Act, which guarantees the right of access to basic water service for all, and recognises that nobody should be denied access to basic levels of service, if they cannot afford to pay for the service.

The FBWP states that provision of the basic amount of water consumed by poor households per month is free of charge and must be sustainable. The policy does, however, make provision for local governments through their water services‟ authorities to decide how they will apply the policy specifically and practically. It means that the right to basic water services is not absolute but subject to the state taking reasonable legislative and other measures, within its available resources, to achieve the progressive realisation of these rights (DWAF, 2003:29; Smith & Green, 2005:438; Earle *et al*., 2005:13).

The volume of water offered through the FBWP is recommended as 6 kl/6000 l of potable water per household per month. Six kl. per household per month provides 200 l per household per day, or 25 l per person living in an 8-member household per day. Six kilolitres of free basic water is delivered per household per month, via individual metered connections. The FBWP is driven by the National Department of Water Affairs and Forestry (DWAF) but set and implemented by local government. The water quality will receive attention in the next session.

2.10 WATER QUALITY

Kolanisi (2005:45) and Boyacioglu (2007:102) classify water quality in terms of its physical properties, microbial, as well as chemical properties. DWAF (2005:8) defines safe drinking water as water that is acceptable, according to standards, for humans to drink and use for other domestic purposes such as food preparation and bathing. It should contain no harmful concentration of chemical or microorganisms and should ideally have a pleasant appearance, taste and odour. Ascertaining water quality is crucial before use for various intended purposes such as for drinking, agriculture, recreation and industrial water uses. Water constituents determine the quality of water and the treatment required to reach the minimum standard as laid down in the water quality guidelines (Momba *et al.*, 2006:715).

The microbial, chemical and physical properties of water will be addressed in the next section.

2.10.1 Microbial water quality

Organisms that may contaminate water and are a health hazard to humans and households include Escheria coli, Salmonella, Syclosporas, Campylobacter Jejuna, Shigella and Vibrio Cholera (Obi *et al.*, 2002:287). These organisms can cause diarrhoea, which could be both severe and life threatening. According to Hillie *et al.* (2008:8), it is estimated that about 1.1 billion people globally drink

unsafe water. Hillie *et al*. (2008:11) further indicate that rural communities are the most affected with regard to unsafe drinking water.

Rural communities have their own way of judging water quality. They are generally not aware of pollutants that cannot be seen, tested or smelt, thus they are vulnerable to waterborne diseases (De Fontain, 2000:3). The vast majority of diarrhoea-related diseases in the world (88%) are also attributed to unsafe water, sanitation and hygiene (Hillie *et al*., 2008:8). Although these figures might have improved in recent years, through attempts made from water authorities to improve the quality of drinking water, underserved rural areas are still without quality water supplies and sanitation (SALGA, 2006:6). The most vulnerable to these water-related diseases, are children under the age of 6 years, the elderly and immune-compromised individuals, since their immune systems are not strong enough to fight off these infections. These diseases, as a result, affect most rural residents who use already compromised health facilities (Obi *et al*., 2002:287). Water-related infections are transmitted directly through individuals drinking contaminated water or indirectly through contaminated crops (Kolanisi, 2005:33; Zamxaka *et al*., 2004:339). In a study conducted in a rural community where residents used river water as a source of drinking water, it was found that the possible cause of microbial contamination of water sources include human and animal faeces or introduction of micro-organisms by birds and insects (Obi *et al*., 2002:287).

Detection of bacteria, potentially toxic substances, and other contaminants in water require laboratory-concluded tests. A basic microbiological technique is used in monitoring these microorganisms in water. The coli form group of bacteria

can be defined as the principal indicator of purity of water for household utilisation (Sami & Murray, 1998:333). According to the South African guideline as determined by the DWAF (1998:12), the total number of coli form in drinking water should be less than 10 colonies per 100 cm cubed. The presence of total coli form counts indicates that the water is contaminated with both faecal waste and other bacteria from the soil. Faecal coli form bacteria indicate that water is contaminated with faecal human or animal waste (Zamxaka *et al.*, 2004:339).

In view of the fact that water cannot be pure, the universal water quality index was devised into categories of water quality, as presented in Table 2.4, by Boyaciolglu (2007:102). Boyaciolglu (2007:10) developed a Universal Water Quality Index (UWQI) to provide a simpler method for describing the quality of surface water used for drinking water supply "class I: excellent, class II: acceptable, class III, polluted"". This index has water quality determinants such as concentration of Mercury, Cyanide, Fluoride, Nitrate, dissolved oxygen and pH, among others. According to these determinants, water is classified under either class to show its quality. The various classes of water quality are, as a result, tested accordingly. These are:

- Class I: This type of water needs simple physical treatment and disinfection such as rapid filtration and disinfection.
- Class II: This type of water needs normal physical treatment, chemical treatment, and disinfection such as pre-chlorination, coagulation, flocculation, decantation, filtration, disinfection.

- Class III: This type of water requires physical and chemical treatment (Boyacioglu, 2007:102).

The issue of levels of concentration of chemical compounds is set by DWAF (Ncube & Schutte, 2005:35). It is unfortunate that the levels of concentration of chemical compounds are not properly communicated to consumers because the information is highly technical for the local people, and no interventions have been made to increase awareness of consumers in the rural areas. These chemicals are determined by specific criteria.

Table 2.4 Classification of water quality for the development of UWQI

	Unit	**Class (excellent)**	**ClassII (acceptable)**	**Class III (polluted)**	**Remark**
Total coli form	CPU10/0ml	50	5000	50000	It used to indicate whether other potentially harmful bacteria may be Present
Cadmium	mg/l	0.003	0.005	0.01	Chemicals from industrial and domestic discharges
Cyanide	mg/l	0.01	0.05	0.1	
Mercury	mg/l	0.0001	0.0005	0.002	

Selenium	mg/l	0.01	0.01	0.02	Naturally occurring chemicals
Arsenic	mg/l	0.02	0.05	0.1	
Fluoride	mg/l	1	1.5	2	
Nitrate-nitrogen	mg/l	5	10	20	Chemicals from agricultural Activities
DO	mg/l	8	6	3	Operational monitoring parameters
Ph		6.5 - 8.5	5.5 - 6.4	>5.5	
			8.6 – 9	>9	
BOD	mg/l	<3	<5	<7	Indicator of organic pollution
Total phosphorus-Po	mg/l	0.02	0.16	0.65	It is included to satisfy the Ecological requirements of Certain types of environment.

2.10.2 Chemical water quality

Kolanisi (2005:19) defines chemical water constituents as the nature and concentration of dissolved substances such as salts, metals and organic chemicals. The chemicals in water generally occur in varied degrees, depending on the water (Hillie *et al*., 2008:5).

Studies confirm that South African ground water contains high levels of chemicals such as nitrates, fluoride, calcium, magnesium and phosphates (Sami & Murray, 1998:11; Pietersen, 2005:27; Kolanisi, 2005:19; Van Vuuren, 2007:14). Although chemicals are needed in a water consumer"s diet for health purposes, the WRC (1999:20) warns that high levels of these chemicals have a negative impact on their health. Venter *et al*. (2008:15) describe rainwater as generally free from chemicals. However, rainwater does contain minute quantities of carbon dioxide (or carbonic acid) and chloride derived from the air through which it passes in the atmosphere. These chemicals leave the water slightly acidic and are further acidified by the decomposition of organic matter in the soil and vegetation, and in this condition, it may have a solvent action on the rocks through which it passes (Venter *et al*, 2008:15). These chemicals are potentially harmful to human beings. Hillie *et al*. (2008:5) describe the characteristics of the different chemicals found in water as follows:

- Fluoride: Normal levels of fluoride are essential for bone and dental development. The government regulates that fluoride should be added to water to boost this development. Low levels can cause dental caries, whereas high levels of fluoride can affect the calcification of teeth, resulting

in dental fluorites. Fluoride is considered to be excessive if it is >1.0mg/l (Obi *et al*., 2007:231). Obi *et al*. (2007:231) associate excessive fluoride with slight mottling of dental enamel, tooth damage and crippling skeletal problems.

- Chromium: Kolanisi (2005:19) found chromium to be one of the chemicals found in water that could negatively affect human beings. Excessive amounts are associated with skin ulcers, as well as gastrointestinal and lung cancer (Obi *et al*., 2007:231).
- Nitrates: High levels of nitrates are dangerous to human health. The WRC (1999:87) and Van Vuuren (2007:14) report on a number of dangers associated with excessive nitrates in drinking water. When bottle-fed infants ingest water containing high level of nitrates, the body converts it to nitrites. Nitrites interfere with the oxygen carrying capacity of the child‟s blood (it replaces the oxygen in the red blood cells). It has been associated with a risk of stillbirth, methaemoglobinaemia gastric syndrome, (blue baby) characterised by a breathing difficulty, vomiting and diarrhoea, as well as cancers and hypertension.

It is evident that the monitoring of levels of chemicals in drinking water as quality parameter is vital to human health. Ncube and Schutte (2005:35) recommend that monitoring of water quality should be done to prevent human health hazards.

2.10.3 Physical water quality

Physical quality of water depends on the smell, taste and physical appearance (Kolanisi, 2005:22). Any inconsistencies associated with the physical water quality are generally easier to identify, especially by water consumers themselves.

All purifying techniques discussed earlier can affect the physical quality of water when used in an inappropriate manner. Chlorine, for example, when manually added by consumers to disinfect water, affects the physical quality of water due to its ability to dissipate quickly in water leaving high levels of organic residue (Momba *et al.*, 2006:720; Kolanisi, 2005:22). Physical water deterioration is caused by suspension of organic material, which causes the growth of microorganisms and affects the physical water treatment (Obi *et al*., 2007:233).

2.11 WATER TREATMENT BY THE GOVERNMENT

DWAF (2005:10) has found that although water is freely available in SA, it is costly, as it has to be desalinated and purified at the source by the consumers. Obi *et al.* (2007:229) and Hillie *et al.* (2008:35) state that in rural areas, water sources is usually treated in small units called Small Water Treatment Plants (SWTPs) by water service providers who have been contracted to supply potable water to rural communities in the remote areas. SWTPs are defined as water treatment systems that are installed by the SA government in rural communities in the remote areas which are not serviced, and which do not fall within the

confines of urban areas (Obi *et al.*, 2007:236). It includes water from boreholes and springs that are chlorinated. This treatment system is installed in rural communities and small municipalities. This is an attempt to access quality water for communities that are disadvantaged and for small communities that cannot afford big water treatment plants.

The SWTPs process generally includes pre-disinfection of water supplied directly from the river, coagulation-flocculation, sedimentation, and post-disinfection (Holtzhausen, 2005:6). A small amount of chlorine is added or some other disinfection method is used to kill bacteria or microorganisms that may be in the water. Filtration and disinfection are critical. Different filtration systems can be used and the most common methods used, include slow sand filtration, rapid gravity sand filtration or in some cases press filter (Obi *et al.,* 2007:236).

Disinfection is commonly done by chlorination (in different forms), coronation and ionisation. This purified water is then released into distribution systems. It is evident that this process needs much equipment and chemicals, which have to be precise and adequate to produce water that is of acceptable quality for human consumption. According to Earle *et al.* (2005:14), the local government has to recover operations and maintenance costs from the consumers. This method has not proven practical in rural areas because water is collected from communal taps. Cost recovery from water consumers is linked to poverty in rural areas as well as their willingness to pay for levels of service satisfaction received. Even though water treatment has become the golden standard in ensuring that safe water is supplied to the community, the challenge remains for treatment plants

that operators lack technical knowledge such as knowledge regarding chlorine dosages and determining flow rates of water.

2.12 CONCLUSION

This chapter gives an overview of the three main key areas of the research problem namely, Madibogo as a rural community with special reference to its characteristics, social status, demographics, socio-economic position consumer behaviour and service delivery. Education and training as a tool towards knowledge creation with emphasis on learning styles, teaching methods and challenges facing adult learners have also been discussed extensively. Community empowerment and capacity building have also been highlighted. The water policy and the human right to water have been addressed within the legislative framework.

CHAPTER 3: METHODOLOGY

3.1 INTRODUCTION

Chapter 3 outlines the method of research employed in this study. It explains the rationale behind the methodology, how the research was conducted and what steps were taken to ensure the validity of the study. The purpose of the study was to determine whether the WET-Programme could improve the knowledge of rural water consumers. The purpose of this study, as stated in Chapter 1, was the guiding force in this investigation. The methodology will follow the intervention research approach, which was deemed appropriate based on the literature review that was conducted. The intervention research model is applicable in this instance since the WET-Programme is new and implemented for the first time (De Vos, 1998:365). This intervention research model will be discussed further.

3.2 INTERVENTION RESEARCH

The study follows an intervention research approach, which is described by De Vos (2005:394), “as an action undertaken by a researcher with consent of the affected party to enhance or maintain the functioning or well-being of an individual, family, group or population”. It is the most utilised model in intervention research studies, because it enhances achievement of methodological credibility

and produces reliable findings (Comer *et al.*, 2004:251). The intervention is the result of the integration of two well-known development research models. These are Thomas‟s developmental research and utilisation model (1994:25-54) and Rothman‟s social research and development model (1994:25-54). The intervention approach is usually utilised when the intention of the study is to reduce problems experienced by the community. In this study, the intervention research was used with the possibility of improving consumers‟ knowledge through the WET-Programme.

This intervention programme aims to improve consumers‟ knowledge through educating and training them in water related issues. The intervention research process will consequently be discussed.

3.3 THE INTERVENTION RESEARCH PROCESS

Rothman and Thomas (1994:25) categorise intervention research into six phases namely (1) problem analysis and project planning, (2) information gathering and synthesis, (3) design, (4) early development and pilot testing, (5) evaluation and advanced development and (6) dissemination.

The six phases of the intervention process will be used as a guideline and it will be adapted for the purpose of this study (Fawcett *et al.*, 1994:25). The researcher completed certain phases in partnership with other researchers, as this study forms part of the multi-disciplinary study as explained in chapter one.

All the phases, which the researcher was actively involved individually in this study, will be highlighted in red in Table 3.1. The phases of intervention research are summarised from Rothman and Thomas (1994:25-54) and De Vos (1998: 384-404) in Table 3.1, and consist of various subdivisions.

Table 3.1 The phases of the intervention process

PHASE1	PHASE2	PHASE3	PHASE4	PHASE5	PHASE6
Problem analysis and project Planning	**Information gathering and synthesis**	**Design of intervention**	**Early development and pilot study**	**Evaluation and advanced development**	**Dissemina-tion**
Identifying and involving the participants	Using existing information sources	Designing an observational system	Developing a prototype or preliminary intervention	Selecting an experimental design	Preparing the product for dissemination
Gaining entry and cooperation	Studying natural examples	Specifying procedural elements of the intervention	Applying design criteria to the preliminary intervention concept	Collecting and analysing data	Identifying potential markets for the intervention
Identifying concerns of the population	Identifying functional elements of successful models			Replicating the intervention under field conditions.	Encouraging appropriate adaptation

Analysing identified concerns				Refining the intervention	Providing technical support for adopters
Setting goals and objectives					

3.3.1 Phase 1: Problem analysis and project planning

The first phase in the intervention process usually brings to the attention of the community the unrecognised problem that exists within their community. This is achieved through the analysis of the five steps of this phase, namely identifying and involving clients, gaining entry and co-operation from settings, identifying concerns of the population, analysing identified concerns and setting goals and objectives (Rothman & Thomas, 1994:27). These steps are discussed as applied in the study.

3.3.1.1 Identifying and involving participants

Hlophe and Modise from the North-West University, Department of Chemistry in Mafikeng, identified the Madibogo village as a rural area where the study could be conducted (Venter & Hlophe, 2008:128). The focus of their study was on the chemical aspects of water, evaluation of Nano filtration for the treatment of rural groundwater for potable use (Modise & Krieg, 2004:viii). The two researchers, Kolanisi and Molefe, from the North-West University, Potchefstroom, Consumer Sciences Department, were later brought on board to address the social

dimension that encompassed consumer attitudes, knowledge and operations towards basic water utilisation.

The previous study by Kolanisi (2005) in the same village about consumers" perceptions and household water utilisation of a rural water service provision enabled the researcher to start with the planning process which, according to Greyvenstein *et al.*, 1999:105), is vital for every study and provides the researcher with an insight of the community he or she is about to work with. The researcher, therefore, did not identify the community herself, but familiarised herself by studying the literature from previous studies in the same community.

3.3.1.2 Gaining entry and co-operation

The two researchers, Kolanisi and Molefe, focusing on two different aspects namely attitudes and knowledge, identified the participants for the WET-Programme, through numerous visits to Madibogo village before the implementation of the WET-programme. The reason for the visits was to provide the researchers with a better understanding of the area in which the research was to be conducted (Kolanisi, 2005:44). Gilbert (1998:307) confirms that this exercise also enables the researchers to build a relationship with the community in order to gain their participation and to support the research. During the visits to Madibogo, the two researchers introduced themselves to the community structures and identified the key community leaders as recommended by Sork and Cafforelle (1999:236). The chief granted permission to hold meetings with community members and to introduce the research. The researchers established a good relationship with the gatekeepers to arrange venues, meetings times and to confirm dates of meetings.

3.3.1.3 Identifying the concerns of the population

Sork and Cafforelle (1999:236) recommend that the researcher should not only rely on information available in literature but to do his or her own analysis and needs assessment to ensure that the programme is relevant to the community. The researcher concerned with the implementation of the WET-Programme endeavoured to understand the issues of concern to the population identified from the previous study by Kolanisi (2005) by visiting Madibogo. During the meetings, the community raised their concerns and expectations from the research. Their concerns included limited information on water. The concerns and expectations proved that the community had difficulty in identifying water quality determinants, following protocol when laying complaints, applying inappropriate coping strategies such as adding laundry detergents to bathing water in order to soften the hard water because they lack information on hygiene related issues, and lack of empowerment with regard to rational decision-making. The researcher of this project attended all the meetings so she understood the concerns of the population very well. Kolanisi (2005) identified the need for the WET-Programme from the previous study.

3.3.1.4 Analyse identified concerns

Analysis of the community concerns identified from the study by Kolanisi (2005) served as a guide in the compilation of the WET-Programme, which was to be used as an intervention for the same community.

3.3.1.5 Setting goals and objectives

The following objectives for the general education and training programme were

formulated based on Kolanisi and Hlophe‟s studies (2005).

- To purify water using Nano filtration treatment method.
- Design the education and training programme.

3.3.2 Phase 2: Information gathering and synthesis

In this phase, it is essential to discover what research has already been done in the Madibogo Village and what was written about the problem to avoid repetition and to further gain insight from what has already been done (De Vos, 2005:398). This phase consists of three steps, namely: using existing information sources, studying natural examples and communities as well as identifying functional elements of successful models.

3.3.2.1 Using existing information sources

The literature study explored by the researcher on the existing information sources including community and community‟s leadership structures were used to do an analysis of education programmes. During the study, not only water and consumer behaviour literature were surveyed, but also other available literature from other related areas, such as community development, adult education and evaluation. Comer *et al.* (2004:251) encourage researchers to complete this phase since their understanding of the issues or concerns will be improved and they will be in a position to identify the criteria for the formulation of appropriate and effective interventions.

3.3.2.2 Studying natural example

Research regarding individuals who have actually experienced the problem or a similar problem can lead to insight into the way forward. Studying unsuccessful programmes or interventions can lead to a better understanding of the current situation. In this instance, natural examples were not available as the WET-Programme was the only programme of its kind to be implemented in a rural community such as Madibogo, as indicated by community members.

3.3.2.3 Identifying functional elements of successful models

This step involves using information, which has been gathered, and analysis of the potentially useful features of an intervention. This can serve as a guide in the designing and development of activities. The models of other interventions were analysed and together with literature explored were useful to be considered as a guide towards the development of the WET-Programme.

3.3.3 Phase 3: Design of the intervention

In the design phase of intervention research, researchers and practitioners will specify the elements of the intervention and devise a detailed plan for the implementation of a pilot study to determine whether the intervention will be feasible (Comer *et al.,* 2004:251.) Rothman and Thomas (1994:34) and De Vos (1998:383) outline the two steps of the design phase as designing an observational system and specifying procedural elements of the intervention. During this phase, affected community members identified the conditions relating to water issues such as water quality and water quantity, which needed to be addressed.

3.3.3.1 Designing an observational system

This step was not applicable to this study because it is a short-term intervention; therefore, it was evaluated over the long term (Venter, 2006:91).

3.3.3.2 Specifying procedural elements of the intervention

The researchers also observed concerns and elements that could be used in the intervention (Kolanisi, 2005:76). Following the different phases, actions and procedures developed the WET-Programme. These phases, actions, and procedures are summarised for further clarification.

The findings from Kolanisi‟s study (2005:77) enabled the process of the development of the WET-Programme as a start. All the stakeholders concerned within the social dimension of the study led by Venter *et al*. (2008:1) contributed to this exercise.

The steps followed in the compilation of the WET-Programme will be discussed. They are:

i. Compiling information for the education programme

The concepts that needed to be addressed, upon which the WET-Programme information and outcomes were based, were extracted from the results from Kolanisi‟s study (Kolanisi, 2005:89). Comer *et al*. (2004:251) recommended that the information gathering and synthesising process should involve consulting appropriate sources for identification of criteria for the formulation of appropriate and effective intervention.

The booklet for the WET-Programme was compiled mostly by Venter M.D (see Appendix I) with the necessary information that was used as the basic guide on water such as water quality, quantity, water policies and household water utilisation (Venter *et al.*, 2008:1). The WET-Programme is available in the form of a hard copy or CD (Annexure I).

ii. Development of learning outcomes

The researcher developed the learning outcomes for the education programme (refer to Appendix C for the developed learning outcomes). These outcomes are clearly stated in the section.

Iii. Develop lesson plans and teaching aids

The researcher facilitated and transmitted the information using appropriate teaching aids. Appropriate lesson plans and teaching aids were developed by the course presenter in order to communicate the information from the education programme as well as help with the skills demonstrations by the educator (see Appendix J).

iv. Development of knowledge questionnaire

The researcher developed the knowledge questionnaire based on findings on consumer perceptions on household water utilisation and rural water service provision by Kolanisi in 2005. The classification of questions was based on Kolanisi"s study (2005:7). The following topics formed the basis of the test items: (1) Water quality comprises physical components, chemical components and microbial components (2) Water quantity, including availability, accessibility and affordability (3) Household utilisation such as household hygiene and uses of water (4) Social responsibility (sharing of responsibilities), which includes community and other

stakeholders‟ roles and FBWPs. By using these items, the knowledge questionnaire started as a 20-item pool comprising true or false. These items were generated from the literature. The questionnaire comprised two sections. The first section included demographic information relating to age, gender, educational background and residential area of the community members. Refer to the questionnaire (Appendix F & G).

The second section of the questionnaire tested the community members‟ knowledge with regard to specific items relating to water utilisation and service provision. The items generated were then sent to an expert panel, consisting of three consumer scientists and a researcher, to evaluate each question in terms of its relevance. The necessary adjustments were made based on their recommendations.

The knowledge questionnaire was piloted on a group similar to the target group prior to the main study to allow the researcher to familiarise herself with the study and to test the suitability of the questions. De Vos (2002:211) supports this exercise and further indicates that it helps the researcher to correct mistakes and to modify some of the questions. After the pilot study was conducted, unsuitable items were eliminated or changed if the items were not relevant or important for community members or if the wording of the questions was unsuitable. The column for “I do not know” was also added to give participants additional options. This resulted in a questionnaire comprising 20 items that were judged appropriate and important for community members. This questionnaire was used before and after the WET-Programme workshop was presented to see if participants‟

knowledge has increased. The knowledge test was compiled by means of a series of steps aimed at ensuring validity and reliability of the final product.

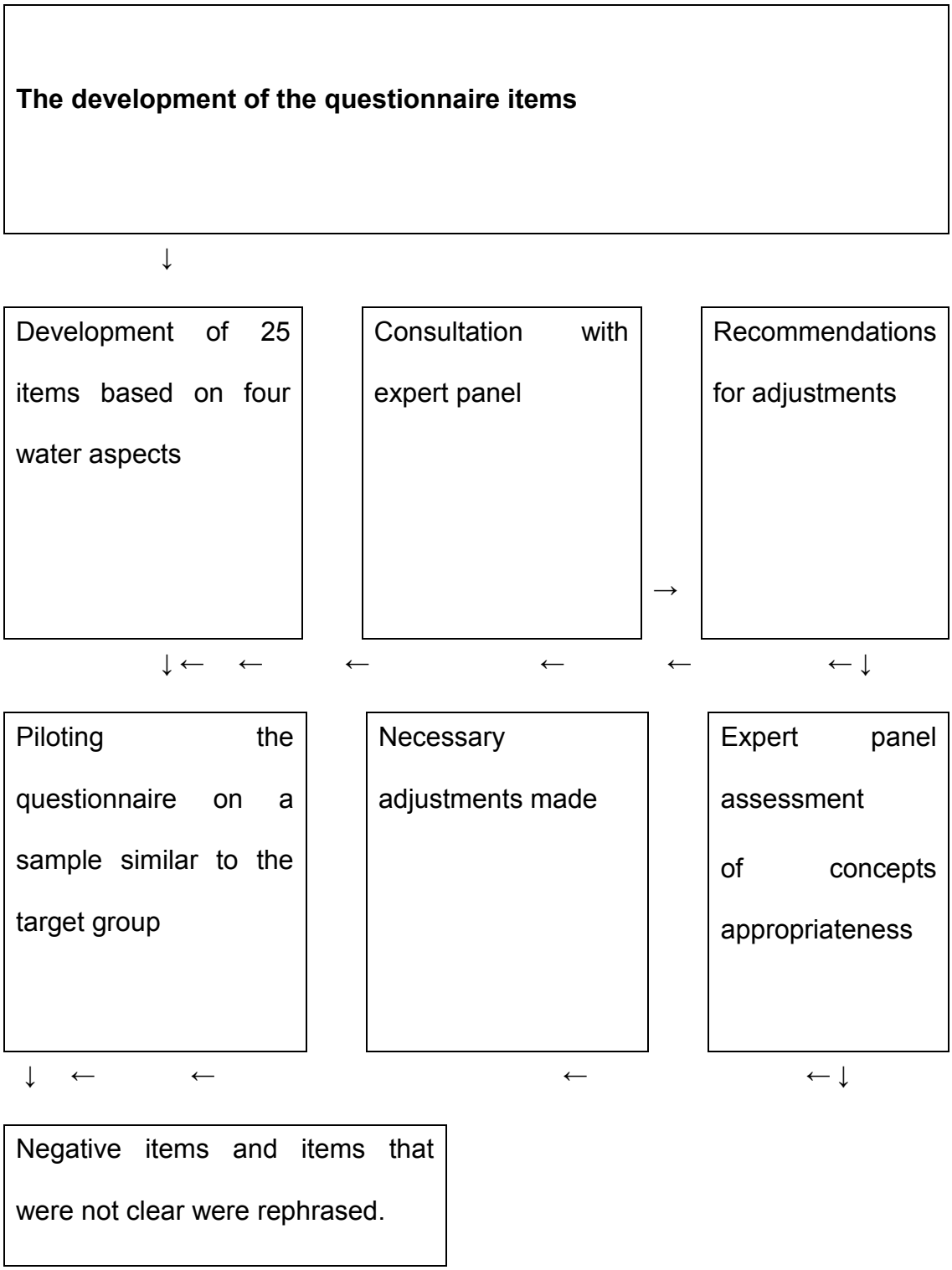

Figure 3.1 Summary of steps followed in the development of the knowledge questionnaire

v. The quality of measurement

The quality of quantitative measurement depends on the validity and reliability of the knowledge questionnare

- Validity of the knowledge questionnaire

  According to De Vos (2002:211) and Babbie (2001:143), a valid measuring instrument must measure what it is supposed to measure. To be valid, the instrument must, therefore, accurately measure the content in question. The following types of validity were considered for this research:

  - Face validity

  Venter (2006:179) describes face validity as being concerned with the sampling adequacy of the content. Venter (2006:179) and Anastashi (1988:144) state that the questionnaire should look valid with clear questions that are about the specific concept that the researcher wants to measure and must be relevant to those who will complete it. Face validity refers to whether the items of the test measure what they claim to measure. If the items do not, the participants might question the purpose of completing the questionnaires.

  - Content validity

  To ensure content validity, only those items that adequately addressed concepts that were water related were retained. Bryman (2001:70) indicates that thorough inspection and evaluation can confirm whether every item used represents a specific domain. To ensure content validity, subject expects who formed part of the panel evaluated the appropriateness, relevance, accuracy and formulation of the items for the knowledge questionnaire. The procedures followed in Figure 3.1 in

the development of the knowledge questionnaire ensured content validity of the questionnaire. The study by Kolanisi (2005) was also used to ensure content validity.

- Construct validity

Venter (2006:180), De Vos (1998:85) and Hayes (2000:101) describe construct validity of an instrument as the extent to which an instrument proves to be certain that it measures the theoretical construct that appears in the title.

- Convergent validity

Different ways were used to measure the same concept to ensure convergent validity. This includes questionnaires, focus groups and observations.

- Reliability of the knowledge questionnaire

The reliability of the questionnaire was determined by calculating the Cronbach‟s coefficient alpha of each variable. Cronbach‟s coefficient alpha measures how well a set of items or variables measures a single unidimensional latent construct.

Then 20 statements were subjected to an exploratory factor analysis to determine the correlation between different factors and the Cronbach's coefficient alpha was calculated. Internal reliability is obtained when the Cronbach‟s coefficient alpha is higher as 0.5 (Babbie 2001:143).If the

aggregate knowledge score is not reliable, individual reliable questions can be discussed

3.3.4 Early development and pilot study

An intervention is implemented and used on a trial basis to determine whether the research instruments will succeed at this level. This phase includes developing a prototype or preliminary intervention, conducting a pilot test and applying design criteria to the preliminary intervention concept.

3.3.4.1 Developing a prototype or preliminary intervention

Following this step, the procedure for preliminary intervention was applied when the WET-Programme went through different stages of development, evaluation and refinement. Feedback from consumers and implementers served as input towards the general development of the programme (Venter, 2006:16).

A pilot study for the WET-Programme was implemented at Madibogo village in the Tlhaping section, which was convenient and similar to the setting where the intervention will take place. Pilot studies are conducted in settings convenient for the researcher and similar or the same as the environment where the instrument will be put to use (De Vos, 2002:211). The programme was implemented and 18 participants were part of this pilot study.

3.3.4.2 Applying design criteria to the preliminary intervention concept

De Vos (1998:396) and Venter (2006:170) suggest that the questions to be asked and answered should be in order to apply the design criteria to the preliminary

intervention concept. The questions include: Is the intervention effective? Is it replicable? Is it simple? Who are the end users? Will it be adaptable to various contexts? Is it compatible with local customs and values? Once the questions are answered satisfactorily, the programme evaluation can continue. The results from the pilot study will be used to answer those questions.

- Pilot study

After all the necessary arrangements were finalised the programme could commence. The three-day course (refer to Appendix I for the pilot study programme) was characterised by activities such as presentation of the course material allowing learners to engage in activities such as role-play, discussions, brainstorming, games and other creative activities throughout the course, and completion of the knowledge questionnaire before and after the course.

- Sampling for pilot study

A purposeful sample was used, as only people from a particular section, Tlhaping were expected to undergo the pilot education programme. The targeted individuals originated from the section, which had a pilot water purifying plant set up by the NWU Chemistry Department, and they had to volunteer to attend the education programme. The assumption was that the presence of the piloting plant n that particular section could have triggered curiosity and thirst for knowledge. Secondly, a certain criterion was set for the volunteers to be between the ages 18-35. Justification for setting this criterion was to include adults as per the definition of an adult (Kelly, 1996:1; Gravett, 2003:3), as it was believed they are the most active members of the

community who do most of the household chores. They are also more exposed and informed on water issues. The literacy level and medium was also of concern, thus participants were expected to speak both local (Tswana and English) languages. Unfortunately, after several reminders the volunteers failed to attend the programme. Only two volunteers arrived. Due to time factors the programme could not be rescheduled. Therefore, the researcher extended the invitation to other consumers of rural water service in the same section and other sections of the village in a manner of accidental sampling.

Accidental sampling is a non-probability sample where a researcher selects and uses available participants to suit his/her desired criteria and research purpose (Powell, 1997). Approximately twenty participants were considered in the study. Two participants dropped out and did not complete the study. Thus, the number was reduced to 18.

3.3.5 Phase 5: Evaluation and advanced development of the training programme

The developed programme should now be evaluated and adjustments made accordingly. A causal relationship should be established between the intervention and the behaviours and related conditions targeted for change. Four steps in this phase will be discussed, namely: selecting and experimental design and replicating the intervention under field condition. After the piloting of the WET-Programme changes was made on the programme, that is additional information, which was deemed necessary was added. Items in the questionnaire, which were

not relevant, were removed and additional items were added as explained in 3.3.3.2.

3.3.5.1 Selecting an experimental design

The initial arrangements of the education and training programme consisted of: (1) arranging with gatekeepers in the community for an appropriate date on which to visit the community (2) determining the number of attendees (3) making the necessary travel arrangements (4) recruiting a purposeful sample. After consultations, discussions and delays, permission was granted to implement the WET-programme.

- Sampling for final study

  The eleven sections of Madibogo were targeted and a select sample of 20 people attended the education programme. A purposeful sample was used because the participants were to be adults between the ages … Adults are performing most home chores including using water for most activities. The criteria also required that participants should be able to speak both local language and English so that during administration of the programme the language should not be a barrier.

3.3.5.2 Collecting and analysing data during the final study

Knowledge questionnaires were completed before (baseline) and after the learning programme for the quantitative data of the final study. The FAS questionnaires were also completed after the learning programme. Both the knowledge and the FAS questionnaires were then sorted according to De Vos (1998:204) and cleaned up after which the data was computerised, captured and

statistically analysed using SAS (2003). The qualitative data was tape recorded and then interpreted and analysed by the researcher.

3.3.5.3 Replicating the intervention under field conditions

Finally a three-day course commenced for the final programme (refer to Appendix I for the final programme). The course consisted of activities such as presentation of the course material allowing learners to engage in activities such as role-play, discussions, brainstorming, games and other creative activities throughout the course, and completion of the knowledge questionnaire before and after the course.

3.3.5.4 Refining the intervention

After the implementation of the final programme, the necessary recommendations were made.

3.3.6 Phase 6: Dissemination

Once the intervention was field tested and evaluated, it was ready for dissemination. This is the final step of the intervention research, according to Rothman and Thomas (1994:39). This step follows once the community intervention has been tested and evaluated. The dissemination phase consists of the five steps, which ensure the success of the intervention programme, namely:

- Preparing the product for dissemination.
- Identifying potential markets for interventions.
- Creating a demand for intervention.
- Encouraging appropriate adaptation.

- Providing technical support for adapter.

The success of the intervention can be determined once all these steps have been completed.

3.3.6.1 Preparing the product for dissemination

Aspects such as name for the programme, the price and standards for the use of the intervention should be established at this stage. Appendix D outlines a detailed, systematic action plan, which ensured that all the preparations were completed before the dissemination of the final programme.

3.3.6.2 Creating a demand for the intervention

Potential users of the intervention should be convinced of the benefits for them personally by modelling the innovation by word-of-mouth or by advertising.

3.3.6.3 Encouraging appropriate adaptation

Once an innovation has been originally developed, adaptation of it can be made when adopters modify the intervention to suit local conditions.

3.4 EVALUATION OF THE WET-PROGRAMME

To determine how successful the programme was, there is a need for evaluation (De Vos, 1998:393). There is a relationship between evaluation and assessment, will be discussed.

3.4.1 Assessment

According to De Vos (1998:393) assessment is part of the programme evaluation. It gives an understanding of what someone knows, what Individuals understand and what he or she can do (Venter, 2006:184). Assessment measures the knowledge, attitudes, skills and values to assess if learning was effective and if there was a possible change in knowledge, attitude, skills and values. However, various authors indicate that attitude is deeply rooted, therefore, it cannot easily be changed (Smith & Green, 2005:435). For this study, the focus is mainly on improving knowledge and skills of consumers; therefore, attitude and values were not measured. Knowledge was measured with a standardised knowledge questionnaire and skills by means of quantitative methods such as projective technique, role-play, and discussions.

3.4.2 Programme evaluation

The Facilitation Assessment Scale (FAS)(refer to Appendix L), which was adopted from Weyers and Rankin (2007:94) was used for the programme evaluation. The FAS has been made to systematically assess the learning events on goal attainment, after Weyers and Rankin (2007:94) discovered that there has been the lack of a standardised and easy to administer assessment scales. The two authors then developed such an assessment scale namely the FAS. The FAS “are used to measure and analyse the impact of the facilitator and facilitation process on the outcomes of workshops” (Weyers and Rankin (2007:92). The two authors further indicate that the verification process of the

FAS makes it a reliable tool for the measurement of the effect of facilitation on the participants, as well as for the relevance and value of these learning events.

The scale consists of six subscales namely the:

- Assessment of facilitator"s aptitude. In this section, the ability of the facilitator was assessed.
- Assessment of the facilitator"s presentation skills. In this section satisfaction/dissatisfaction of participants, on the facilitator"s skills and training context was assessed.
- Assessment of the learning process. This section assessed the extent to which the learning experience has improved the participants" knowledge and increased the skills.
- Assessment of the presentation context. This section assessed whether the participants enjoyed the workshop.
- Assessment of the relevance of the programme. This level assesses whether the participants will be able to apply what they learnt to solve their problems.
- Assessment of the value of the workshop.

The FAS is an indication whether learning took place and is not a substitute for a more comprehensive and scientific measurement. In the study, a standardised knowledge questionnaire and several qualitative methods were used to measure knowledge and skills improvement of participants. This scale was hence deemed

suitable to assess the WET-Programme workshop since this scale can be used in a variety of settings that involve adult participants from all population groups.

The authors (Weyers and Rankin, 2007:92-112) use the term “impact of the programme”. The use of the word “impact” in this study is not used in the same context as the term is usually used for a long-term intervention‟s impact but is used within the context of the FAS-questionnaire.

3.5 CONCLUSION

The detailed statistical analysis and results of the study are discussed in Chapter 4. This chapter provided has a comprehensive discussion of the research methodology. The quantitative and qualitative approaches were employed. A questionnaire was used as the main tool for data collection. With the help of the North-West University Statistics Department, computer-aided statistics and analysis were used to determine the results of the study. The detailed statistical analysis and the results of the study are discussed in Chapter 4.

CHAPTER 4: FINDINGS AND DISCUSSION

4.1 INTRODUCTION

In chapter 4 discusses the results of the empirical investigation conducted to determine whether the WET-Programme could improve the knowledge of the rural water consumers. The results of both the pilot study and the final programme will be presented in the form of the quantitative and qualitative discussions. This section also presents the measurement of the effect of the workshop.

4.2 STATISTICAL ANALYSIS

The background regarding the statistical analysis will be discussed in the next section

4.2.1 The results of questionnaire development

A questionnaire was developed to test knowledge and practices of the community with regard to water utilisation and service provision. Participants completed the questionnaire before and after the WET-Programme was presented. Factor analysis was done on the results from the questionnaire by using the scale discrimination technique. Exploratory factor analysis was applied to determine the correlation between different factors to ensure construct validity.

For each factor in the questionnaire, the Cronbach's alpha coefficient was calculated to determine its reliability. Cronbach‟s alpha coefficient is a measurement of internal consistency (reliability). A reliable Cronbach‟s alpha coefficient for a questionnaire is higher than 0.5. If it is lower, the research process or results are not reliable. It only means the total of knowledge changes of the questionnaire cannot be used, but change in individual questions can be used as reliable information.

4.2.2 Statistical significance of results

The paired t-test was used to determine whether the results (difference of mean score of the participants before the programme and means score after programme) were statistically significant. The p-value was calculated and the criteria for statistical significant reliability of results in a large sample are a small p-value (e.g. smaller than 0.05). It does not, however, indicate that the results are practical and significant, especially in smaller samples. The term “practical significance” can be understood to be a large enough difference to have an effect in practice. When working with smaller samples it is necessary to calculate the effect size (d-value). The effect size (d-value) is independent of sample size and is a measurement of practical significance (Steyn, 2000:3).

Cohen (1993) gives the following guidelines for interpretation of the effect size (d):

d ≈ 0.2 small effect and not practically significant;

d ≈ 0.5 medium effect that might be of practical significance; and

d ≈ 0.8 large effect that is significant in practice.

4.3 RESULTS OF PILOT STUDY

Both quantitative and qualitative findings will be presented and discussed. The integrated research method used allowed numerical and verbal data that were gathered to complement each other to provide authentic results.

4.3.1 The quantitative results discussion

This type of findings reveals the contribution made by the participants who completed the knowledge questionnaire. Knowledge improvement is reported in numerical values. These findings are presented in the order the questions from the knowledge questionnaire were asked to the WET-workshop participants.

The quantitative results are categorised into the demographics of the participants, which include the gender, age and location of the participants and other categories, including knowledge measurement, and programme evaluation.
The results of these categories will be displayed and discussed. The number of participants will at times vary from 17 to 18 because of certain information that was incorrectly completed by participants.

4.3.1.1 Demographics of participants

There was a well-balanced grouping representing both genders. Females were just a fraction more than males. This was found to be interesting as most studies indicate that water is usually a concern of women and men who are usually not seen as the primary stakeholders chiefly involved in water issues (Van Vuuren, 2007:18 ; Holtzhausen, 2005:18 ; Van Schalkwyk,19996:22). When the

researcher extended an invitation to interested individuals to participate in the workshop, women showed more interest than men.

Demographics include gender and age in Tables 4.1 and 4.2. Table 4.3 indicates the location of the participants.

Table 4.1 Gender of participants

Gender	Number	Percentage
Female	9	52.94%
Male	8	47.06%
Total:	**17**	**100%**

The majority of the participants (80.2%) in the education programme were between the ages of 18-33 as shown in Table 4.2. Two participants (11.8%) were above the specified age group, but they were allowed to participate because one of them was a volunteer who had been keen in attending the course. It should also be mentioned that the eldest participant was illiterate who also went against the set criteria. Both of the participants were motivated to attend the course. Even though the inclusion of the two participants breached the criterion specifications, it is argued that their interest showed an unfulfilled need that motivated them to be part of the work session (Hoyer & MacInnis, 2006:59).

Table 4.2 Age of participants

Age	Frequency	Percentage	Cumulative frequency	Cumulative percentage
18	2	11.76	2	11.26
20	2	11.76	4	23.53
21	1	5.88	5	29.41
22	2	11.76	7	41.18
25	2	11.76	9	52.94
29	2	11.76	11	64.71
31	1	5.88	12	70.59
33	2	11.76	14	82.24
35	1	5.88	15	88.24
43	1	5.88	16	94.12
49	1	5.88	17	100.00

Table 4.3 reveals that the majority of participants were from Tlhaping. This is because it was nearest to the venue where the course was conducted and this could be motivation activated by the presence of the pilot purifying plant. The other reason was that the participants were keen to improve their lives. Even though the workshop was marketed in other sections of the village, they were represented by only 10% of the total participants.

Table 4.3 Participants' location

Village section name	Number of participants
Lehahleng	1
Dikgatlong	1
Morolong	2
Tlhaping	13

4.3.1.2 Knowledge measurement

The questionnaire was completed before and after the WET-Programme. Table 4.4 presents the findings of the knowledge measurement. The value of the Cronbach‟s coefficient alpha was not above 0.5, so the total score of participants in the knowledge test could not be used. However, the effect size for certain questions was statistically significant and subsequently the change**s** in knowledge of individual questions from the results of the knowledge test for the pilot study are discussed. Only the statements where there are practical reliable increases in knowledge (medium and large effect size will be discussed namely statement 1, 8, 11, 14 and 19. The answer to question 1 (*medium effect size*) and 8 *(large effect size*) indicates that the participants‟ knowledge about factors affecting the quality of water increased. The knowledge about the provision of free basic water also increased in a practical significant manner.

Table 4.4 Measurement of participants' knowledge

Variable	N	Mean know-ledge % before	Stan-dard devia-tion	Mean know-ledge % after	Std Dev	p-value	d-value
1.Water that looks clean and clear is suitable for drinking	18	11	0.323	33	0.485	0.416	0.520 **
2.Water from rivers is suitable for drinking water	18	100	0	100	0	-	-
3.We must receive all our water free of charge	18	50	0.514	83	0.383	0.01	0.687**
4.The government must make sure that everybody receives clean and fresh water daily	18	100	0	94	0.243	0.332	0.243*
5. Water can be stored in any container and no lid is necessary	18	94	0.236	88	0.323	0.331	0.236*
6.Water containers need to be washed as often as possible	17	100	0	100	0	-	-

7.Taps that leak will be fixed by the government	18	38	0.502	61	0.502	0-104	0.405*
8.The RDP provides water	18	33	0.485	75	0.447	0.004	0.854***
9.South Africa is a dry country and we must save water	18	83	0.383	94	0.236	0.331	0.236*
10.All water that is purified tastes bad	18	83	0.383	72	0.461	0.331	0.236
11. Toilets must be built near your borehole	18	61	0.502	94	0.236	0.01	0.687**
12.If your water is not suitable to drink the only thing you can do is complain	18	10	0	88	0.323	0.163	0.344*
13. You are not allowed to form part of a Water Users Association	18	83	0.383	83	0.383	1	0.236*
14.Water can be purified by throwing cement into it	18	50	0.514	0.5	0.236	0-002	0.869***
15.Washing your hair in your village"s water will turn your hair/	18	50	0.514	33	0.485	0-269	0.270*

discolour your hair (ginger)							
16.The community does not like strangers to purify their water	18	61	0.502	88	0.323	0-056	0.484*
17.The machine that is used to purify the water is not our responsibility	18	55	0.511	66	0.485	0.430	0.191
18. We can survive without water	18	100	0	100	0	-	-
19. Government does not care if we have /do not have enough clear, safe drinking water	18	77	0.428	72	0.461	0-717	0.869***
20. The water purifying machine can be costly	18	88	0.323	94	0.236	0-579	0.133

***Low effect** ****Medium effect** *****Large effect**

Only the statements where there are practical reliable increases in knowledge (medium and large effect size will be discussed namely statement 1, 8, 11, 14 and 19. The answer to question 1 (*medium effect size*) and 8 *(large effect size*) indicates that the participants knowledge about factors affecting the quality of water increased. The knowledge about the provision of free basic water also increased in a practical significant manner.

Question 4 (*small effect size*) and 19 (*large effect size*) revealed an interesting finding. Both of these questions dealt with government responsibilities. However, according to the results in Table 4.4, the participants had different ideas after undergoing the education and training programme about the role of government. There are two reasons for these responses. One reason is that the participants are still not clear of roles and responsibilities of government. Secondly, the depreciation could be an indication of transformation, indicating that consumers are trying to take some kind of responsibility towards their own services. This, therefore, signifies a need for reinforcement in consumer education, and that creating and providing information on roles and responsibilities of various stakeholders need to be given more attention.

Question 11 addresses the distance between the borehole and toilet was well understood by participants. After the course, more participants appeared to have captured the implications of question 11. Question 14 (*large effect size*) indicates that the percentage that believe that cement can be used to soften water significantly decreased this is due to the harmful effects of cement that were emphasised during the education programme.

If the knowledge score of a person increases, it indicates an increase in knowledge of the individual. However, when the Cronbach's coefficient alpha was calculated for the knowledge-questionnaire where the totals were not statistically reliable because the Cronbach‟s coefficient alpha was less than 0.5, therefore, the totals of the questionnaires could not be used. The d-value or effect size, that indicates the practical significance of the results, is calculated to determine

whether there is a difference between the scores before and after the intervention. However, the individual questions were practically significant and could still be used. The d-value indicates the effect size of the change in the knowledge score from before the educational programme to after the intervention.

4.3.2 Qualitative results discussion

Focus groups were used for discussion and reflection during the education and training programme. The qualitative results presented were analysed by the researcher.

4.3.2.1 Skills measurement

Focus group discussions were used as a platform for reflection and information synthesis and to support the quantitative data. To reinforce and repeat the information to stimulate desired response, various techniques were used to guide focus group discussions. These techniques included projective techniques, role-plays and group discussions.

- **Projective technique**

  After each session, participants were given a chance to synthesize the information and review whether they had understood the message. When participants were presented with three jars of water from various water sources after having a session on water quality these were the results presented in Table 4.5. This was found regardless of the new information received about not relying on physical appearance when judging water quality. The participants still believed that physical appearance of water

was the main determining factor of good drinking water. The results of the pre and post-knowledge questionnaire presented in Table 4.4 (statement 1) confirm this statement.

Table 4.5 Comparison of water jars from different water sources

Jar	N=participants chose a jar	Reasons for choosing a particular jar	N
Jar 1 Mineral water	9	Sparkling, clean, good, pure, no smell, safe, no chemicals, fresh bubbly, drinkable, beautiful colour	18
Jar 2 Swimming pool water	3	No bubbles, no smell, clean, good drinking water	18
Jar 3 Madibogo water	6	Sparkling, clean, fresh, no impurities	18

This was found regardless of the new information received about not relying on physical appearance when judging water quality. The participants still believed that physical appearance of water was the main determining factor of good drinking water. The results of the pre and post-knowledge questionnaire presented in Table 4.4 (statement 1) confirm this statement.

- **Role-play**

  In the role-play, participants showed that they had understood the lesson about roles and responsibilities of community members as well as stakeholders. In the role-play participants who assimilated the community who were to receive a service from a service provider (stakeholder in the water service provision) managed to ask critical questions that were of importance before accepting the water service that was offered to them. These are some of the interesting questions presented as quotes*: "How will* we *know if the water is clean; Bring us proof that will tell us about the contents of water? We can see that water is clean but we are not sure if it is up to standard?* 'From the play it was evident that participants have acquired information that they did not have before they participated in the programme.

- **Group discussions**

  Participants were asked to divide themselves into small groups of five to discuss their water household utilization. Table 4.6 presents participants perspective of their water and their coping strategies (strategies such as adding laundry detergents in the bath water hoping to soften hard water).

Table 4.6 Consumer coping strategies

Consumer perspectives	Coping Strategies
Water tastes salty and bitter	Buy water from those with tanks Visitors bring own water
Milky colour (participants believed that the milky colour came from limestone inside the reservoir)	Use chlorine

Has a smell (car oil)	Buy water from those with tanks Visitors bring own water
Coagulates with powdered milk and whitener	Must let the tea cool before they add the whitener
Skin feels dry after bathing	Add powdered soap to bathing water to soften the water
Water does not form any lather	Add foam bath or powdered soap
Water does not remove grease from laundry	Addition of paraffin to laundry water and bathing Boil the water for laundry Use more soap powder

Participants made it clear that it would be difficult for them not to use their coping strategies. These were their statements: *"no matter how much you can teach us, we shall remain using these substances because they work for us"; "we do not have money, this works for us"; "the taps are far from our households, so it is better for us to add cement in our laundry water to save water and time"; " we can only let go if we can receive good quality water"*. The reasons provided for this action resulted from the inability to afford foam water softeners. They also mentioned that at times they even run out of powdered soap, hence, one of the substances that are added in the bathing water is paraffin. It is believed that paraffin is good especially for the darker skins. These practices and coping strategies are the result of trying to cope with usage of hard water. Hard water is the result of high concentration of calcium and magnesium (Hille *et al*., 2006:6). The health risks associated with the high concentration of these minerals involves liver damage and kidney stones (Hille *et al*., 2006:6). Other negative effects of hard water on households include more fuel cost, frequent repairs and purchasing of electrical appliances, regular maintenance of pipes. Furthermore, hard water itself might not pose any harm, but the coping strategies or practices might

endanger one‟s life. The practices might bring temporary relief but they can cause more damage in the end. Although there is no valid proof of the negative health impacts caused by the use of powdered soap in bathing water, but it is generally assumed that powered soap is meant for washing clothes. Most of the powdered soap brands have cautioned consumers to moisturize their hands immediately after wash and more so when it is used to wash one‟s hair or face. Paraffin is a fuel that is commonly used for stoves and lamps. Skin exposure to paraffin may result in dermatitis through the extraction of endogenous skin lipids. This can be associated with the complaint launched by the participants that the water caused them to have dark patches on their faces. Even though there is no evident correlation between paraffin and cancer, but chronic skin exposure might result in tumour genesis (Chillcot, 2006).

In relation to these findings, it can be argued that the integration of the two methods provided a good insight of participants‟ change in knowledge. It further reflected the strengths of each research method. There is an indication that knowledge of participants increased. Nevertheless, some findings of this study show that even though the participants had undergone the education programme, they still retain some of their beliefs. This, therefore, suggests that there is still more to be done. These results suggest that certain changes in the programme and approach to qualitative tools as well as encouragement to participants to get involved in community structures such as water committees can bring better results when the adapted programme can be implemented in the same community.

4.4 RESULTS OF THE FINAL PROGRAMME

The measuring instruments and content of the programme were adapted after the pilot programme. The results of the final programme on consumer knowledge entail quantitative data, qualitative data as well as the evaluation of the workshop.

4.4.1 Quantitative findings

4.4.1.1 Demographic information

The following findings give an insight with regard to the participants who participated in the study. Most participants were between the ages of 20 and 22 (28 percent as presented in Figure 4.1)

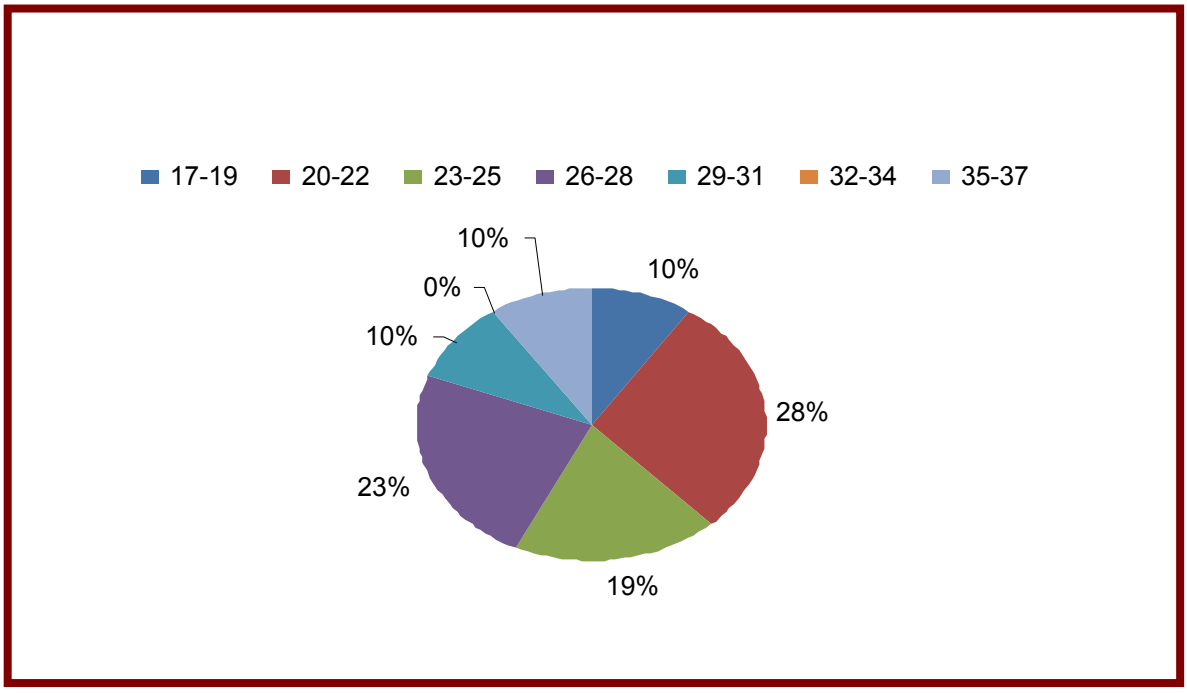

Figure 4.1 Age of participants

Figure 4.2 displays the gender of participants, where females represent the higher number than that of males. The percentage of females was 81 per cent to 19 per cent males. This information proves that women mostly attend education and training programmes.

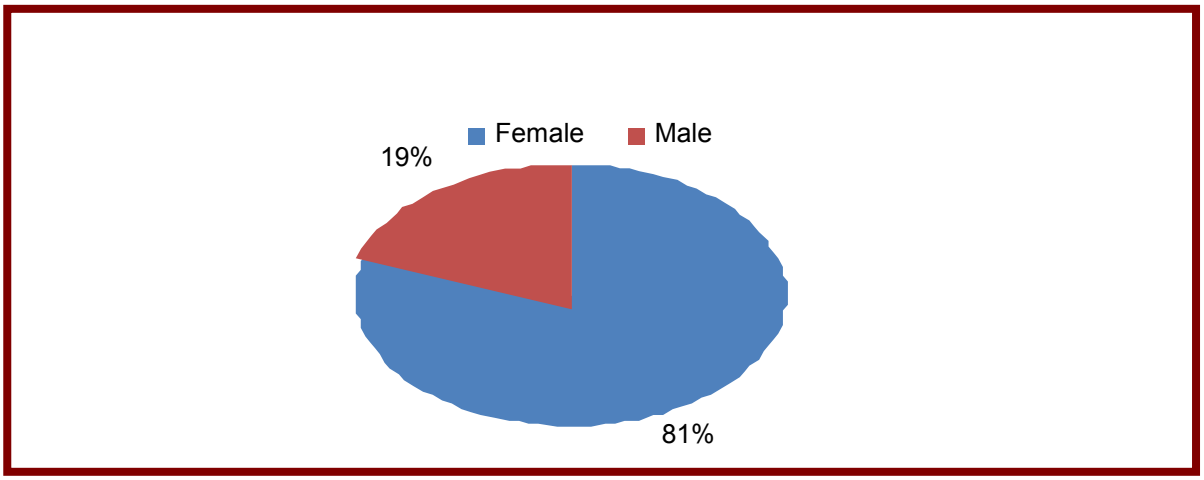

Figure 4.2 Gender of participants

Eighty five per cent of the participants had matric and the lowest education was grade 10, as indicated in Figure 4.3.

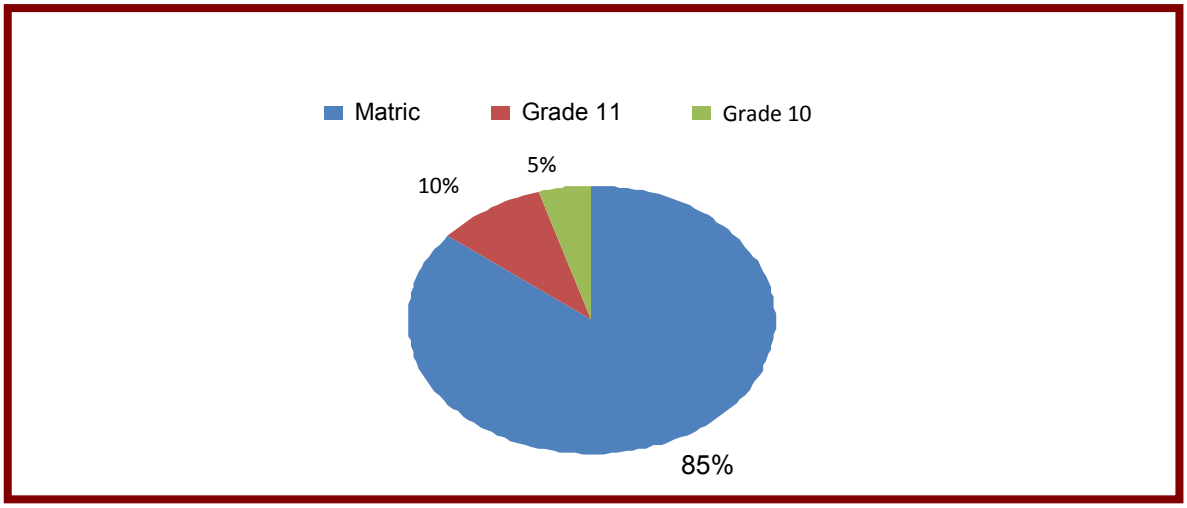

Figure 4.3 Education levels of the participants

Most participants (61 per cent) came from Lehatlheng section as the core village of Madibogo. However, participants from other sections were allowed to participate (refer to Figure 4.4). It was found that adhering to the set criteria had a positive impact in this study.

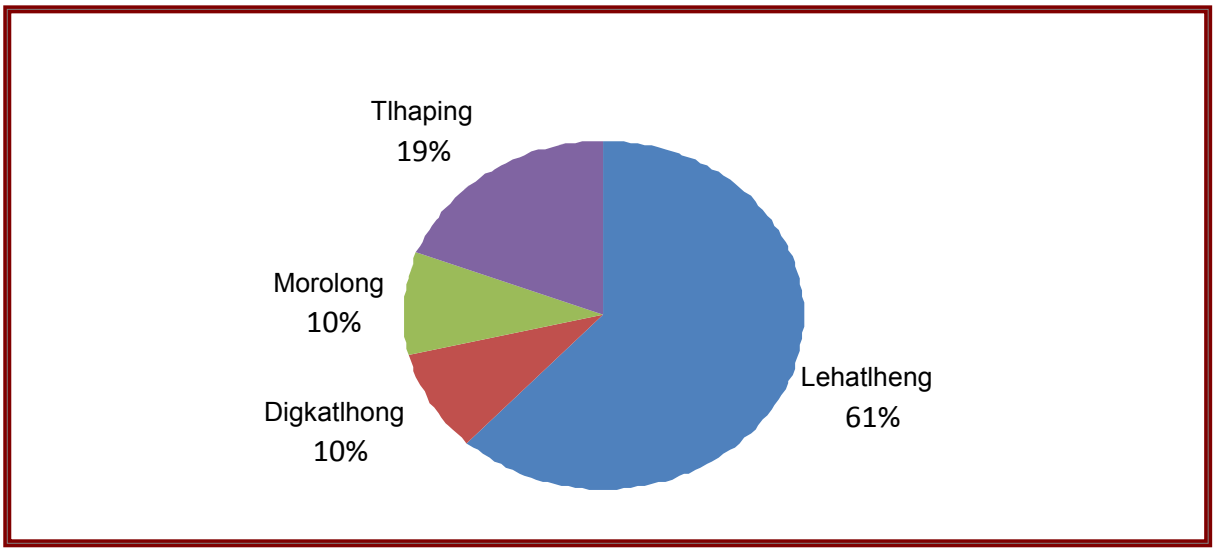

Figure 4.4 The village sections where the participants were residing

The knowledge measurement on the WET-Programme will be discussed in the next section.

4.4.2 Knowledge measurement

In order to establish whether there were changes in the knowledge of the participants, the SAS (2003) was used to analyse the results. The scores and measurements of knowledge for each individual before and after attending the programme were analysed to indicate an increase in knowledge, which indicated the effect of the programme.

The Cronbach‟s coefficient alpha estimates the reliability of the scale by determining the internal consistency of the test or the average correlation of items within the test. The interpretation of data, and determination of reliability concerning the final knowledge questionnaire was done using Cronbach‟s coefficient alpha, the t-test and effect sizes. The value of the Cronbach‟s coefficient alpha for the adapted questionnaire was 0.6, which indicates that the questionnaire was reliable. Therefore, it can be concluded that the WET-Programme workshop had a positive impact on the participants‟ knowledge. The differences between the individual knowledge questions before and after are presented in Table 4.7.

Table 4.7 Final measurement of the participants' knowledge

Variable	N	Mean % before	Std Dev Before	Mean % After	Std Dev After	P value	Effect size
1. Water that looks clean and clear might still not be suitable for drinking.	21	0.5714	0.5071	0.1905	0.4024	0.007700	0.65***
2. Although water is a natural resource we must pay for water services.	21	0.6190	0.4976	0.8095	0.4024	0.1036	0.37**

3. Water services are partly the community"s responsibility.	20	0.7	0.4702	0.9048	0.3008	0.1036	0.38**
4. Water containers need to be washed as often as possible.	20	0.95	0.2236	1	0	0.3299	0.22*
5. Water containers need to be covered.	21	0.0476	0.2182	0	0	0.3293	0.22*
6. Taps that leak must be fixed by the local government	21	0.7619	0.4364	0.1429	0.3586	0.1623	0.51***
7. The RDP provides water	21	0.5714	0.5071	0.9048	0.3008	0.0049	0.69***
8. South Africa is a dry country and we must save water	21	0.7143	0.4629	0.9524	0.2182	0.0565	0.44**
9. Purification improves the quality of water.	21	0.8095	0.4024	0.9524	0.2182	0.0829	0.40**
10. Toilets must be built near your borehole	21	0.6190	0.4976	0.9048	0.3008	0.0104	0.62***

11. All communities should have water committees	21	1	0	1	0	1	0.00*
12. Hard water is dangerous to human health	21	0.3810	0.4976	0.2857	0.4629	0.493	0.15*
13. If your water is not suitable to drink you can complain	21	0.9048	0.3008	1	0	0.1623	0.32*
14. The operations/maintenance of water purifying machines is partly a community responsibility.	21	0.7619	0.4364	0.8095	0.4024	0.5764	0.12*
15. Government must ensure that water delivered to community complies with South African Water Quality standards	20	0.95	0.2236	1	0	0.3299	0.22*
16. The water-purifying machine can be costly to the community.	21	0.5714	0.5071	0.6667	0.4830	0.3293	0.22*
17. Consumer rights are the same as Human rights	21	0.8571	0.3586	1	0	0.0829	0.40**

18. The government is giving free 6kl water per/household/month	21	0.3333	0.4830	0.7619	0.4364	0.0009	0.85***
19. There is no such a thing as pure water	21	0.6667	0.4830	0.7619	0.4364	0.4276	0.18*
20. Excess mineral salts in water are not good for human consumption.	21	0.7143	0.4629	0.9047	0.3008	0.1036	0.37**

Low effect** ****Medium effect** ** Large effect**

Only the statements where there are practical reliable increases in knowledge (medium and large effect size will be discussed namely statement 1, 2, 3, 6, 7 8, 9, 10, 17, 18, and 20. The answer to question 9, 20 (*medium effect size*) and 1 *(large effect size*) indicates that the participants knowledge about factors affecting the quality of water increased. The knowledge about the provision of free basic water also increased in a practical significant manner.

Question 2, 8 (*medium effect size*) and 6 (*large effect size*) revealed an interesting finding. All of these questions dealt with community‟s responsibilities. According to the results in Table 4.7, the participants‟ Knowledge increased remarkably after undergoing the education and training programme. The reason for these responses could be an indication of transformation, indicating that consumers are trying to take some kind of responsibility towards their own

services. This, therefore, signifies the positive effect of the WET-Programme on the knowledge improvement of consumers.

Question 10 is about the distance between the borehole and toilet was well understood by participants. After the course, more participants appeared to have captured their rights with relation to water service provision as displayed in question 7 and 18 (*large effect size)*. Question 3 (*medium effect size*) indicates that the percentage that believe that government should also plays an important part in ensuring that consumer rights are met increased. This is due to emphasis on consumer rights and responsibilities during the education programme.

4.4.3 Qualitative results discussions

Knowledge and skills tested separately…therefore skills measurement will be addressed in this section.

4.4.3.1 Skills measurement

Focus group discussions were used as a platform for reflection and information synthesis and to support qualitative data. To reinforce and repeat the information to stimulate desired response, various techniques were used to guide focus group discussions. These techniques included projective techniques, role-plays and group discussions (see Appendix K).

- **The projective technique**

The projective technique was used to trigger participants‟ participation during the training sessions. After each session, participants were given a chance to synthesise the information and review whether they had understood the message. The participants were presented with three jars of water from various water sources. After having a session on water quality. Regardless of the new information received about not relying on physical appearance when judging water quality, the participants still believed that physical appearance of water was the main determining factor of good drinking water. The knowledge pre- and post-test results presented in Table 4.8 *(statement 1)* confirm this statement.

Table 4.8 Comparison of water jars from different water sources

Jar	N=participants chose a jar	Reasons for choosing a particular jar	N
Jar 1-mineral water	10	Sparkling, clean, good, pure, no smell, safe, no chemicals, and fresh, bubbly, drinkable, beautiful colour.	21
Jar 2-pool water	3	No bubbles, no smell, clean, good drinking water	21
Jar 3-Madibogo water	2	Sparkling, clean, fresh, no impurities	21
No choice	5	All three jars are the same	21
No choice	1	Impossible to judge by looking at the water	21

-
-

- **Role-play**

  A role-play was used as a technique to create a conducive environment for participants to express themselves and to show their understanding. Participants showed that they had understood the lesson about roles and responsibilities of each stakeholder (the community as well as the local government officials responsible for water service provision).The participants assimilated the community and the water service provider who tries to impose a service to the community without having consulted the community before. Performing role-plays in groups, the participants showed understanding of the hierarchies involved in rural water service provision. Additionally, they demonstrated ability to follow the right channels to display their dissatisfaction and lay a complaint. They asked critical questions regarding the type of service they were promised and the advantages and disadvantages of such a service in uplifting the community‟s quality of life. The role-play indicated that participants‟ knowledge has increased and have mastered the skills such as presentation skills and teamwork. They showed an understanding of procedures that could lead to their issues being resolved.

- **Group discussions**

  Participants were again asked to divide themselves into small groups of five to follow the guidelines presented during the workshop to write a complaint letter about water services. All groups presented their letters and other groups engaged in a discussion and criticised the letters based on the guidelines provided. The participants also engaged in discussions

about domestic water purification processes. These included sedimentation, filtration, boiling and addition of disinfectant. Out of four groups, only one group showed minimal competence in performing the domestic water purification processes. After the discussion it was clear that what was learnt in the education programme was reinforced through the discussions and that showed an increase in knowledge on participants. For the criteria and weighing used to assess the groups, refer to attached Appendix K.

- **Demonstration**

  The rubric tool was mainly used as a qualitative tool to assess the performance of the participants when they were demonstrating domestic water purification and role-playing. Qualitative data were collected through the rubric tool (a tool where the criteria for assessment are clearly defined and scores for each criterion are indicated) because there were three scorers: the two researchers and participants who observed and assessed their peers (refer to Appendix K). The checklist was specifically used to assess the complaint letter writing skills.

4.4.4 Measurement of the effect of the workshop

To determine how successful the programme was, the results of the programme evaluation will be presented. As indicated in the literature, the source also plays an important role in improving consumer knowledge. An evaluation of the presenter and the programme content was conducted to assess the impact of the

source on the recipients (Weyers & Rankin, 2007:92; Hoyer & MacInnis, 2006:134). A Facilitation Assessment Scale (FAS), a standardised scale adopted from Weyers and Rankin (2007:104), was used for this study (see Appendix L). The scale measured the following „levels" of criteria:

- The facilitator"s aptitude: In this level, the aptitude of the facilitator was assessed.
- The facilitator"s presentation skills: In this level, satisfaction/dissatisfaction of participants, on the facilitator"s skills and training context was assessed.
- Assessment of learning process: This level assessed the extent to which the learning experience has improved the participants" knowledge and increased the skills.
- Context of workshop: The level assessed whether the participants enjoyed the workshop.
- Relevance of the message: This level assesses whether the participants will be able to apply what they learnt to solve their problems.

- A four-point Likert-scale ranging from *„Strongly disagree", „Disagree", „Agree" and „Strongly agree"* was used. According to Hoyer and MacInnis (2006:135), the source of the message plays a crucial role in knowledge change. The Facilitator Assessment Scale (FAS) adopted from Weyers and Rankin (2007:92) revealed the impact made on the workshop participants on Table 4.9.

Table 4.9 Measurement of the effect of the workshop

Criteria	N	Mean	Std	Effect size	Crobanch's coefficient alpha
Aptitude	21	3.68	0.29	2.34***	0.659
Skills	21	3.73	0.32	2.30***	0.722
Process	21	3.70	0.33	2.12***	0.673
Context	20	3.40	0.37	1.11**	0.681
Relevance	21	3.63	0.32	1.93**	0.625
Value	21	3.54	0.36	1.47***	0.629

***Low effect** ****Medium effect** *****Large effect**

Table 4.9 illustrates the Cronbach‟s coefficient alpha measure exceeded 0.6 on all the levels namely: the criteria: the facilitator aptitude, presentation skills, process, context, relevancy of the message and the value of the workshop. For each of these subscales on the questionnaire there is a big d-value and effect size, which reflects an increase in knowledge and skills. There is an indication on Table 4.7 that participants liked and enjoyed the programme. All these confirm that FAS has proven to be practically reliable and effective, as suggested by Weyers and Rankin (2007:108).

4.5 CONCLUSION

Measuring the change in knowledge and skills did assessment of whether the outcomes of an education intervention programme have been reached. A

standardised knowledge questionnaire was developed and completed before and after the intervention, while the change in skills was observed. According to the results, the participants‟ knowledge, and skills involved in solving their water-related issues and problems improved. The Cronbach alpha of 0.6 was achieved which indicates that the questionnaire was reliable. The participants‟ also acquired skills through participation in the WET-Programme. The FAS, which assessed the effectiveness of the programme, showed that participants liked and enjoyed the programme. Therefore, the education programme was effective. This indicates that the programme was successful and all the objectives outlined in chapter one were achieved. The WET-Programme is suitable to be implemented in other communities and addresses the problem of communities‟ ignorance about general water usage.

CHAPTER 5: SUMMARY, FINDINGS, RECOMMENDATIONS AND CONCLUSIONS

5.1 INTRODUCTION

The main aim of this chapter is to present a brief summary of the research conducted. Recommendations on how water education and training could improve consumers‟ knowledge will also be presented in this chapter.

5.2 SUMMARY

Chapter 1 outlines the problem statement wherein the rationale for the study was explained. The related literature was reviewed. From the literature review, it became clear that Madibogo communities lack knowledge on safe water and the understanding of policies, consumer and human rights. The literature further revealed that Madibogo communities do not have water education and training programmes in place. The previous study by Kolanisi (2005) was used to develop the WET-Programme and implemented it in an attempt to bridge and improve Madibogo rural water consumer‟ knowledge on water-related issues. The intervention research strategy was employed and the tested and standardised knowledge questionnaire was developed using the information from the previous study. Focus groups were used as another data-gathering tool to reinforce

learning and to complement the quantitative data. Measures were taken to ensure the reliability and the validity of the study and are outlined in Chapter 3.

Chapter 4 dealt with the empirical study used to determine whether the WET-Programme can influence consumers‟ awareness towards water quality and quantity, household utilisation and the FBWP through improved knowledge. The standardised questionnaire developed assembled the data during the implementation of the WET- Programme. Data were analysed by a statistical technique to obtain the opinions of the respondents. According to the results, the participants‟ knowledge, and skills involved in solving their water- related issues and problems improved.

5.3 RESULTS

The aim of the study was to determine whether a water education and training programme (WET-Programme) could influence consumers‟ knowledge and skills towards rural water service provision. The objectives of the study included the following:

- To develop a standardised knowledge questionnaire to use as a baseline for knowledge measurement.

  The above objective was fully achieved, the participants were able to complete the developed questionnaire before and after the final programme and Cronbach's coefficient alpha of.0.6 was obtained

- To implement the WET-Programme as a way of equipping community members with the knowledge and skills that is necessary to assist them to function effectively in their households within the community.

  The WET-Programme was successfully implemented as pilot and final. Programme in the form of a 3-day workshop with the necessary measuring tools.

- To determine the effectiveness of the WET- Programme in:
  - Improving the consumers‟ knowledge:

    The results of the final study showed that there was knowledge improvement amongst the participants and the results proved to be practical and reliable (see table 4.7). The Cronbach‟s coefficient alpha of 0.6 was achieved which indicates that the questionnaire was reliable.
  - Improving the consumers‟ skills:

    The participants acquired skills through role-play, group discussions and projective techniques in the WET-Programme.
  - Programme quality (analyse the impact of the facilitator and facilitation process on the outcomes of the workshop).

  The FAS, which assessed the effectiveness of the programme, showed that participants liked and enjoyed the programme. Therefore, the education programme was effective.

- To make recommendations after the presentation of the WET-Programme on improvements to be made for further use.

After the administration of the education programme the recommendation are as follows:

- The local language should be used in the writing and administration of the education programme since the education level of most of the community members is low thus English. Programmes limit participation of other interested community members.
- This study should be repeated in another region in the North West Province as it was done on a small scale in a single community to establish the effectiveness of the programme and to impart knowledge and skills.
- More time should be given for the administration of the programme because adult learners have a short concentration span because of this they need to learn at a pace that would accommodate their concentration span.
- Education programmes should be done as part of the process of empowerment and should be coupled with other projects that aim at capacitating the community members with technical skills.

5.4 LIMITATIONS OF THE STUDY

The programme was written in English and it had limitations for those who did not understand English well. During the programme, it became evident that not all

participants understood English that well. The programme only accommodated people available during the day. Therefore, more time should be given to allow those who are busy during the day to participate in the programme. The sample used in this study relied on available community members who could read and write and who were 18 years old. The limitation was based on those other community members who are active in water activities but could not participate because their education level was below the set criteria. Child-headed families were not included in the sample whereas they are also engaged in water related activities on a daily basis.

5.5 GENERAL FINDINGS

A short summary of the general findings from the research is given.

- Madibogo communities do not have water education and training programmes in place.
- Rural consumers have been marginalised and do not have access to potable water.
- The community‟s participation is essential if learning outcomes are to be achieved successfully.
- Education programmes can improve the rural consumers‟ knowledge and change them to become more active citizens who can participate in their communities through rational decision -making.

- Communities need to be responsible for their own learning by identifying issues that need to be addressed by education programmes through the help of experts.
- The education programmes embarked upon should be informative and educative in order to establish empowerment and capacity building for the people of the community.

5.6 CONCLUSION

The study revealed positive outcomes and results including empowerment and capacity building from the education programme. From the study, it became evident that there was an improvement of knowledge. The participants were positive that the programme bridged their knowledge gap with regard to water-related issues. The study further revealed that the participants enjoyed the programme and were positive that more of these education programmes could improve their life situation. The programme was effective because the FAS give a reliable Cronbach's coefficient alpha and all the aims and objectives were reached. The programme also provided guidelines regarding relevant stakeholders involved in rural water service provision and protocols to be followed should the community experience problems.

It is important that the community is involved right from the start, in the planning phases, for any water provision initiative. If necessary, an education and training programme can be part of the process. Education and training must be part of the total water provision process and can contribute towards the empowerment of

community members to function as independent, informed, and responsible consumers regarding their water usage. The Water Education and Training Programme, with measuring instruments, will be suitable to use in these situations.

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APPENDIX A: CONSENT FORM PRESENTED TO PARTICIPANTS OF THE STUDY

CONSENT FORM PRESENTED TO PARTICIPANTS OF THE STUDY

TITTLE OF RESEARCH PROJECT

WATER EDUCATION AND TRAINING AS A STRATEGY TO INFLUENCE RURAL WATER SERVICE PROVISSION AND HOUSEHOLD UTILIZATION AND OPERATIONS

Dear Mr. /Mrs. /Miss. **Date 22/06/2008**

AIM AND NATURE OF THE STUDY

The aim of the study was to determine whether the WET-Programme could influence the consumers" knowledge towards rural water service provision.

RESEARCH PROCEDURE

The different methods of data collection, namely focus group discussions based on projective technique and questionnaires will be used. You will be requested to participate in both of them. A tape recorder will be used to record the information to avoid misinterpretation.

Information collected will be handled with confidentiality and identity of participants will not be used when the information is reported. This information will only be used for the research and to report to the Water Research Commission.

DECLARATION OF CONSENT

I, the undersigned ---------- (full names)

read the information provided about the research project and declare that I fully understand the content thereof and hereby voluntarily agree to participate in the research project.

I also understand that the University and the researcher will not be held liable for any damages, which I might incur during the project.

Signature of participant: ----------

Signed at---------- on----------

APPENDIX B: LETTER FOR ETHICAL CLEARANCE

TO WHOM IT MAY CONCERN

During 2002 the North-West University received the tender to do research for the Water Research Commission about water purification:

THE TESTING OF A MEMBRANE TECHNOLOGY UNIT FOR THE REMOVAL OF NITRATE, CHLORIDE, FLUORIDE, SULPHATE, CALCIUM AND MAGNESIUM POLLUTANTS FROM GROUNDWATER, AND THE MONITORING OF RURAL CONSUMER KNOWEDGE AND ATTITUDE TO WATER PURIFICATION

Reference number: 1529

The project leader was Dr MR Hlophe from the Mafiking Campus with the assistance of Dr EL Kempen from the Potchefstroom Campus. After Dr Kempen left the North-West University the responsibility was taken over by Dr. M.D. Venter. The following postgraduate studies were completed as part of this project:

An education and training programme as a strategy to improve consumers knowledge towards basic water utilization. KM Molefe. M Consumer Sciences.

Consumers‟ attitudes towards rural water provision and learning strategies to enhance community participation: the case study of Madibogo, North West Province. U Kolanisi. PhD Consumer Sciences

During the early 2000‟s ethical clearance was not compulsory so this project was not registered. However a consent form was completed by the participants.

DR. M.D. VENTER

STUDY LEADER

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APPENDIX C: PROGRAMME OUTCOMES

LEARNING OUTCOMES OF THE WET-PROGRAMME

After completing this programme the learner must be able to:

- To have the necessary knowledge regarding basic water services.
- To have an understanding on water quality, based on physical, chemical and microbial components.
- To evaluate water quantity based on availability, accessibility and affordability.
- To have an understanding on household hygiene and uses of water.
- To have an insight on the social responsibility, describing the community and other stakeholders" roles.
- To have knowledge about Free Basic Water policies.

APPENDIX D: ACTION PLAN FOR THE FINAL PROGRAMME

Action plan for WET-Programme

Activity	Date	Person Responsible	Task to be performed	Completion	Remarks
1) Contact co-worker	15/05/08	Mavis	Discuss what to be done for preparation for the workshop Identify the village.	15/05/08	Successful
2)Establish field workers	2016/05/08	Mavis	Establish the venue Collect phone numbers for The school principal/school, Kgosi and the Counsellor	2023/05/08	Successful
3.Contact stake holders telephonically	26/0508	Mavis	Call the community meeting for the 7th of June	1930/05/08	Successful
			Secure the venue for the workshop		
4.Visit to Madibogo	2007/06/08	Mavis	Book the venue for the next workshop	2007/06/08	Successful
5.Call co-worker	2009/06/08	Mavis	Update her on the developments	2009/06/09	Successful

6. Meeting for preparation for the workshop	2013/06/08	Mavis	I. Meet the stakeholders ii. Meet and brief the community about the workshop iii. Identify the participants Give feed back to Madibogo Draw a plan of action of activities before the workshop. • Drawing of budget • Different roles assigned to relevant individuals needed in the preparation of the workshop	2013/06/08	Successful

APPENDIX E: WORKSHOP PROGRAMME FOR THE PILOT STUDY

WATER SERVICE PROVISION EDUCATION PROGRAMMME

24 – 27 JUNE 2008

Presented by Mrs Mavis Molefe and Ms Unathi Kolanisi from North-West University Potchefstroom Campus

DAY ONE	
INTRODUCTION SESSION	
Theme: Prior knowledge and attitude measurement	
Time	Activity
09:00 – 10:00am	Tea/coffee
10:00 – 10:15am	· Opening prayer
	· What brings us together
10:15am – 10:30am	Getting to know each other
10:30am- 11:00am	Completion of knowledge questions
11:00am- 12:30am	Attitudes questionnaire completion and discussion
12:30am-1:00pm	Refreshments
1:00pm	Disperse
DAY TWO	
Theme: Water quality and quantity	
Time	Activity
09:00 am – 10: 00am	Tea/coffee

10:00 am – 10:05am	Opening prayer
10:05 am – 10:20 am	· Introduction of the topic – activity
	· Participation expectation
	· What do they know?
10:20 am – 11:00 am	Topic introduction and presentation
11:00 am – 11:30 am	Focus group discussion
11:30 am – 12:00 noon	Reflection and lessons learnt
12:00 noon – 1:00 pm	Refreshments
1:00 pm – 1:20 pm	· Introduction of the topic
	· Participants expectations
	· What they know
1:20 pm – 2:00 pm	Presentation of the topic
2:00 pm – 2:30 pm	Focus group discussion
2:30 pm – 3:00 pm	Reflections of lessons learnt
03:00:00 pm	Disperse

WATER SERVICE PROVISION EDUCATION PROGRAMME

24 – 27 JUNE 2008

Presented by Mrs Mavis Molefe and Ms Unathi Kolanisi from North-West University Potchefstroom Campus

DAY THREE	
Theme: Sharing responsibilities and Free Basic Water Policy	
Time	Activity
09:00 am – 10: 00am	Tea/coffee
10:00 am – 10:05am	Opening prayer
10:05 am – 10:20 am	· Introduction of the topic – activity
	· Participation expectation
	· What do they know?
10:20 am – 11:00 am	Topic presentation
11:00 am – 11:30 am	Focus group discussion
11:30 am – 12:00 noon	Reflection and lessons learnt
12:00 noon – 1:00 pm	Refreshments
1:00 pm – 1:20 pm	· Introduction of the topic
	· Participants expectations
	· What they know
1:20 pm – 2:00 pm	Presentation of the topic

2:00 pm – 2:30 pm	Focus group discussion
2:30 pm – 3:00 pm	Reflections of lessons learnt
03:00:00 pm	Disperse
DAY FOUR	
Theme: Household utilisation, post knowledge and attitude measurement	
Time	Activity
09:00 am – 10: 00am	Tea/coffee
10:00 am – 10:05am	Opening prayer
10:05 am – 10:20 am	· Introduction of the topic – activity
	· Participation expectation
	· What do they know?
10:20 am – 11:00 am	Topic presentation
11:00 am – 11:30 am	Focus group discussion
11:30 am – 12:00 noon	Reflection and lessons learnt
12:00 noon – 1:00 pm	Refreshments
1:00 pm – 1:30 pm	Completion of knowledge questions
1:30 pm – 2:30 pm	Attitude questionnaire completion and discussion
02:30:00 pm	Disperse

APPENDIX F: PILOTED QUESTIONNAIRE - ENGLISH

WATER QUESTIONNAIRE 2006

DEMOGRAPHIC INFORMATION

Name:----------

Sex:----------

Age:----------

Level of education:----------

Village section----------

Instructions

Read the statement carefully; please tick in the box true if you agree and false if you do not agree with the statement.

WATER QUESTIONNAIRE 2006	True	False
1. Water that looks clean and clear is suitable for drinking.		
2. Water from rivers is suitable for drinking water.		
3. We must receive all water free of charge.		
4. The government must make sure that everybody receives clean and fresh water daily.		
5. Water can be stored in any container and no lid is necessary.		
6. Water containers need to be washed as often as possible.		

7. Taps that leak will be fixed by the government.		
8. The RDP provides water.		
9. South Africa is a dry country and we must save water.		
10. All water that is purified tastes bad.		
11. Toilets must be built near your borehole.		
12. If your water are not suitable to drink the only thing you can do is complain.		
13. You are not allowed to form part of a water Users Association.		
14 Water can be purified by throwing cement into it.		
15. Washing your hair in your village"s water will turn your hair/ discolour your hair (ginger)		
16. The community does not like strangers to purify their water.		
17. The machine that is used to purify water is not our responsibility.		
18. We can survive without water.		
19. Government does not care if we have/ do not have enough clear, safe drinking water.		
20. The water-purifying machine can be costly.		

APPENDIX G: PILOTED QUESTIONNAIRE - SETSWANA

DIPOTSO KA GA METSI

DEMOGRAPHIC INFORMATION

Leina: ----------

Bong: ----------

Bogolo:----------

Borutegi:----------

Lefelo----------

Ditaelo

Bala dipolelo tse di latelang mme o tshwae ka mo lebokosong ee, fa o dume lakgotsa nyaa fa o ganetsa.

Dipolelo	**Ee**	**Nyaa**
1. Metsi a a lebegang a le phepa e bile a galalela a siametse go ka nowa.		
2. Metsi a a mo melapong a siametse go ka nowa.		
3. Re tshwanetse go bona metsi otlhe mahala.		
4. Go matshwanedi gore puso e dire gore mongwe le mongwe a bone metsi a a phepa tsatsi lengwe le lengwe.		
5. Metsi a ka nna mo kgamelong nngwe le nngwe e bile ga a tlhoke go ka khurumelwa.		

6. Dikgamelo tsa metsi di tlhoka go phepafadiwa nako le nako.		
7. Ditepe fa di dutla di ka ba akangwa ke puso.		
8. Metsi a neelwa ke RDP.		
9. South Africa ke naga e e senang metsi ka ga jalo re tshwanetse ra somarela metsi.		
10. Metsi otlhe a a phepafaditsweng ga a na tatso e e monate.		
11. Matlo boithusetso a tshwanetse go agiwa gaufi le mo go nang le le metsi a a tswang mo tlase ga lefatshe.		
12. Fa metsi a gago a sa siamela go ka nowa selo se sele segwe se o ka de dirang ke go ngongorega.		
13. Ga o a letlelelwa go ka nna karolo ya mokgatlo wa tiriso ya metsi.		
14 O ka tshela samente go phepafatsa metsi.		
15. Fa o ka tlhapa moriri ka metsi a ko magaeng a ka fetola mmala wa moriri go nna mohibidu (ginger).		
16. Baagi ba motse gaba rate go phepafaletswa metsi ke batho ba ba sa ba itseng.		
17. Mochini o o dirisiwang go phepafatsa metsi ga se maikarabelo a baagi.		
18. Botshelo bo ka tswlela ntle le metsi.		
19. Puso ga ena sepe le fa baagi ba sena metsi a a lekaneng a a phepa e bile a bolokesegile.		
20. Mochini o o dirisiwang go phepafatsa metsi o dirisa madi amantsi.		

APPENDIX H: FINAL QUESTIONNAIRE USED

WATER QUESTIONNAIRE 2008

DEMOGRAPHIC INFORMATION

Name:----------

Sex:----------

Age:----------

Level of education:----------

Village section----------

Instructions

Read the statement carefully; please tick in the box true if you agree and false if you do not agree with the statement.

WATER QUESTIONNAIRE 2006	**True**	**False**	**I do not know**
1. Water that looks clean and clear might still not be suitable for drinking.			
2. Although water is a natural resource, we must pay for water services.			
3. Water services are partly the community"s responsibility.			
4. Water containers need to be washed as often as possible.			
5. Water containers need to be covered.			
6. Taps that leak must be fixed by the local government			

7. The RDP provides water			
8. South Africa is a dry country and we must save water			
9. Purification improves the quality of water.			
10. Toilets must be built near your borehole			
11. All communities should have water committees			
12. Hard water is dangerous to human health			
13. If your water is not suitable to drink you can complain			
14. The operations/maintenance of water purifying machines is partly a community responsibility.			
15. Government must ensure that water delivered to community complies with South African National Standards (SANS)			
16. The water-purifying machine can be costly to the community.			
17. Consumer rights are the same as Human rights			
18. The government is giving free 6kl water per/household/month			
19. There is no such a thing as pure water			
20. Excess mineral salts in water are not good for human consumption.			

APPENDIX I: WATER EDUCATION AND TRAINING PROGRAMME

CD in the back of script

APPENDIX J: LESSON PLAN

LESSON PLAN ON WATER EDUCATION AND TRAINING PROGRAMME				
FACILITATOR: MAVIS MOLEFE **CO- FACILITATOR**: UNATHI KOLANISI Date: 23-27 June 2008	**PARTICIPANTS:** Madibogo community members **AGES:**18-35		Context: Rural water service provision ASESSMENT: Knowledge and skills	
Learning outcomes	Content	Learning methods	Media resources	Assessment
DAY 1 determine prior knowledge of water quality to understand the purpose of the workshop	- Expectations -Completion of knowledge questionnaires	Brainstorming Lecture	Posters	Questionnaires

to fill in the questionnaires **SNACK** **DAY 2** □ develop understanding on water sources □ create a distinction between rain and ground water □ should be able to assess water based on three water quality determinants	*WATER QUALITY* **Energiser-**muscle man Water sources	Projective technique Brainstorming	Puzzles, Flip chart 3 glasses of Madibogo, pool and still water	Observation
Learning outcomes	Content	Learning methods	Media resources	Assessment
DAY 2	Water cycle	lecture	Posters,WET-	

(CONTINUED)			Programme pg13-14	
TEA BREAK	Ground water model . Properties of water. -Physical	demonstration Lecture	Poster Flip chart WET-programme	Observation
	Smell Taste Microbiological Microbes invisible-needs microscope e.g. fungi, germs -Results in disease like cholera, typhoid, fever, diarrhoea Water contamination How to avoid contamination		posters	

LUNCH		Discussion		
Learning outcomes	Content	Learning methods	Media resources	Assessment
DAY 2 (CONTINUED) develop skills in domestic water purification process raise awareness on responsible behaviour on household water utilization	Domestic water purification processes: Sedimentation Filtration Boiling Addition of disinfectant Uses of water Conservation of water	Demonstration	White cloth 25 litres water 1 litre water Wet, poster Kettle Glasses	Practical demonstration

	Categorise Madibogo water and share perceptions about the category indicated Danger of using harmful chemicals Coping strategies	demonstration	Foam bath Soda soap Vinegar ,aqueous cream Dish washer	
Learning outcomes	Content	Learning methods	Media resources	Assessment
DAY 2(CONTINUED)				
REFLECTION SESSION: *focus groups* Participants were divided into three provided with three glasses of water which comprised of:				

- Madibogo water
- Still water
- Swimming pool water.

The focus groups were to assess water based on three water quality determinants. The reflection session was to determine whether the participants had assimilated the information gained

Learning outcomes	Content	Learning methods	Media resources	Assessment
DAY 3	*WATER QUANTITY*			
TEA BREAK	**Energiser-**Balloon game(consumer rights protection)			Observation
To show comprehension on three water quantity aspects To illustrate an understanding of consumer rights	Human rights Consumer rights	Brainstorming Group discussion	Poster Flip chart	Listening to presentations

To have an insight and understanding of policies on rural water provision	Policies on rural water services provision		WET-Programme	
LUNCH **DAY 3(CONTINUED)**	Guidelines on writing a complaint letter Write a complaint letter	Demonstration	Note pad	Check list
REFLECTION SESSION: ***focus groups***		Discussion		

Participants were divided into groups and were to follow the guidelines to write a complaint letter about services. Participants were to critic letters as a way to reflect on the lesson learnt				
Learning outcomes	Content	Learning methods	Media resources	Assessment
DAY4	*SOCIAL RESPONSIBILITIES* **Energiser-**Cycle game			

To raise awareness of organisations that exist in their community and how they can use their service	Which social organisation do you have in Madibogo. Which ones are politically inclined? Which roles do they play? Which issues do they address?	Question and answer Brainstorming Discussion	Flip chart	
	Which one is influential or not influential? Give reasons Do you want to form new organisations or do you want to keep the existing ones?			
	Challenges they face with these organisations How can you improve on these			

	organisations to overcome this challenge			
TEA BREAK **DAY 4 (CONTINUED)** Be active participate in solving problem regarding their water	Different governing structure and their roles-Government - National -Provincial -Local government - Community -DWAF DEBATE –should the community wait for the government to provide them with services	Lecture		
Understand the role they can play on			WET-Programme	

improving their lives				
To understand channels they need to take to voice their needs and illustrate the importance of observing protocol when lodging a complaint. To have an insight and understanding of how municipalities operate to		Debate	Posters Water awareness booklets Flip chart	Listening to presentation of ideas

resolve problems				
Understand other government structures that can assist in water related issues. **LUNCH** **REFLECTION SESSION:** ***Focus groups***				

Participants were divided into groups to form focus groups. They role played stakeholder"s roles and responsibilities on rural water service provision. The focus groups were to reinforce what was learned and to reflect on the lesson learned		Role play		Skill to demonstrate knowledge gained

APPENDIX K: SKILLS ASSESSMENT INSTRUMENT

Domestic Purifying methods

Group name	**A**			
Aspects of assessment	**Excellent**	**Proficient**	**Adequate**	**Limited**
Understanding of purification process				
Proper use of relevant material				
Systematic logic of adding				
Neatness				
Total = /20				

Role-play: *Leaking taps*

Group Name	**A**			
Aspects of assessment	**Excellent**	**Proficient**	**Adequate**	**Limited**
Clearly stated problem				
Composure/self control				
Gesture				
Incorporation of theory				
Understanding of following protocol				
TOTAL /25				

Complain letter

CHECKLIST	
Group Name	
Two addresses: complainant and defendant (2)	
Date of writing the letter (2)	
Title: Problem clearly stated (2)	
Content: Short and concise with a complain clearly highlighted (2)	
Proof (2)	
TOTAL = /10	

APPENDIX L: FACILITATION ASSESSMENT QUESTIONNAIRE

Facilitation assessment questionnaire

		Category, range and responses		
Assessment of the facilitator's aptitude	**Strongly disagree**	**Disagree**	**Agree**	**Strongly agree**
1. The facilitator was knowledgeable about the subject/issues that were covered				
2. The facilitator could link the material to the				

participant"s level knowledge					
3. The facilitator was clear and easy to understand					
4. The facilitator succeeded in keeping me interested in the subject					
5. The facilitator was enthusiastic about the subject covered					
Facilitator's presentation skills					
6. I could clearly hear what the					

facilitator was saying							
7. The facilitator was skilful in the use of the teaching material							
8. The facilitator encouraged participant involvement							
9. The facilitator prepared herself thoroughly for the presentation							
Assessment of the learning process							
10. In the beginning the facilitator gave a clear overview of what we could expect during the workshop							
11. The facilitator made sure that participants understood a subject before continuing on to the next subject							
12. At the end, the facilitator gave a summary of the material/issues that were covered							
13. The facilitator was able to communicate on							

my level				
14. The workshop stimulated my interest in the subject/issue that was covered				
Assessment of the context ***within which the conducted***				
15. How would you rate the quality of the material that was presented?				
16. How would you rate the quality of the teaching media				
17. How well was the workshop organized?				
18. How would you rate the venue?				
The relevance of the workshop				
19. The workshop stimulated my				

creative thinking				
20. I will be able to apply the new knowledge and insights that I have gained in my community				
21. I feel that the workshop will help me to be an asset in my community				
22. I will be able to apply the new knowledge and insights that I have gained in my daily life				
23. I feel that the workshop will help me cope better with challenges of life				
24. All community members should be involved in similar workshops				
The value of the workshop				
25. What was the overall value of the workshop?				
26. What value did the following components have for you: water quality, water quantity?				

27. What value did the following have for you: water quantity?				
28. What value did the following component have for you: stakeholders‟ roles and responsibilities				