EVALUATING THE FEASIBILITY OF THE EXPANSION OF COMMUNITY BASED REHABILITATION INTO THE PHYSIOTHERAPY CURRICULUM IN ,AHFAD UNIVERSITY FOR WOMEN SUDAN

Hassan M. Abdelnour

Student No: 2634759

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University of the Western Cape

Supervisor:
Prof. Anthea Rhoda

Co-Supervisors:
Prof. Michael Rowe
Prof. Graziella Van den Bergh

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ABSTRACT

Community Based Rehabilitation (CBR) is used internationally, to address the lack of access of People with Disabilities (PwD) to rehabilitation services. Physiotherapy is one of the rehabilitation services offered to PwDs at community level, through CBR. In Sudan, Ahfad University for Women (AUW) offers a Bachelor degree in Physiotherapy, which integrates a CBR module into the curriculum, since 2007.

The aim of this current study was to investigate the CBR components of the current physiotherapy curriculum at AUW, to determine whether they should, and could be expanded. The Mix method study design was employed, with a mixed research methodology, containing both qualitative and quantitative approaches for data collection. The components of CBR, present in the current physiotherapy curriculum at AUW were identified, using the constructive alignment framework, and content analysis for data analysis. The PWD's needs of rehabilitation services in Sudan were established, using a questionnaire survey among users at various rehabilitation centres in Khartoum State. The CBR components that needed to be adapted in the physiotherapy curriculum at AUW were identified, using focus group discussions and in-depth interviews with AUW physiotherapy students and a CBR expert. Finally, the CBR components were revised and adapted, using a collaborative approach during workshops with AUW staff and clinicians.

It was concluded that, in order to address the rehabilitation needs of PwDs, the CBR module needed to include additional components, to align the course content, teaching and learning techniques, as well as assessment tasks, with the intended learning outcomes of physiotherapy students. The components in the CBR matrix, such as livelihood and empowerment, were deemed important to provide students with knowledge, skills and competence. Additionally, providing information about assistive devices was deemed vital in rehabilitation. A significant relationship ($P<0.05$) was observed between the provision of information on assistive devices, and the maintenance thereof, as well as the benefits to users, respectively. Ultimately, commencing CBR placements in the fourth year, as is currently the norm, was deemed too late; therefore, it was suggested that community visits in the first and second years of physiotherapy studies, be included in the CBR course curriculum.

KEYWORDS

Community Based Rehabilitation

Curriculum

Disability

Physiotherapy Education

Sudan

LIST OF ABBREVIATIONS

AUW - Ahfad University for Women.

ARC - Al Amal Rehabilitation City.

CBE - Community Based Education.

CBR - Community Based Rehabilitation.

ICRC - International Committee for Red Cross.

ICT – Information and Communication Technology.

KCH - Khartoum Cheshire Home.

KCMUCo - Kilimanjaro Christian Medical College.

NAPO - National Authority for Prosthesis and Orthosis.

QQA - Quality Assurance Agency for Higher Education.

PT - Physical Therapy.

OT - Occupational Therapy.

PHC - Public Health Care.

PBL - Problem Based Learning.

PwD – People with Disability.

OVCI - Organismo di Volontariato per la Cooperazione Internazionale.

SDG – Sustainable Development Goals.

(UN) CRPD – (United Nations) Convention on the Rights of Persons with Disability.

UNESCO - United Nations Educational, Scientific and Cultural Organization.

UoG - University of Gezira.

UR - University of Rwanda.

USADC - Usratuna Sudanese Association for Disabled Children.

UZ - University of Zambia.

UWC - University of the Western Cape.

WHO - World Health Organization.

DECLARATION

I hereby declare that “Evaluating the feasibility of the expansion of community based rehabilitation into the physiotherapy curriculum in Ahfad University for Women, Sudan» is my own work, that it has not been submitted, or part of it, for any degree or examination in any other university, and that all the resources I have used or quoted have been indicated and acknowledged by means of complete references.

Name: Hassan M. Abdelnour

Date: 2019

Signature: ……..

DEDICATION

I dedicate this study to physiotherapy education in Sudan, and to my father, who passed away during the course of this work.

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Above all, I am deeply grateful to Allah, who blessed me with the opportunity and strength to further my studies.

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CHAPTER ONE

RATIONALE FOR THE STUDY

1.1. Introduction

People with disabilities (PwD) face many challenges in their lives, for a wide variety of reasons. A lack of access to rehabilitation services is chief among the challenges experienced by people with disabilities (Iemmi *et al.*, 2016). Internationally, Community Based Rehabilitation [CBR] has become recognized as an option, to address the challenges experienced by the lack of access to community services. According to the World Health Organization, the aim is to strengthen and extend habilitation, rehabilitation, assistive technology, assistance and support services, as well as community based rehabilitation, to those in need (World Health Organization [WHO], 2015). Physiotherapy is one of the rehabilitation services, often required by PwDs at the community level; therefore, physiotherapists are important stakeholders in rehabilitation, especially Community Based Rehabilitation (Karthikeyan & Ramalingam, 2014; World Health Organization [WHO], 2011). In addition, the World Confederation for Physical Therapy (WCPT, 2017) supports the development of CBR, as a means of empowering people with disabilities, to maximize their physical, intellectual and social abilities. Finally, the Sustainable Development Goals focus on including all people in the goals, including PwDs, and the CBR guidelines are recognized as an important tool for reaching those goals (Nganwa, Sserunkuma & Mbugua, 2017).

In this chapter, the researcher presents the background for this current study, by defining relevant concepts, such as disability, physiotherapy, Community Based Rehabilitation (CBR), Community Based Education (CBE), and curriculum development, with examples from across the world, including Sudan. The content of this chapter is focused on how physiotherapy is linked to rehabilitation, and how the physiotherapy education curriculum could be used to promote community service delivery. This chapter comprises the problem statement, the research questions, as well as the aim and objectives of the study. Finally, a summary of the chapter is included.

1.2. Background and Literature Review

1.2.1. Disability

The World Health Organization (WHO) defines disability as a contextual variable, dynamic over time, and related to circumstances (WHO, 2015). Different organizations consider disability a very important limitation in any community, and an individual is considered disabled, based on the interaction between the social environment and the individual (Fine & Asch, 2018). This interaction is limited by reduced function, which results in restrictions for PwDs in the community. This loss of function is the focus in any rehabilitation process (WHO, 2011). The World Health Organization (WHO) developed the International Classification of Functioning Disability and Health (ICF), which emphasizes functional status over diagnoses (WHO, 2001). The ICF considers all the interactions between the variables affecting disability, such as environmental, social, intellectual, and physiological. According to the World Health Organization (WHO, 2010), health is the physical, intellectual, and social well-being of a person, and not only the absence of disease.

Over time, various models for the explanation of disability have emerged, such as the medical model, as well as the social model (Nganwa *et al.,* 2017). The social model of disability regards societal systems as causes of disability, instead of the impairment of the individuals (Nganwa *et al.,* 2017). The medical model of disability, with its diagnose-based perspective, is too narrow, and, in isolation, does not help to solve PwD's problems (Nganwa *et al.,* 2017). Public issues and social forces are important in disability and rehabilitation, and are considered in the social model. For example, wheelchair accessibility into buildings can be solved with a social perspective on disability, where structural conditions are addressed, such as, adding a ramp at the entrance. People with Disabilities (PwD) need health and rehabilitation services, in all communities. In addition, the social model of disability addresses other aspects of disability and rehabilitation, such as education, employment, and awareness (International Disability and Development Consortium [IDDC], 2012). The social model focusses on removing barriers that restrict life choices for PwDs, and not only physical barriers. Additionally, it focusses on changing societal attitudes towards PwDs. For example, an individual with disability, struggling to pay his/her rent, will be supported by the Ministry of Social Affairs. Similarly, with children and their inclusion in the education system, as the CBR

social model maintains that children with disability are more likely to be excluded from education (Iemmi *et al.*, 2016).

According to WHO (2011), several researchers from the social and health sciences identified various social and physical factors that influence disability. The fact that people are disabled by environmental factors, as well as by their own bodily impairment, shifted the focus of the understanding of disability more towards human rights. In 2006, the United Nations Convention on the Rights of Persons with Disability (UNCRPD) was incorporated at the United Nations Headquarters in New York (WHO, 2011). The convention was designed as a protocol, or human right instrument, which adopted PwD's (Nganwa *et al.*, 2017).

As a conceptual framework for disability, the International Classification of Function and Disability (ICF) was used to clarify the interaction between health condition, environmental, social, and personal factors (WHO, 2011).

1.2.2. Disability prevalence

According to WHO (2015), there are around 1000 million PwDs worldwide, including both adults and children. The estimated number for adult PwDs is 907 million, and 93 million children, with 80% of PwDs living in low-income countries (WHO, 2015). Iemmi *et al.* (2016) classify disability as physical and mental conditions associated with disability. Some examples of physical health conditions that might lead to disability are, stroke and arthritis, while examples of mental health conditions that might lead to disability are, Schizophrenia, Dementia, and Intellectual impairment.

According to World Health Organization [WHO] & United Nations International Children Emergency Fund [UNICEF] (2014), in Sudan, the disability percentage of the whole population is 10%, including both adults and children. For adults, a study conducted by El Tayeb, Abdalla, Heuch and Van den Bergh (2015) revealed that 34.1% of physical disabilities in Khartoum State, are due to amputations. For children, physically disabled children in Sudan total 38.5% of the overall child population (Nour, 2005). This implies that health and rehabilitation services are crucial for disabled individuals of all ages.

The Sudanese government focuses on health services and has initiated different developmental programmes, including CBR, aiming at improving the health conditions in the country (International Labour Organization [ILO], 2004). In 1996, the CBR programme was expanded to cover all types of disabilities (ILO, 2004). However, these programmes did not cover the whole country of Sudan, due to the tough civil war conditions, at that time (ILO, 2004). Subsequently, the Government established an Office on Disability, under the Ministry of Social Planning, and initiated a Forum on Disability, with participants from governmental, Non-Governmental Organizations [NGOs], as well as the private sector (ILO, 2004).

Although, there are many institutions that serve disabled people in Sudan, most are situated in Khartoum, namely, the International Committee of the Red Cross [ICRC], the National Authority for Prosthetics and Orthotics [NAPO], Khartoum Cheshire Home [KCH], AL Amel Rehabilitation Hospital, Organismo di Volontariato per la Cooperazione Internazionale [OVCI], in partnership with Usratuna Sudanese Association for Disabled Children [USADC]. These institutions appear to cover approximately 68.3% of the services for disabled children, which implies that 31.7% of the disabled children receive no services, in Khartoum (ILO, 2004; Kartoum Cheshire Home [KCH], 2007).

In the North of Sudan, River Nile State constitutes an area of 122,123 km², with an estimated population of 1,027,534. In Atbara, which is the state's capital, there is one institute, named the Border Horizons Institute, offering rehabilitation and education services for children with disability (KCH, 2007). The available data reveal a shortage of rehabilitation services, offered for PwD's in Sudan. This situation is similar in Khartoum State, where the capital, Khartoum, is located.

1.2.3. Rehabilitation as a tool of response to disability

The need of rehabilitation for PwDs is highly recognized, globally, as 15% of the world population is living with disabilities (WHO, 2015). Rehabilitation is described as a set of measures that allow PwDs to regain and maintain optimal body function, to interact satisfactorily within their community (Gamiet, 2015; WHO, 2015). The availability of rehabilitation services improves the quality of life, and reduces the disease burden. According to WHO (2011), rehabilitation comprises three main categories. Firstly,

rehabilitation constitutes the medicine that focuses on a specific health condition, the diagnosis, and treatment, with the aim of reducing and preventing the impairment complications. Secondly, therapy in rehabilitation focuses on restoring function and preventing deterioration in functioning, in diverse areas of a person's life. The therapy team may include an occupational therapist, physiotherapist, orthotics and prosthetics specialist, social worker, psychologist, speech therapist, as well as a technical assistant. Thirdly, assistive technology is important to increase the functional capabilities of PwDs. Assistive devices are any equipment employed, in the environment of PwDs, to increase, maintain, or improve their functional capabilities (WHO, 2011: p. 101), which usually provided by PT, OT, and technical assistants.

Disabled people, who access rehabilitation services, can participate better in their communities, to enjoy the available resources. Therefore, rehabilitation targets all services in the community, including health, for PwDs to access (Fritsch, 2013). Continuous rehabilitation in the community needs a planned strategy, to ensure stability and continuity of the service. Accessibility to rehabilitation is an important challenge in all health sectors, in many countries. In the case of low-income communities, several factors interact to limit accessibility to rehabilitation, such as poverty and the lack of awareness (Nganwa *et al.*, 2017; Fritsch, 2013). An important shift of the rehabilitation strategy, therefore, has been to offer the services within the community, known as CBR (Rajan, 2016: WHO, 2015). The aim is to offer rehabilitation services in the communities where people live, while simultaneously, training health workers and professionals in a CBE philosophy, and regarding the community as the learning setting for rehabilitation professionals (Arantes do Amaral, Dos Santos & Rodrigues, 2018; Nganwa *et al.*, 2017).

1.2.4. Community Based Rehabilitation (CBR)

Community Based Rehabilitation (CBR) is a development strategy that is currently implemented in over 90 countries worldwide, to offer equal access to health and rehabilitation services for PwDs in their own communities (Rajan, 2014: WHO, 2011). In the 1960s, efforts were made to establish rehabilitation centres in developing countries, but these failed to cover the needs of disabled people in the rural areas (Waage *et al.*, 2010). Therefore, the focus of the development organizations shifted toward rural community programmes, especially in Asia, Africa, and North America. These efforts led to the adaptation and initiation of CBR programmes, in line with the WHO's

principles on primary health, launched in 1978, known as the *Declaration of Alma-Ata*, which expressed the need of all government health and development workers, as well as the world community, to protect and promote the health of all people (WHO, 2015: WHO, 2011). The declaration implied that primary health care (PHC) was developed to address the main health problems in the community by providing promotive, preventive, curative and rehabilitative services, and it was the first time that rehabilitation was mentioned in the context of primary health care (WHO, 2011).

In 2018, the Declaration of Astana and WHO reaffirmed the historic Declaration of Alma-Ata, and again, countries around the world agreed to strengthen their primary health care systems as an essential step toward achieving universal health coverage, thus implying rehabilitation services (UNICEF, 2018).

Over the years, CBR has been implemented in different countries. In Rwanda, for instance, CBR programmes were launched, to expand rehabilitation beyond the offering of medical services, while social workers were targeted and trained to identify persons with various impairments in the communities, through door-to-door surveys (Dusaberurema, 2009). After PwDs had been identified, they were examined by professionals and sent for rehabilitation. CBR has also been implemented early in South Africa (Rule, 2010). The CBR strategy started with the provision of services among the disabled population, and focused on involving PwDs in the CBR programmes, when training field workers (Rule, 2010). The CBR strategy invested in existing community resources, such as community centres and schools, which promoted development in the community. However, Rule (2010) observed that there were challenges with the existing CBR programmes, as the rehabilitation professionals were not sufficiently and adequately prepared to work in the community.

Therefore, the concept of CBR was developed and refined over time, acknowledging that rehabilitation does not only constitute dealing with health issues, but is rather a multi-dimensional concept that involves a variety of factors, across all dimensions of a person's life (WHO, 2011). As illustrated in Figure 1.1, the central CBR components are Health, Education, Livelihood, Social, and Empowerment. Each of the five components, are divided into elements, which a comprehensive CBR programme should address depending on local circumstances (WHO, 2011). The CBR components together

constitute the *CBR matrix*, as presented below, with each component subsequently described.

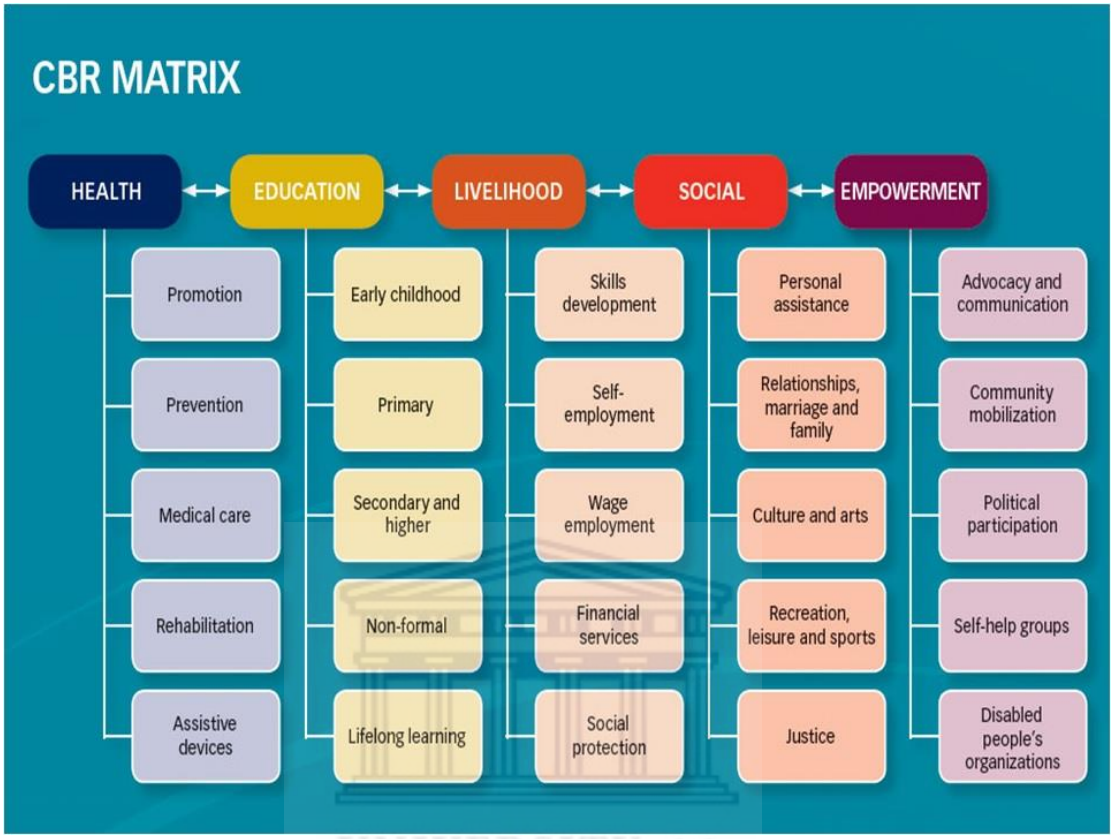

Figure 1.1: Components of CBR (WHO, 2011)

Health: Community Based Rehabilitation (CBR) aims to promote community awareness about health, as well as disease prevention. This includes information on how to access health services, and why these are important (Iemmi *et al.*, 2016). It also aims to advise PwDs on how to access the needed medical care and assistive devices in their community. In a primary health context, health should be promoted at different levels. First, it implies health promotion initiatives empowering the community and including PwDs. Furthermore, disability and disease should be prevented for all, implying primary, secondary and tertiary prevention as components of primary health care. Medical care must be accessible and provided if needed by PwDs, and finally, rehabilitation services and assistive device provision is fundamental for PwDs. The concerns about rehabilitation should always be present in the health component, and team work among health and other professions is important. The rehabilitation process includes different components and occurs in different locations rather than patients only attending clinics.

People with disability are more likely in need of assistive devices. Therefore, access, use, and maintenance of assistive devices should be included in the health components, as it is important to facilitate social participation of PwDs. If healthcare is aligned to the CBR Guidelines recommended by WHO, PwD's can be involved in community based development by decreasing physical and functional barriers.

Education: CBR also aims to expand early childhood care and education, providing free compulsory primary education for all, and improving the quality of education. These are aims of a global movement, led by The United Nations Educational, Scientific and Cultural Organization [UNESCO], to provide quality basic education for all children (WHO, 2015). As shown in Figure 1.1. The education component includes the primary, secondary, and higher education level. The right of PwD's to access all levels of education is stated in the CBR guidelines, with the aim to enable PwD's to seek work in order to earn an income and enhance their quality of life. However, the CBR guidelines do not only address formal education, but also non-formal education and life-long learning opportunities to acquire or improve skills and increase the possibility of getting a meaningful occupation, which brings us to the Livelihood component of the CBR matrix.

Livelihood: CBR aims to secure the basic needs for living, such as food. To achieve this goal, CBR aims to improve the skills of PwDs, to secure jobs and release opportunities for employment, whether self-employment, or salaried employment. Accessing financial services (pensions, grants, loans) from the community is one of the CBR methods to securing livelihood, for the social protection and support of PwDs (WHO, 2015). In addition, maintaining social protection, funds, and support over time, could be challenging, economically, in both high and low income societies (Nganwa *et al.*, 2017). The concept of livelihood is aligned with CBR guidelines recommended by WHO to support PwDs in order to meet their own basic needs as well as their families.

Social life: The CBR concept aims to strengthen the PwDs' participation in society and improve their social circumstances (Davey & Gordon, 2017). For example, justice is necessary in social life. PwDs have the same right to marry, raise a family, as well as be involved in sports and other social activities, as other people do, without political, cultural or social restrictions. The aim is to support PwDs getting full and equal access to services and to use them in improving their social life without barriers resulting from their

disability. On the other hand, there are challenges resulting from disability. Therefore, social assistance is included in order to enable PwDs to overcome barriers (WHO, 2013).

Empowerment: To promote the participation of the PwDs in the community, empowerment of the PwDs is emphasized in the CBR matrix. Empowerment is about assisting people, whether individual persons or groups of people in the community, to believe in themselves, and strive to improve their circumstances by themselves, and together (Tambuyzer & Van Audenhove, 2015). Ultimately, this can help to reduce poverty, and promote quality of live for all people in the community. Involving PwD's in decision making, political life, and their own organization strengthens the empowerment component of CBR. People will be able to decide on how to play their roles as active members in their communities and how to benefit from community resources (WHO, 2013).

Health, economic and social security, learning skills, and inclusion in the community are common basic needs of all people, including PwDs as recommended by WHO in CBR guidelines. The government and other stakeholders need to be involved in the community, so that these common needs could be affordable and accessible for PwDs (Davey & Gordon, 2017). For example, building a public environment, which is accessible for PwDs, such as, accessible accommodation, transportation, information, and communication technologies. Non-discrimination, equality in gender, and other opportunities, are all common principles in CBR (Fritsch, 2013).

For children with disability, the same principles apply. The disabled child needs to enjoy all the same facilities in the community, as other children do, to preserve his/her dignity (Dan & Panteth, 2017). Different studies have revealed that children with disabilities are more likely to drop-out of school, and they have more problems with entering the workforce market, along with other accessibility problems, consequently, increasing the inequality in opportunities for self-development (Fadul & Mohammed, 2018; Dan & Panteth, 2017). For example, in India and Bangladesh, one of the aspects of the CBR programmes was to train the community in business skills, to increase their income, as poverty was one of the main challenges (Agho & John, 2017).

Therefore, the new CBR guidelines, which are reinforced by UNCRPD, focusses on how to develop and strengthen CBR programmes, promoting a strategy for community-based development involving PwDs, supporting stakeholders to meet the basic needs, to enhance the quality of life of people with disabilities, as well as their families, and finally, to encourage the empowerment of PwDs and their families (WHO, 2011). The Sustainable Development Goals (SDGs), and the development agenda for 2030, promotes development for all, including PwDs, and CBR has been acknowledged as an approach to reach such development for all ideals (WHO, 2015).

Indeed, ddisability is addressed explicitly in several of the 17 SDGs, such as the goals related to health, education, social, economic and political inclusion of persons with disabilities (PWDs). The goals furthermore highlight the promotion of accessible environments, water and other infrastructure, and the importance of data collection with emphasis on disability disaggregated data (UN, 2017). Thus, it is recognized that investing in people with disabilities according to the UN Convention of the rights of persons with disabilities (CRDP 2006) is a precondition to reaching the SDGs vision for all.

The efforts of public and voluntary organizations, to include children with disability in various development projects, through CBR and in education (United Nations Human Rights Council [UNHRC], 2018), were encouraged by the Sudanese government, who had ratified the CRPD convention and protocol (United Nations [UN] Enable, 2016). Various educational institutions for children with disability cooperated, and pursued to integrate PwDs into society, by providing them with the needed skills (ILO, 2004). In 1994, the total enrolment of children with disability was 976 students in 7 institutions, with 110 teachers (ILO, 2004); however, there was no information regarding the number of special education teachers. The available information from that period does not cover vocational guidance services, vocational training, or job placement (ILO, 2004).

In contrast, other information and statistics reveal the risk of health and disability complications. According to World Health Statistics, the maternal mortality rate in Sudan is 311 per 100 000 children (World Health Organisation [WHO], 2018). The statistics revealed high rates related to malaria prevalence and conflict death. Regarding health professionals, the statistics revealed that there were only 0.3 physicians for each 1 000

individuals in the country (WHO, 2018). A study conducted by Iemmi *et al.* (2016), determined that Sudan encountered several challenges, mainly related to water and sanitation quality, which affected environmental and health conditions. Recently, in 2015, the SDGs replaced the MGDs, and 17 developmental goals were set to be achieved by 2030. These goals were to promote PwDs access to services in the community, without discrimination. It also aligned the CBR matrix in health and well-being, the reduction of poverty, education, and empowerment.

The socio-political, cultural and economic context of Sudan shapes the Sudanese healthcare system, where policies and plans are produced and implemented at federal, state, and district levels. The federal levels are presented by the Federal Ministry of Health. It is responsible for country health policies, strategies, funds, and evaluation. Under the Federal Ministry of Health there are 18 state Ministries of Health responsible for states plans, strategies, and guidelines for funding and implementation of plans. At the district level, plans are implemented and service delivered. However, implementation of plans and strategies for health care services is challenged in both short and long term by the political and economic changes and obstructions (United Nations Human Rights Council [UNHRC], 2018: Seidi & Hussein, 2005). Limitations used to be related to costs of civil war, cuts in public social budget, and political instability. The results can be seen clearly in the form of poor medical professional payments, limited access to health services, poor health work environment, and poor health quality (Seidi & Hussein, 2005).

According to Northrop, Biru, Lima, Bouye and Song (2016), the government of Sudan demonstrated its willingness to implement policies that were in line with the SDGs. For example, raising awareness among communities on climate-related diseases, in order to ensure healthy lives and promote well-being at all ages. However, a study conducted by Bangert, Molyneux, Lindsay, Fitzpatrick and Engels (2017), established that public health in Sudan was at risk of diseases, including disability related diseases. This was due to several socio-economic factors. Alarming environmental conditions had been observed at Khartoum, most probably due to the high migration rate and limited available services. In addition, a high rate of tropical diseases prevailed, due to the construction of a large dam that served as a breeding site for blackflies, which cause these tropical diseases (Iemmi *et al.,* 2016: Bangert *et al.,* 2017). Contextual challenges impact the Sudanese community and PwDs negatively. For example, a long civil war has impacted

the economic situation, and the government finds it very difficult to strengthen the health budget. Therefore, accessibility to health services challenges PwDs even more. In the end, this affects PwDs in all fields, including education, livelihood, social participation, and empowerment, and not only in health.

In this current study, therefore, the researcher explores how physiotherapy professionals training in Sudan can be improved, to serve in their local communities, by refining the curriculum on CBR, as well as community-based education, during their professional education.

1.2.5. Physiotherapy and its link to CBR

The physiotherapy profession has become one of the important professions worldwide, in high, middle, and low-income countries, and the role of physiotherapists is acknowledged as important in rehabilitation teams, for an inter-disciplinary and multi-disciplinary approach (Körner, 2010). The profession is defined as one that "provides services to individuals and populations to develop, maintain, and restore maximum movement and functional ability throughout the lifespan" (WCPT, 2017: p. 2). The techniques prescribed and applied by a physiotherapist, could target any impairment that limits activity in daily living (Taylor, Dodd, Shields & Bruder, 2007). Physiotherapists are part of the teams that provide services to PwDs, including CBR.

Physiotherapy education programmes in higher education worldwide, need to include knowledge and skills to work in the community, according to the CBR principles and guidelines. Precise theoretical knowledge is required to apply the CBR principles and provide appropriate guidance, in order to evaluate, assist, and provide recommendations to clients, regarding their real life situations, as well as addressing real community needs (Karthikeyan & Ramalingam, 2014).

An inter-disciplinary approach refers to combining of two or more academic disciplines into one activity to address a similar goal (Körner, 2010). In health education it refers to using a methodology and language from different disciplines to achieve the aim of combining different perspectives, and reach a bio-psycho-social approach to health. This will be true for an inter-disciplinary approach on curriculum integration and teaching with team members from different disciplines (Körner, 2010). When academic disciplines work side by side and do not address a similar goal it's referred to as multi-

disciplinary. These disciplines are part of the same profession such as the disciplines of surgery and paediatrics which is part of the medical profession. Interprofessisonal educational occur when two or more professions such as medicine and physiotherapy work together to achieve a common goal. When it comes to service delivery it is called a collaborative practice approach which refers to coordinated care of patient presented in a form of collaboration between different health professionals (WHO, 2010). Designing and implementing health professions curriculum needs contribution from different health experts whether it's from different disciplines within a profession or different professional groups.

Strategies on how to apply CBR in physiotherapy might differ from one setting to another; however, it is important to know the specificity of particular settings, and to adapt the application of CBR to local needs and resources. For example, India, Bangladesh, and Pakistan are all on the Asian continent, with similarities in various sociodemographic and geographic aspects (Commons, 2011). Therefore, when applying CBR in the local physiotherapy educations, there were a number of similarities, yet also differences. For instance, in Pakistan, another gender-biased strategy was used. Gender-biased means that the strategy needed to be modified to accommodate the religion and cultural attitudes towards gender in the community (Commons, 2011).

Social accountability is an essential component of CBR and contributes to the improvement of PwD's status in the community. Social accountability in both developed and developing countries is important to strengthen CBR programs and university curricula (Forouzan *et al*, 2017; Commons, 2011). Social accountability is related to the way in which public officials, politicians, and service providers are accountable to the service users. In developing countries, such social accountability towards PwDs may be problematic (Common, 2011). In Sudan, the researcher's previous experience in the field had demonstrated that it is important to involve public officials, politicians, and service providers in order to understand the functioning of health services. One aim in this study is to evaluate service delivery in the community and see how it may improve the well-being of PwD's, as well as how PwDs' rights may be achieved. In Sudan and other developing countries, a main challenge in the community is poverty. In other words, taking poverty reduction into account will help in planning of the CBR strategy by community members.

Health profession programmes in higher education curriculums are increasingly designed to prepare students for the community needs, as well as train them to fulfil their role in community-based health services (Talaat & Ladhani, 2014: Magallona & Datangel, 2012). Therefore, it is important that the link between their education and profession, is well aligned (Biggs, 2014). Medical knowledge and skills are included in their curriculum during education, according to their profession; however, the curriculum should also be designed to align with the community needs and resources (Karthikeyan & Ramalingam, 2014). Similarly, the CBR curriculum for health sciences students, in general, and for physiotherapy students, in particular, should equip students with skills that will enable them to address disability related issues, and promote positive social change in the community.

In the case of Africa, literature has revealed the need for physiotherapists to acquire knowledge about CBR, and consequently, the need for physiotherapy education to include the concept sufficiently in the curriculum. For instance, in Nigeria, Hamza Nabilla, Loh and Misau (2011) identified the need to prepare physiotherapists to use CBR as a model for professional service delivery. Therefore, the physiotherapy education in Nigeria has shifted from institution-based learning environments to CBE, in order to address rehabilitation at a wider and broader range in the community, and not to be limited to hospitals and clinics. Consequently, the requisite tools for both educators and students need to be taken into consideration.

In light of the above, researchers have endeavoured to train students to work in CBR as facilitators, rather than leaders (Hamza *et al.*, 2011), which would involve the PwDs more in their treatment and rehabilitation. Physiotherapy education in Nigeria used the WCPT's new Declaration of Principle on Primary Health Care and Position Statement on CBR, as well as the revised Declaration of Principle on Education, to integrate CBR in the physiotherapy education curriculum. The CBR in the physiotherapy education curriculum in Nigeria used a variation of teaching and learning activities, rather than lectures and tutorials only.

According to Dusaberurema (2009), health service providers in Rwanda are acquiring more skills and information, regarding the CBR approach. Therefore, the policy in the

country focused more on recruiting and educating personnel, to provide CBR services at community level. At present, CBR programmes in Rwanda have recruited social workers and assistant physiotherapists to assist PWDs. Ultimately, offering health services, including physiotherapy, and satisfying the need of the community is an important challenge worldwide, particularly in middle- and low-income countries.

Regarding the physiotherapy training in Sudan, physiotherapy education as a degree only started in the 2000s (Haugland, Sørsdal, Salih, & Salih., 2014). The initial education started as diploma training for physiotherapy assistants who received basic training in nursing (Rhodes, 1989). Nowadays, many physiotherapy assistants have started upgrading their diploma to Bachelor's degrees by attending an update program offered by the Ministry of Health in Sudan. On the other hand, higher education institutes in Sudan continue establishing physiotherapy programmes for new undergraduate students, such as Ahfad University for Women, Ibn Sina University, University of Al Jazeera, El Nilen University, National University, and The National Ribat University. However, CBR is not included in the physiotherapy curriculum in all institutions, which is a challenge both for the profession and for PwD's who benefit from physiotherapy services.

In Sudan, El Tayeb & Khalifa (2013) have attempted to assess the status of PwDs and their access to health services. The study concluded that future intervention programmes and training, for both PwDs and health professionals, are needed to empower PwDs in their community. These programmes and training are aimed at equipping PwDs and health professionals with the requisite skills to decrease the effects of disability in the community. In addition, the study determined that only 14% of persons with an impairment are actually receiving some form of medical management, related to their disability (El Tayeb & Khalifa, 2013). These authors also investigated other components of the CBR matrix, establishing that a few PwDs receive social grants.

Regarding integrating CBR into physiotherapy education in Sudan, only one university in Sudan currently includes CBR in the physiotherapy curriculum, according to the researcher’s experience to date. An in-depth investigation into how to improve the physiotherapy curriculum, to include CBR in the education of physiotherapists, would be valuable to all institutions that train professionals, who encounter PwDs, whether they

be physiotherapists, or others. Ultimately, this will be for the benefit, empowerment and positive development of local communities and nations, as well as in line with the SDGs.

1.2.6. Community Based Education and its link to services delivery

Three generations of education reforms occurred in the last century. The first taught science based curriculum, the second introduced problem based learning, and the third is the Competency Based Curriculum (Jacob, 2019). The Competency Based Curriculum emphasis the need for adapting core professional competencies to the specific context, while drawing on global knowledge. In other words, the focus is on what learners are able to do (Basheer, 2019). This shows the importance of learning outcomes of the courses. Well-structured courses lead students to achieve the intended learning outcomes (Basheer, 2019).

According to Biggs (2003) and Glatthorn, Boschee, Whitehead and Boschee (2018), a curriculum covers a range of topics, including the academic content being taught in a course, or programme. It includes specific information about the programme content and the method of teaching. In addition, it reveals the aim of the course, why the course was being taught, as well as practical conditions, such as, for how long it should be thought (Biggs, 2014). To measure whether students grasped the intended objectives of the course, assessments should be included in the curriculum specifications.

It is important to link the curriculum of health and social professions to the community needs. In the early 1990s, CBE appeared as a new concept, with the intention of using the community as an appropriate environment for learning (Mpofu & Imalingat, 2006). Currently, it has become common in education. Community Based Education (CBE) is a form of instruction that has been applied in various contexts, where students learn professional competencies in a community setting, to help them build a sense of connection with communities (Arantes do Amaral *et al.*, 2018; Kelly *et al.*, 2014; Gruppen *et al.*, 2012). Its pedagogical approach helps students to learn, having different learning instruments, to assure proper skills and knowledge (Arantes do Amaral *et al.*, 2018: Wright *et al.*, 2018). The aim of CBE is to create a health profession, based on, and adapted to solve, the health problems in the community, where the learning institution is based, and where the curriculum objectives reflect the community needs (Glatthorn *et a.l*, 2018: Kelly *et al.*, 2014). According to Arantes do Amaral *et al.* (2018)

and Kelly *et al.* (2014), the community is a rich environment for relationships, meaningfulness, and learning. Therefore, education can take place outside the institution, and the community could be used as a learning environment, in which all can be involved in the learning process and knowledge sharing. Community Based Education (CBE) integrated to the medical curricula, shifts medical education from an informative learning process, to a formative learning process (Wright *et al.*, 2018). The informative learning process produces expertise, while the formative learning process produces professionals (Wright *et al.*, 2018). CBE focuses on transformative learning that produces leadership (Quintero, 2014), which is meant to offer the highest skills to assess the community needs for medical services through trained medical professionals. Professionals need to have enough medical knowledge and skills, but this is not enough to assess the community health and social needs. Professionals need leadership skills, as well as qualifications, to solve health problems, and plan health strategies, based on proper analysis and decision-making.

CBE students are sent into the community during their education, as health science students in Australia were sent into the community before and during clinical placement (Wright *et al.*, 2018). According to Kelly *et al.* (2014), clinical placements can be organized in different ways. It can be a short time placement, during courses, or one year at the end of the programme. In Australia and Canada it is known as Longitudinal Integrated Clerkship (LICs). The one-year LICs were pioneered in Australia, in the late 1900s, and produced positive results in developing students' communication skills, clinical reasoning, and management skills. Currently, it is applied in most of the medical education courses in Australia (Wright *et al*, 2018).

Some programmes shifted towards becoming community based, and health oriented, instead of disease-oriented, for example, in Australia, Finland, Philippines, Thailand, Mexico, and Nepal (Talaat & Ladhani, 2014). In Algeria, medical programmes curricula were based on the functions of health providers, working in community health centres (Talaat & Ladhani, 2014). In Colombia, an increasing number of medical schools were emerging, but the curricula designed for these schools could not produce change agents to improve the health services in the country (Quintero, 2014). The medical education seemed to be divorced from the social reality. It was also acknowledged that the learning process should not stop after graduation, but should be a lifelong process. Therefore, the

Rosario University School of Medicine and Health Science in Colombia implemented a curriculum that included biomedical, clinical, socio-humanistic, and population health sciences, based on society needs. They also adopted teaching and learning activities, based on Problem Based Learning (PBL), enabling students to acquire leadership-, teamwork-, communication-, and professional skills, to improve the healthcare system, wherever they worked. The learning outcomes were based on teaching for understanding, and not teaching for memorizing. The objective was for students to be able to think creatively and solve problems, while they worked in a collaborative way, to gain new knowledge (Wright *et al.,* 2018: Quintero, 2014).

In CBE placements, the students are sent mostly to rural and low socio-economical areas in their communities, where they are provided with the opportunity to learn from people living with medical conditions in the community, rather than focusing on pathology in patients, during their short-term stays in tertiary hospital settings (Hanson & DeIuliis, 2015). In the community, they are exposed to direct interaction with people with disabilities, and patients, as well as how these cope with their pathological conditions. Such CBE could encourage students to work in the community after graduation, as health professionals, to fulfil an important role in CBR. Since previous physiotherapy education tended to focus on institution-based learning, students may not be prepared to work in rural and community settings. Preparing physiotherapists for community oriented services, requires philosophical, organizational, conceptual, and structural changes in education provision (Hamza *et al.,* 2011). Therefore, this current study is focused on contributing to this objective, in the case of Sudan.

The philosophy of CBR requires that physiotherapy educators provide learning experiences that enable students to transfer knowledge about the nature of disability, prevention, and rehabilitation to patients and families. For the students, the challenges are, how they experience working in non-traditional medical settings for rehabilitation, as well as how they meet the challenges, when addressing the social situation of PwDs (Barzallo & Gross-Hemmi, 2017). The physiotherapist, working in the community, needs to be creative, in order to manage challenges, and accomplish targets (Rule, 2010). This requires patience, awareness (of her/his responsibility as a professional), skill, as well as being psychologically prepared.

Including CBR training, in the health sciences curriculum, has contributed greatly to community development (Magallona & Datangel, 2012). It has helped to take rehabilitation services to poor communities, which precipitated great transformative development on students, PwDs, families, and communities. Magallona and Datangel, (2011) recommend that, in order to have successful CBR training programmes, the training strategy for health professionals should equip the student to deal with the family of a person with disability, training the family members or field workers, and learning from them simultaneously.

1.2.7. Physiotherapy education and curriculum development

In education, the curriculum is the very foundation of any system, and the course needs must be covered, in terms of content, learning outcomes, and socio-cultural context (Hamza *et al.,* 2011). Worldwide, the quality of curricula has been connected to the quality of curriculum design. Therefore, professional bodies fulfil an important role of advising education institutions about the core competencies, and minimum standards that should be applied, when designing the curriculum (Rust, 2002). Different bodies in each country contribute to this, with or under the Ministry of Higher Education, to assure quality. For example, in the UK, the Quality Assurance Agency for Higher Education (QQA) is an independent body, checking for the quality of the curricula in higher education (Rust, 2002). In addition, teaching development centres have been established at universities worldwide to improve teaching and programme design.

Over time, different models have been used to develop, review, and improve curriculum design in higher education. For example, the *Deep- and surface approach model* by Gibbs has been used, and will be described in detail, later in Chapter Three of this current study (Rust, 2002). This model comprises two main approaches to curriculum design. The deep approach strategy is based on motivating the students to learn through different learning activities, based on interaction with others.

Lately, the *Constructive alignment model* of Biggs has been used and recommended worldwide by QAA in the UK (Rust, 2002). This model consists of three stages in the development and mapping of a curriculum. The first stage is to identify clear learning outcomes. Second, design appropriate assessment tasks to assess whether, or not, students have achieved each learning outcome. The assessment is meant to indicate

whether the students have learned, as stated in the objectives. The third stage is to design learning opportunities and motivate student to successfully take the assessment task. In constructive alignment, the objective of the course needs to show the level of understanding needed clearly, and the teaching methods chosen, should address the study objectives (Rust, 2002).

Different studies have revealed the benefit of using constructive alignment in curriculum development, evaluation, and improvement. In a study conducted in Finland, Morselli (2018) observed positive change in students' techniques when searching knowledge. In this study of Morselli (2018), a course was designed for a master degree programme, based on constructive alignment principles, which aligned the intended learning outcomes, teaching and learning activities, and assessment. Along with lectures, group work, and peer review activities, the students prepared a career development plan as the course progressed, undertook a homework assignment, wrote a reflective journal, and sat tests twice. The students' reflections were analysed qualitatively, revealing that the students used their skills in knowledge development outside the classroom, and continued to do so, after graduation. The students became more creative, and attained additional skills, when placed in the community, where the intended learning outcome was set that the students needed to develop communication skills at the community level. For example, they learned how to share their work together, and manage tasks among each other. The quantitative analysis revealed a highly statistically meaningful change in the overall score (P=value 0.01), a statistically meaningful change in risk taking and locus of control (P=value 0.05), and a quasi-meaningful change in relation to the need for self-realization.

In addition, the students were guided and trained to use the community sources (Morselli, 2018). Subsequently, their performance was assessed by designing different assessment tasks. The students started to generate new techniques, such as approaching community members to access the community, and practice their communication skills. Joseph and Juwah (2012) also revealed that *Constructive Alignment Theory* equips educators with techniques to develop and evaluate their education plan. Curriculum design in medical education is an ongoing debate since the 1900s (Quintero, 2014). The discussion covers how to equip students with a different types of knowledge required, including its social characteristics. Medical education should be based on the differences and nature of

several types of knowledge, such as biological, psychological, social, and cultural aspects of addressing health and disease in the community (Quintero, 2014).

Many physiotherapy programmes start their clinical education placement in the third and fourth year (Mpofu & Imalingat, 2006). In Africa, some universities are integrating CBR modules in their physiotherapy education, namely, AUW in Sudan and the University of the Western Cape (UWC) in South Africa. The content of CBR in physiotherapy education has been investigated in various studies, and the importance of including CBR in health sciences curricula has been demonstrated (Maganolla & Datangel, 2011; Rule, 2010). Rule (2010) investigated whether the CBR curriculum informs students of the oppression and needs for the empowerment of people with disabilities in South Africa, while Magallona & Datangel (2012) investigated the effect of CBR on the allied health profession in the Philippines. All these studies revealed that CBR in the physiotherapy curriculum can contribute to community development, and has impacted, positively, on persons with disability, students, CBR workers, leaders, as well as agencies involved in the CBR programme.

In the case of Sudan, physiotherapy curriculum development is still in the making. During a review of the literature, few studies, if at all, were found on the status of physiotherapy in the Sudan. Information about physiotherapy education history and syllabus were hard to find by the 1980s, but it is acknowledged that only a diploma in physiotherapy was offered in Sudan, at the time (Rhodes, 1989). Physiotherapy education in Sudan consists of two to three years training to become physiotherapy medical assistants (Rhodes, 1989). According to the researcher, who worked as a physiotherapist in Sudan, Khartoum Teaching Hospital (KTH), subsequently, established the Department of Physiotherapy, which provided 2 years training to qualified nurses. Additionally, during the last 10 to 20 years, a number of physiotherapists acquired bachelor degrees, after being trained abroad, either in the Philippines, the Middle East or Europe. Sadly, during the last decade, many trained physiotherapists have left the Sudan, due to higher economic incentives abroad (Frantz, 2007: Seidi & Hussein, 2005). On the other hand, the job opportunities for Sudanese physiotherapists in the public sector is not yet satisfying physiotherapists. Therefore, more attention is given to the private sector by physiotherapists in Sudan. This can be reflected in the level of accessibility for PwDs into physiotherapy rehabilitation.

According to the researcher, from the early 2000s, the increasing demands for physiotherapy services in Sudan were recognized, and new physiotherapy schools were opened, particularly in Khartoum State, which is the state housing the capital of Sudan. Bachelor degrees in physiotherapy are now offered at AUW since 2005, at Neelain University (NU) since 2006, at Ibn Sina University (ISU) since 2004, at the National University (NU) since 2005, and at National Ribat University (NRU) since 2010, which together help to increase the awareness of physiotherapy and the rehabilitation needs in Sudan. Currently, a Bachelor of Physiotherapy degree is being offered in different Sudanese schools, using international guidelines developed by the WHO, WCPT, and UNESCO (Haugland, Sørsdahl, Salih & Salih, 2014).

To date, two publications were traced that discuss physiotherapy education in Sudan. One study, conducted by Haugland *et al.* (2015), presents a collaboration example between Bergen University College (BUC) in Norway and Ahfad University for Women (AUW) in Sudan, to develop a physiotherapy bachelor programme in Sudan. The experience revealed how the collaboration between high- and low income countries can be productive in higher education. Recently, a study was conducted by Gameel & Ali (2016), aiming to evaluate an annual training programme that focuses on teaching and learning, assessment, research, leadership and career advancement, offered by NU, for the staff in different departments, including physiotherapy. However, according to the researcher, no studies were traced that integrated CBR components into the physiotherapy education in Sudan. Therefore, it is unclear whether the role of physiotherapy rehabilitation is acknowledged as a means of offering CBR services to PwDs.

In summary, information about physiotherapy education and curriculum development in Sudan is important, given the relatively low number of higher education institutions that train physiotherapists in the country, as well as the obvious need for rehabilitation services to be strengthened in a country with near to 40 million inhabitants (WHO, 2018). This study, therefore, aims to contribute knowledge about physiotherapy education, CBR and curriculum development to help academic institutions, educators and faculties to strengthen the quality and appropriateness of education for the Sudanese context. For

PwDs, in particular, studies are crucial to improve health- and rehabilitation services, reaching out to all in need of services in the community.

1.3. Problem statement

Sudan is a large country with a population of over 40 million inhabitants, and with conditions that make it difficult to offer health services to all. For example, it is estimated that there is only one community health worker per 10 000 people in the country (WHO, 2015), which illustrates the importance of including CBR in the education of health professionals, especially physiotherapists. In addition, CBR could help to extend the knowledge about, and accessibility to, health services in Sudanese communities throughout the country. Strengthening the CBR components in the education of physiotherapists, would help physiotherapists become agents of change and development, by involving all the community members in health promotion, including the prevention and management of disability (Hamza *et al.*, 2012).

The problem is that PwDs face many challenges in society, and physiotherapy students, currently, are not well prepared to provide services, in the context of CBR. This is because developing the relevant knowledge, skills and attitudes of physiotherapy students, to be able to work in a CBR context, is difficult. (Hamza *et al.*, 2012). The researcher is of the opinion that physiotherapy graduates should have the knowledge and skills to engage, competently, in forming CBR initiatives, as part of the rehabilitation team. In order to develop the necessary knowledge and skills, curricula should include the practical and theoretical components of CBR that enable students to achieve the intended outcomes. The CBR component at Ahfad University for Women (AUW), to date, is limited, as it mainly consists of a theoretical module, which is offered in the fourth year of study. The students have very little experience with implementing the different aspects of CBR in a clinical setting. Students need to be exposed to various clinical settings in the community, in order to develop their clinical skills (Mpofu, Daniels, Adonis & Karuguti, 2014).

Since the inception of the physiotherapy programme at AUW, according to the researcher, the CBR module has not been reviewed. The views and experiences of PwD students with the current CBR curriculum, as implemented at AUW, have not been explored, and, to date, no data have been gathered on the needs and experiences of PwDs with CBR. However, little is known about how to develop CBE in a Sudanese context, because scant research has been

conducted, regarding the physiotherapy curriculum, in general. Therefore, it might be conducive to consider making some changes to the physiotherapy curriculum. These changes should be guided by a teaching framework referred to as *constructive alignment* (Biggs, 2014).

The researcher maintains that the reviewing of the curricula could reveal challenges and discrepancies in the module, and might help in the planning of how to overcome those challenges and discrepancies. There is, therefore, a need to evaluate whether the current CBR curriculum is responding to the views and needs of PwDs, as well as whether it relates to the newly developed CBR guidelines. The contribution of PwDs, physiotherapy students, lecturers, and other experts, together, could increase knowledge about the community needs in the field of rehabilitation, as well as how best to design, implement, and monitor CBR in education, and service delivery.

Generally, there is lack of information about physiotherapy education in Africa, and Sudan, in particular (Rhodes, 1989; Frantz, 2007). There is a need to develop the profession, as well as the education of physiotherapy professionals, according to the needs of local contexts (Rhodes, 1989; Frantz, 2007). Furthermore, there is a need for community engagement and collaboration with stakeholders in the research environment in order to provide information on CBR in the physiotherapy curriculum. It is a continuous process to enable physiotherapy training in CBR to address the needs of PwDs. Therefore, the knowledge acquired about the development of a CBR curriculum in physiotherapy education at AUW will be useful for other institutions offering, or intending to offer, physiotherapy education in Sudan. This implies that the integration of CBR in the curriculum design and content, as well as learning outcomes, is appropriate to the socio-cultural context (Audette *et al.*, 2017). This current study aims to expose physiotherapy education in Sudan to discussion, where experience from different settings could be shared to, hopefully, improve professional education and strengthen the profession, at national and international levels.

1.4. Research questions

In order to achieve the aim of this current study, the following questions need to be answered:

1. What are the current CBR course components, included in the Physiotherapy Curriculum at AUW?
2. What are the needs of PwDs, regarding CBR services in Sudan?

3. What are the CBR course components that should be included in the Physiotherapy Curriculum at AUW, to improve it, and better prepare students for CBR?

1.5. Aim of the study

In order to address the problem stated above, the aim of this current study is to revise the CBR module for the undergraduate curriculum, using input from a variety of stakeholders, including other universities, physiotherapists, PwDs, lecturers, which would help to address the shortcomings of the current programme, and prepare the students for professional practice in the community.

1.6. Objectives of the study

In order to answer the research questions, the goal of this current study is to achieve the following objectives:

1. To determine the Community Based Rehabilitation (CBR) components present in the current physiotherapy curriculum at Ahfad University for Women (AUW).
2. To determine the needs of People with Disabilities (PwD), regarding rehabilitation services in Sudan.
3. To determine the CBR components that need to be adapted in the physiotherapy curriculum at AUW.
4. To revise and adapt CBR components of the AUW Physiotherapy curriculum.

1.7. Significance of the study

Knowing the rehabilitation services needs of PwDs, globally, in Africa, and particularly in Sudan, improving professional education, specifically physiotherapy in the field of rehabilitation, is important (Haugland *et al.,* 2014). In this case study, evaluating the physiotherapy education at AUW, in the field of CBR, is important, and is an attempt at improving the alignment between the needs of PwDs in their community, and the CBR components that should be part of a quality Physiotherapy Curriculum. Exploring, reviewing, and revising the CBR component in the Physiotherapy Curriculum at AUW, could reveal that CBR components can be adapted to prepare professionals better for rehabilitation services in local communities. The results of the study could inform physiotherapy curricula elsewhere in the country, and beyond, in other similar settings. It could demonstrate how PwDs, physiotherapy students, professionals and other experts in the field can contribute towards

curriculum development, in line with local needs and resources. The results of the study could contribute to the development and improvement of the Physiotherapy profession, regarding qualifying health workers with CBR skills and competencies that are appropriate for the local setting. Physiotherapists, therefore, will be able to promote the rights of PwD better; firstly, the right to having their need for appropriate health- and rehabilitation services fulfilled, as well as their rights in the field of education, livelihood, social life and empowerment, and to fully participate in their community (Commons, 2011).

To date, in Sudan, there are no studies elaborating on CBR in physiotherapy education; therefore, this current study could contribute to, and impact, positively, the improvement of the health and rehabilitation services in the country. In addition, this current study could contribute to knowledge about disability and rehabilitation, and respond to objective three of the WHO's action plan for disability, calling for the intensified collection of relevant data on disability, as well as the support of research on disability and related services (WHO, 2015). This current study could also contribute to the essential role of research and higher education, to reach the SDGs (Rieckmann, 2017).

1.8. Definitions of the terms

Disability: Refers to impairment, activity limitations and participation restrictions, interacting negatively between the individual health condition and that individual's environment (WHO, 2015).

Rehabilitation: Rehabilitation is a set of measures that assists PwDs to regain and maintain optimal bodily functions, and interacting with their community (WHO, 2015).

Community Based Rehabilitation (CBR): Community Based Rehabilitation (CBR) is a development strategy, currently implemented in over 90 countries in the world, to offer equal access to health and rehabilitation services to PwDs in their own communities (WHO, 2015).

Community Based Education (CBE): Community Based Education (CBE) is a form of instruction, applied in various contexts, where students learn professional competencies in a community setting, to help them build a sense of connection with communities (Arantes do Amaral *et al.*, 2018)

Curriculum: Curriculum is a range of topics, including the academic content, being taught in a course, or programme (Glatthorn *et al,* 2018: Biggs, 2003). It includes specific information about the programme content and the method of teaching (Glatthorn *et al.,* 2018).

Physiotherapy: This profession provides services to individuals and populations, to develop, maintain, and restore maximum movement and functional ability throughout the lifespan (WCPT, 2017).

1.9. Summary of the chapters

Chapter One constitutes an introduction to this study of evaluating and improving the physiotherapy curriculum and its content, in the field of community-based rehabilitation at a Sudanese University, with the aim of preparing physiotherapy students better, to serve persons with periodic or chronic disabilities in their community. In this chapter, the background to the study is introduced initially, at a time when the SDGs highlight the importance of higher education and research, assisting all people to reach their goals, especially PwDs. The researcher defines and illustrates several important concepts, namely, disability, rehabilitation, CBR, physiotherapy, CBE, key moments in curriculum development, and others, with examples from the local Sudanese context and beyond, as well as research concerning CBR in physiotherapy education. Finally, the research questions, aims, objectives and significance of the study are presented.

Chapter Two comprises the study methodology and how Mix method approach were used as a study design, aligned with the study objectives. The methodology includes the study setting, which was the AUW, as the aim of this study was to develop a new CBR module for the undergraduate curriculum. Therefore, the CBR module in the physiotherapy curriculum at AUW was the case of investigation. Different data collection methods were used, according to the study phase and objectives. For example, the first phase of PAR is to identify the problem; therefore, two objectives were followed; firstly, review the current physiotherapy curriculum to identify the components of CBR, and secondly, determine needs of PwD with regards to rehabilitation services. The second phase of PAR is the action plan; therefore, the aim was to identify the components of CBR that needed to be included in the physiotherapy curriculum at AUW. The third phase of PAR is to take action; therefore, the physiotherapy curriculum at AUW was revised to include the additional CBR components. In the fourth phase of PAR, which is evaluation, the feasibility of implementing the revised curriculum was evaluated.

Chapter Three involves the review of the current physiotherapy curriculum to identify the components of CBR. Content analysis was used as a data collection methodology. Constructive alignment was used as a framework for the content analysis. The CBR module at the physiotherapy programme at AUW was analysed and compared to programmes at other four other universities, in terms of intended learning outcomes, course content, learning and teaching activities, and assessment task. The course was also compared to WHO and WCPT guidelines. This was viewed as Phase 1, stage 1, of this current study.

Chapter Four incorporates a survey to determine the needs of PwDs, regarding rehabilitation services. Therefore, the information gathered in this phase and stage (Phase 1, stage 2) would assist later phases/stages of the study, to establish how these needs could be included in the CBR module of the physiotherapy curriculum at AUW. A questionnaire survey among PwDs was used as a data collection tool for this stage. Questions focused on the demographic information's, disability details, rehabilitation services information's, and assistive devices details. The survey included PwDs attending rehabilitation services in Khartoum State, and comprised 25% of the total number of PwDs in Khartoum State, being 467 of 1868 PwDs. Data were analyzed by investigating relationships between variables and test collaborations, to discuss the challenges met by PwD in accessing rehabilitation services in Khartoum State.

Chapter Five encompasses identifying the CBR components, or elements thereof, which needed to be included in the physiotherapy curriculum at AUW. A focus group discussion (FGD) with graduated students from the physiotherapy department at AUW, as well as an in-depth interview with a CBR expert, were used as data collection methods. Six graduated students from the physiotherapy programme at AUW were included in the FGD. The discussion involved their experience of having the CBR module as a part of their education. Their opinions and suggested components were interrogated by the in-depth interview with a CBR expert to seek consensus. The findings from the analysis of both methods were ultimately compared and integrated.

Chapter Six involves revising and adapting the CBR components of AUW Physiotherapy curriculum. Therefore, a workshop was used as the preferred data collection method. All the adapted components into the CBR course of physiotherapy education at AUW were discussed in the workshop. The discussion included AUW physiotherapy staff and clinical supervisors.

Chapter Seven comprises the conclusion and recommendations of the overall study. The conclusion presented the CBR course of physiotherapy education, before and after the

adaptation of the new components. Based on the findings of this current study, the researcher recommended that more investigations regarding research be conducted in the same field, the physiotherapy department at AUW, and the clinical practice of the physiotherapy education at AUW.

CHAPTER TWO

METHODOLOGY

2.1. Introduction

In this chapter, the overall methodology utilised to conduct this current study is described. In addition, the motivation for using the specific methods applied, is provided. Each method is explained, in detail, in the methodology section of each study, in particular, the settings, study design, population and sampling, data collection methods, and instrumentations. Additionally, the data analysis and procedure to validate the data tools are provided. Finally, the issues of ethical considerations, pertaining to this current study are discussed.

2.2. Study design

In this study, Participatory Action Research (PAR) study design was employed to collect both qualitative and quantitative data. Participatory Action Research is an approach to research that attempts to apply changes and action to a specific topic, as presented by Mshelia *et al.* (2013) in the PAR cycle, in Figure 2.1.

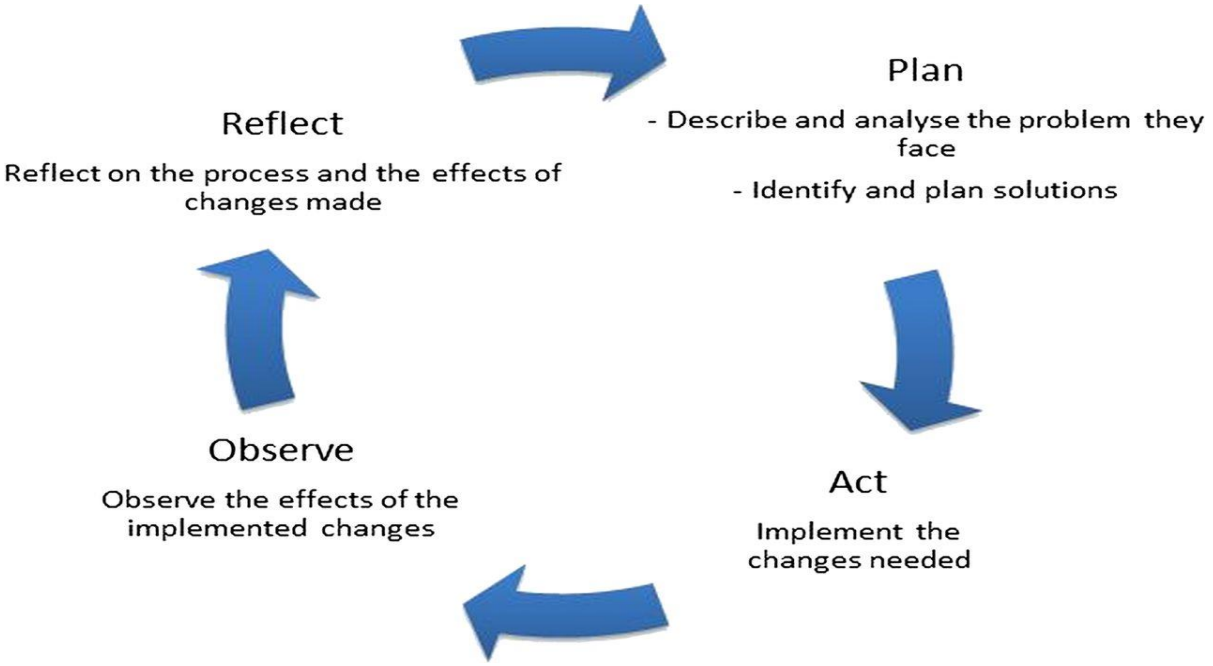

Figure. 2.1. Participatory Action Research cycle by Mshelia *et al.* (2013)

Participatory Action Research (PAR) is an inquiry conducted by a group, involved in a certain problem, to try and improve the practice of this problem, as well as generate knowledge about how to improve the process and the strategy of this problem (Mshelia *et al.*, 2013). In this current study, PwDs, CBR experts, Physiotherapy educators, and students were involved in providing feedback, during the research process. Rule (2010) used PAR in social education, disability, and CBR. The main CBR concerns were to maintain social justice and equalization for PwDs (WHO, 2011). Therefore, it was important to choose a research approach that reflects and accommodates social justice in the process and content, as is the case with PAR. In this current study, PwDs were involved because they were important in the field of CBR, which is concerned with PwDs' needs to participate equally in the community. In education researches, the PAR approach is recommended in different studies. Rule (2010) reveals how the PAR approach could help to plan and apply changes to the CBR curriculum in the physiotherapy education. Newton and Burgess (2008) reveal how the process of PAR could enable practitioners in education to question their own practice.

The aim of this current study was to to develop a new CBR module for the undergraduate curriculum, using input from a variety of stakeholders, including other universities, physiotherapists, PwDs, students and lecturers, which would help to address the shortcomings of the current programme, and prepare the students for professional practice in the community.

Therefore, the people involved in the CBR components in physiotherapy education at AUW, could have the opportunity to question their own education, and take ownership of finding solutions. This current study was conducted as follows:

- **PAR Phase 1: Identify the problem:**
  - The current physiotherapy curricula of AUW and 4 other universities were reviewed to identify, as well as compare the components of CBR.
  - The needs of PwDs were determined, regarding rehabilitation services.
- **PAR Phase 2: Action plan:** By comparing the CBR components of the physiotherapy curriculum of AUW to the curricula of the other 4 universities, the CBR components that needed to be included in the physiotherapy curriculum at AUW, were identified.
- **PAR Phase 3: Take action:** The physiotherapy curriculum at AUW was revised to include the proposed additional CBR components.
- **PAR Phase 4: Evaluating:** The feasibility of implementing the revised curriculum was evaluated.

Both qualitative and quantitative methods for data collection were used. Spratt, Walker and Robinson (2004) highlight that using both methods of research offer a more comprehensive approach to finding answers to the research questions. In addition, it helps to gather more in-depth information and knowledge of the phenomenon under study, as well as provide rich datasets (Spratt, Walker & Robinson, 2004). Another advantage of using a mixed methods design is that a theory could be developed in the qualitative phase, and tested in the quantitative phase, as is the case in this current study (McCusker & Gunaydin, 2015). In addition, it provides a greater understanding and/or validation of instruments and results (Bazeley & Jackson, 2013).

This current study, therefore, aimed to investigate, and include new components into the physiotherapy education curriculum at AUW, as well as to test the added components. McCusker and Gunaydin (2015) explain that, by using a mixed methods design, the strengths of one method could be used to overcome the weaknesses of the other method. For example, the quantitative method lacks the capacity to understand the context of people's behaviour, as well as the setting, which the qualitative method facilitates. Alternatively, the qualitative method is inadequate at generalizing findings to a larger group, which the quantitative method facilitates.

The strategy utilized in this current research was the concurrent mixed method design, in which qualitative and quantitative data were converged, in order to provide a comprehensive analysis to answer the research questions, as illustrated in Figure 2.2.

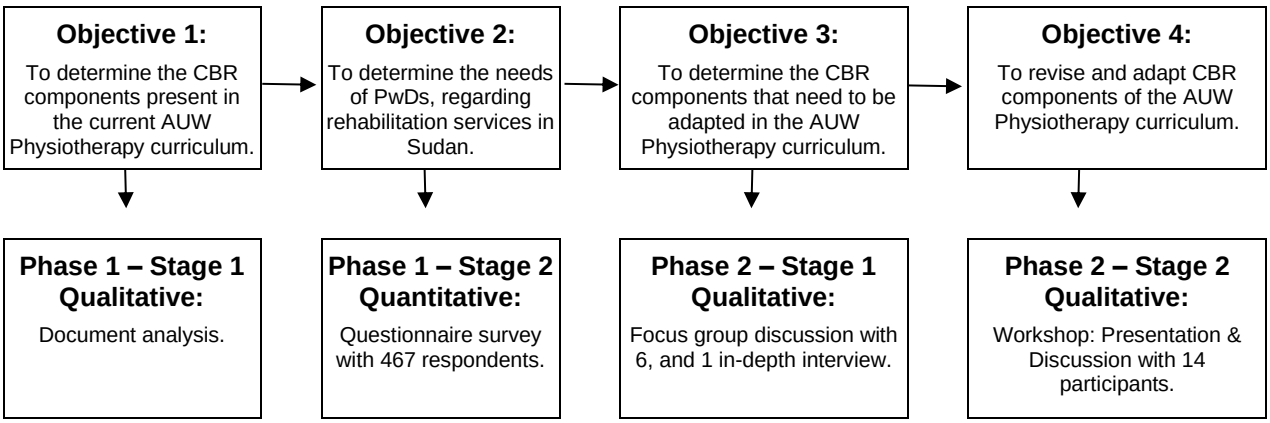

Figure. 2.2. Mixed methods design used in this study.

Phase 1 of this current study included two separate stages that were used to determine the extent of the problem. **Stage 1 of Phase 1** was to conduct a document analysis of the undergraduate physiotherapy curriculum at AUW, as well as 4 other universities, namely, University of the Western Cape (UWC) in South Africa, University of Rwanda (UR) in Rwanda, Kilimanjaro Christian Medical College (KCMUCo) in Tanzania, and University of Zambia (UZ) in Zambia. This qualitative approach to data collection and analysis helped to establish a snapshot of the curricula, with respect to the integration of CBR, and allowed the researcher to compare AUW's curriculum to those of the other four. **Stage 2 of Phase 1,** an exploratory, descriptive, non-experimental approach was used to gather quantitative data related to how PwDs perceived the services available to them. The study form was based on a one-time survey, as one of the most common forms of research, with a clear, strong, and appropriate design. These two parts of Phase One were combined to establish the ways in which the AUW curriculum was unable to address the needs of PwDs, in its current form. Therefore, the first phase of the project clearly identified the problem under consideration, achieving the first and second objectives.

Phase 2 of this current study also included two separate stages. **Stage 1 of Phase 2** involved a focus group discussion with former AUW students, who were currently staff members, and a face-to-face, in-depth interview with a CBR expert, a psychiatrist working at an NGO, regarding their experiences of the current CBR components in the physiotherapy curriculum.

This qualitative approach to data collection and analysis helped to identify new CBR training components that should to be included in the physiotherapy curriculum at AUW. An exploratory design was adopted for this part of the study. **Stage 2 of Phase 2**, the researcher conducted a workshop with staff from AUW, engaged in CBE at School of Health Science (SHS), as well as physiotherapists working at NGOs to revise the current physiotherapy curriculum at AUW, regarding new CBR components. Therefore, the second phase of the project was aimed at identifying and revising the CBR components that needed to be included in the physiotherapy curriculum, achieving the third and fourth objectives.

The qualitative part of this current study covered the assessment of the CBR model at AUW. An exploratory design was employed, using a document analysis, a focus group discussion, in-depth interviews, and a workshop. The qualitative research method is an inquiry method employed in different academic disciplines, including social science (Neuman, 2014), and is popular in education researches, as is the case with this current study. It is a design that reveals meaning, which informs action, through a deep investigation into human behaviour, gaining a deep understanding of a specific event (Savela, 2018). In this current study, to evaluate and revise the CBR course in the physiotherapy curriculum at AUW, requires a deep investigation and understanding of what should be included in physiotherapy education at AUW. Therefore, an investigation into the CBR course, and the Sudanese society, would help in the course of this evaluation and revision.

The advantages of the qualitative research method are that it is concentrated less on quantity, and more on the content of the data. Therefore, more information and meanings could be achieved from a lesser number of data sources (Neuman, 2014). The qualitative research method can explore the underlying, or hidden responses, through open ended questions, which implies that the topic will be explored, to include each, and every, opinion available, or emergent, during the process of data collection (Neuman, 2014). In this current study, the views, or the participants' behaviour towards the topic might be different; however, it is important that the information include those views, in order to provide a realistic evaluation and revision into the CBR course in physiotherapy education at AUW. In qualitative research, a smaller sample size can be used, which can save on costs (Neuman, 2014).

The disadvantages of the qualitative research method is that data collection consumes more time, as in this current study. Using a small sample size in each part was aimed at reducing

time consumption (Neuman, 2014). For example, in the content analysis, the researcher evaluated the CBR course at five universities, recruited six participants for a focus group discussion, one participant for an in-depth interview, and twelve for a workshop. Additionally, the quality of qualitative research, heavily depends on the researcher's skills. In this current study, using information and guidelines from literature was aimed at reducing bias. In addition, the researcher strongly focused on using individual expertise, in qualitative research methods, for example, to explore and review the current CBR course components in the physiotherapy curriculum at AUW, as physiotherapy experts in CBR and teaching were used during the data collection process. This helped to limit the possible influence, which the researcher's presence might have had on the responses to the subject, being a senior physiotherapy lecturer.

In contrast, the quantitative research method is a systematic investigation of observable phenomena, through statistical, mathematical or computational techniques (Savela, 2018). It quantifies the problem and generates numerical data. There are four different quantitative research designs, namely, descriptive, correlation, quasi-experimental and experimental. The descriptive design, used in this current study, seeks to describe the status of a variable, or phenomenon, which is to explore the needs of PwDs, regarding rehabilitation services.

The advantages of the quantitative research method are that it involves a few variables and many cases, while employing prescribed procedures to improve validity and reliability (Savela, 2018), and generates findings through statistics. For example, it can identify relationships between variables, as well as establish cause and effect (Mitchell & Jolley, 2010). Therefore, it is one of the reliable evidence-based knowledge methods (Driessnack, Sousa & Mendes, 2007). In this current study, this design is aligned to one of the study objectives, which is to determine the needs of PwDs, regarding rehabilitation services in Sudan. This design enables the researcher to explore the variables, related to rehabilitation services in Sudan, as well as the accessibility of PwDs to these services.

A disadvantage of the quantitative research method is the proper representation of the target population, which requires a large sample size (Savela, 2018). In this current study, the sample size required to represent the population was achieved, as explained later in the sample size of the descriptive survey. The data collection time was long enough for the expected challenges in data collection, such as availability and accessibility to respondents. In this current study, both a statistician and statistical software were used to facilitate the data analysis process.

2.3. Study setting

According to the researcher, a senior lecturer at AUW, the Ahfad University for Women (AUW) is a university for female students only, located in Omdurman, and established in 1966. Approximately 5 000 students attend 6 faculties, namely, Medicine, Pharmacy, Health Sciences, Rural Extension, Management, and Psychology. The Physiotherapy option, under the School of Health Sciences, was established after two years of preparation (from 2005 to 2007), in collaboration with international partners from Norway and Italy (Badri, 2005). The partners' role was to support AUW in establishing and developing the new course, including training the Sudanese staff, offering scholarships to students to study abroad, sponsoring teachers from abroad to teach at AUW, and supporting the formulation of the official syllabus. The duration of the degree course is five years. The first group of 33 students graduated in 2012. AUW graduates in physiotherapy are expected to promote the physiotherapy services in Sudan, together with graduates from other institutions offering physiotherapy degrees, by increasing the quantity and quality of the services (Haugland *et al.*, 2014). This current case study focuses, particularly, on AUW.

2.4. Data collection methods

The data collection methods, used to achieve each objective, are presented in the following sections.

2.4.1. Objective One – To determine the CBR components present in the current physiotherapy curriculum at AUW.

2.4.1.1. Phase 1 – Stage 1: Document analysis

The design used in this part of the study (Phase 1, Stage 1) was a retrospective documents analysis. Retrospective refers to the use of the data that were existent at the time of the study (Ahmad, Marwat & Khan, 2014). A document analysis is a form of qualitative descriptive research approach that interprets documents into meaning (Vaismoradi, Turunen & Bondas, 2013). For example, when documents of public records are analysed, the meaning of the on-going official activities performed by an organization, can be determined and explained. In this current study, the CBR course module was collected and analysed for each of the five universities, mentioned earlier. Universities were selected based on the fact that

they are all in African countries and all of their documentation was in English. A document analysis was used because its rich source of information could be used to explore the CBR course in the physiotherapy education, at AUW, which increases the credibility of the study. In addition, it allows the researcher to compare the possible associations and relationships (Ahmad *et al.*, 2014).

For the purpose of analysing the content of the documents, a constructive curriculum alignment framework, designed by Biggs (2003), was used in this current study, as illustrated in Figure 2.1. Curriculum alignment is an approach to curriculum design that optimizes the conditions for quality learning (Biggs, 2003). The theory of this framework is that building knowledge is not transmitted by teachers, but built by learners, while teachers encourage learners, in and outside the classrooms, through appropriate learning activities (Biggs, 2014).

According to the Quality Assurance Agency (QAA) in the United Kingdom (UK), the Biggs module could effectively assess the achievement of students, against intended learning outcomes (Rust, 2002). Therefore, the constructive alignment framework assesses to what extent the intended learning outcomes have been achieved in a course. In this current study, the aim was to determine the components of the CBR course in the current physiotherapy curriculum at AUW. Therefore, this framework could help to identify whether the CBR course in physiotherapy education at AUW was aligned to achieve the intended learning outcomes.

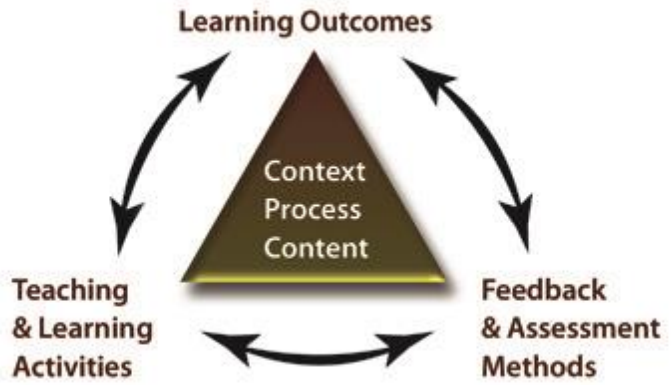

Figure. 2.3. Constructive alignment framework (Biggs, 2003)

Various studies have used the constructive alignment framework in curriculum development and evaluation. Morselli (2018) used this framework to evaluate one course at tertiary level, and the study findings revealed that the course led to significant positive changes in students' attitudes towards seeking knowledge. The students extended their skills of seeking knowledge beyond school, and applied it in their communities. In addition, they became more creative in developing learning activities. Joseph and Juwah (2012), however, used this framework to develop an undergraduate nursing course. The study findings revealed that constructive alignment was the proper framework for nursing educators, as the framework theory equipped students with the required knowledge and skills, after graduation. The study also highlighted that additional skills were not required in their practice.

2.4.1.2. Trustworthiness of data collection

Trustworthiness is ensured by establishing whether the research findings are credible, transferable, confirmable, reflexivity, and dependable (Korstjens & Moser, 2018).

Credibility is important because it relates the research findings to reality, and confirms that the research findings are true. In this current study, it was important that the findings of the content analysis revealed the content of the CBR module in physiotherapy education at AUW, as well as the 4 other universities, as it would enable the researcher to compare the curricula, and continue with the study process. Triangulation and members checking are the common methods, used to ensure credibility in qualitative research. For members checking, the findings, would have had to be shared with individuals, who were not involved in this current study, because, in document analysis, there are no respondents. Alternatively, several sources of data, observers, or theories could be used (Korstjens & Moser, 2018). In this current study, data were collected from various sources. Modules from different universities, in different countries, could have increased the credibility of the study, instead of documents analysed according to one framework only. However, using the constructive alignment framework would increase the credibility, as it is acknowledged as the appropriate method in curriculum documents analysis (Biggs, 2014). Finally, using existing written documents for

analysis, also increases the credibility of the data, as they existed prior to any intervention, or interest in the research (Rule, 2010).

Transferability refers to whether the research findings would be applicable to other contexts or similar situations, as well as whether the same results would be obtained, if the study was conducted in other situations or settings (Korstjens & Moser, 2018). Transferability is important to show that the data are presenting reality. Transferability is difficult to be establish, as qualitative research uses a small number of participants, and generalization is not easy to establish, as in the case of quantitative research (Korstjens & Moser, 2018). In this current study, transferability was important to the CBR curriculum in physiotherapy education at AUW; therefore, the findings were analyzed to screen the similarities and differences. The differences in the CBR curriculum in the physiotherapy education were expected, as the compared models were based in different settings. In the following process of this current study, the differences are discussed, to assess what is relevant to the physiotherapy education curriculum at AUW, which is the Sudanese context.

Conformability refers to how the findings are related to the responses, and affected by bias. It is a way of minimizing possible mistakes in the study process (Korstjens & Moser, 2018). It is important, as it is a way proving that the study findings accurately portray the real situation. In this study, the process of data gathering and interpretation was under continuous review by the study supervisor's comments and feedback.

Dependability is the extent to which the study findings would be consistent, if repeated by other researchers, with similar participants and in similar settings (Korstjens & Moser, 2018). Dependability is very important in this study, to limit any findings biases, and to ensure that the results were not influenced by the researcher's interests, or mistakes. In this study, the analysis was done by the researcher, and subsequently, by an independent reviewer. When both results were compared, there were no significant differences.

Finally, to address my positionality as a researcher, I will define reflexivity. R*eflexivity* means that the researcher has to be aware of his or her own biases and how they could affect the participants' responses or opinions (Korstjens & Moser, 2018). It is not possible that the researcher excludes himself or herself from data collection, analysis, and reporting of the research (Holloway & Biley's, 2011). The challenge is to find a balance between the researcher's and participants perspectives (Holloway & Biley's, 2011). In this study, the researcher is a staff member in the physiotherapy department at AUW, as well as a physiotherapist working in the community, which could have created a bias during data collection by influencing the informants during the interviews, whether students or PwDs. I tried though to be aware of this during the interviews, while explaining the purpose of the study. Another bias could be that as an AUW staff member, I only considered local documents and practices as point of reference. However, I included documents from other universities related to the CBR component in the physiotherapy curricula. On the other hand, the personal situation of the researcher being a lecturer at AUW and studying at UWC influenced the outcomes of the study positively. For example, my position facilitated communication with physiotherapy teacher colleagues at the University of the Western Cape (UWC) in South Africa, such as from the University of Rwanda (UR) in Rwanda, Kilimanjaro Christian Medical College (KCMUCo) in Tanzania, and the University of Zambia (UZ) in Zambia, which gave me access to data and documents from other countries.

2.4.1.3. Data analysis

The data analysis for qualitative and quantitative research vary significantly. Qualitative data analysis is based on patterns, features, and themes (Malterud, 2012). Quantitative data analysis is based on the identification of statistical relationships. In this current study, the curriculum of AUW was compared to those of four other universities, namely, University of the Western Cape (UWC) in South Africa, University of Rwanda (UR) in Rwanda, Kilimanjaro Christian Medical College (KCMUCo) in Tanzania, and University of Zambia (UZ) in Zambia. The similarities and differences in these universities, regarding the learning outcomes, main content, learning activities, and assessment in each university, were explored. The data capture sheet was based on comparing the similarities and differences in

these four main curriculum aspects. In addition, the analysis included a critical analysis of the relative advantages and disadvantages of the approaches used in the CBR components of the physiotherapy curriculum at each of the five universities.

2.4.2. Objective Two - To determine the needs of PwDs, regarding rehabilitation services in Sudan.

2.4.2.1. Phase 1 – Stage 2: Questionnaire survey

The design used in this part of the study (Phase one, part 2) was a quantitative, cross sectional, exploratory research design (see chapter 4). The study was conducted, using a questionnaire survey, at the selected research settings in public and Non-Governmental Organizations (NGOs) centres that offer CBR services for People with Disabilities (PwDs) in Khartoum State.

2.4.2.2. Population and sampling

The targeted population in this part of the study were 1 868 PwDs attending CBR and physiotherapy services in Khartoum State, including persons with physical disabilities, as well as persons with both physical and other types of disabilities, who had received rehabilitation services at the research settings and the community. Therefore the inclusion criteria for this study were:

- People with Physical Disabilities (PwDs) attending physiotherapy services.
- People with Physical Disabilities (PwDs) attending CBR.

The exclusion criteria were:

- People with other types of disabilities.

The probability sampling technique was employed to select a sample that was a proportional size of the people with physical disabilities, who were registered at centres offering physiotherapy and CBR in Khartoum State. The sample size was calculated, using a standard sample size formula for cross-sectional design (Eltayeb & Khalifa, 2013). The minimum sample size was calculated, according to a defined level of acceptable error and design effect, as follows:

$$n=N/1+N\,(d)^{2}$$

Where n= is the sample size

N= is the population size

d= is the degree of accuracy desired (or the accepted margin of error and is usually set to 0.05).

Therefore, n = 1 868 **divided by [**1+1 868 **multiplied by** 0.0025**]** = 400, which is equal to 21.5% of the total population; however, to increase the validity of the study, the minimum sample size was increased to 25% of the study population, totalling 467 participants (Sullivan & Feinn, 2012: Finer & Zolna, 2011).

2.4.2.3 Data collection

As will be explained, in detail, in Chapter Four of this study, an interview questionnaire was designed, which included questions on different disability types, different services offered to PwDs, participation challenges, and expectations, satisfaction, as well as needs of PwDs, regarding the rehabilitation services. According to Brace (2018), the interview questionnaire has several advantages, namely: it can be administered to respondents who cannot read or write; it helps to overcome misunderstandings, or misinterpretations, of words, or questions, resulting in clearer answers; and all the items are considered. In addition, the respondents are not inclined to omit difficult questions in an interview questionnaire, while the researcher could reassure the respondents, and encourage them to persevere. The questionnaire in this current study comprised open- and closed-ended questions, employed for ease of analysis, as well as greater uniformity of responses (Babbie & Mouton**,** 2010).

2.4.2.4. Validity and reliability

Validity and reliability are two of the most important criteria by which a quantitative instrument's adequacy is evaluated (Polit, Beck & Hungler, 2004). Validity refers to the extent to which an instrument measures what it is supposed to be measuring (Sarantakos, 2013). *Content validity* explores whether the instrument adequately covers all the content that it should, with respect to the variable (Sarantakos, 2013). To ensure the *content validity* in this study, the questionnaires were designed in conjunction with the study objectives, while researcher consulted expert reviewers in the field of this current study, throughout the adaptation process (DeCuir-Gunby, 2008: p. 132). The questionnaires were focused on determining the needs of people with disabilities, regarding

rehabilitation services. Therefore, the population, which were PwDs in Khartoum State, were asked about types of disability services offered to PwDs, the satisfaction of the PwDs with the rehabilitation services offered, participation challenges of PwDs, as well as expectations and needs of PwDs, regarding the rehabilitation services. Different literature been used to insure the validity of each variable; for example, Participation Restriction Score (PRS) indicators were used to investigate participation restrictions for PwDs, as recommended by Mont & Loeb (2010). Scientific support was provided by experts in the field of disability, through advice in questionnaires design, until the point was reached that the questionnaires appeared to be valid.

Reliability is the degree of consistency of a measure (Polit, Beck & Hungler, 2004). A test is reliable when it reveals the same repeated result, under the same conditions. The reliability of a research questionnaire is confirmed by the reproducibility of the scores, from one administration to another, when no real change has occurred; one example being the test-retest and inter-rater reliability (Polit, Beck & Hungler, 2004). In the absence of evidence of a research questionnaire's repeatability, reliability tests of the statistical internal consistency of its scales (alpha coefficient, Cronbach Alpha) augment its reliability (Sarantakos, 2013). In this study, the principal researcher conducted a pilot study to assess the reliability of the questionnaires.

2.4.2.5. Data analysis

The researcher employed descriptive statistics to analyse the survey data. Completed data were captured on spread sheets, using the Microsoft Excel programme, in preparation for analysis. Subsequently, the data were exported into the Statistical Package for the Social Sciences (SPSS) version 21.0. Tables were used to describe categorical data, while means and standard deviations were used to describe continuous data. An Independent Sample t-test was used to compare means. Cross tabulation and Chi-square tests were used to test the relationships between variables. The level of significance was set at $p<0.05$.

2.4.3. Objective Three - To determine the CBR components that need to be adapted in the physiotherapy curriculum at AUW.

2.4.3.1. Phase 2 – Stage 1: Focus group discussion and in-depth interview

After comparing the CBR components of the AUW physiotherapy curriculum with the four other universities, it was observed that certain components, which were present in the other universities' curricula, were missing from the AUW curriculum. The aim of this part of this current study was to explore the AUW staff members' experiences with the CBR components in the physiotherapy curriculum, and to determine whether any of these missing/new components of CBR training, needed to be included in the physiotherapy curriculum at AUW. The study used an exploratory design, with a focus group discussion (FGD) and a face-to-face in-depth interview, to ascertain this information. The procedure involved selecting data relevant to this objective, devising a classification system, coding the data and analysing the coded data (Fu, 2011).

The *focus group discussion* (FGD) is one of the popular qualitative methods to collect data. It is a form of discussion guided by a moderator, following prepared interview guidelines (Darlow *et al*, 2016). The discussion can last between one and four hours, and include eight to 10 people (McMahon, O'Donoghue, Doody, O'Neill, Barrett & Cusack, 2016). It encourages the participants to share their views and allows time for individuals to think and reflect on the views of others. In addition, it offers a chance for participants to discuss and debate, as a group (McMahon *et al.*, 2016: Ritchie, Lewis, Nicholls & Ormston, 2013).

The *in-depth, face-to-face interview* is a qualitative research technique known also as the unstructured interview (Ritchie *et al.*, 2013). It involves conducting an intensive interview with individuals to explore their perspectives of a particular topic. It is a useful technique to gain more in-depth data on individuals' thoughts, or behaviour (Ritchie *et al.*, 2013). It provides freedom for extra knowledge and thoughts to be created, and involves all participants in individual brain storming, creativity, as well as group decision making (Ørngreen & Levinsen, 2017).

2.4.3.2. Population and Sampling

The study is concerned with a specific type of population, linked to the Physiotherapy and CBR curriculum, as it involves adapting curriculum to include omitted aspects related to CBR in physiotherapy. Therefore, the researcher adopted the technique of expert sampling, by recruiting experts in a particular field (Etikan, Musa & Alkassim, 2016). Using experts in all scientific research is well-known for subjectivity and valid inferences (Etikan *et al.,* 2016; O'Donoghue, Doody & Cusack, 2011). In this qualitative part of the current study, data were collected from a physiotherapist, who was a CBR expert, as well as physiotherapists, who were staff members at AUW. This type of sampling technique is recommended for new areas of study (Etikan *et al.,* 2016). In this current study, the CBR curriculum in physiotherapy education is a new field in Sudan. There were no studies found on this subject, using different search engines on the Internet. According to Mason (2010), samples for qualitative studies are generally smaller than samples in quantitative studies, due to the fact that frequencies are rarely important in qualitative studies, and the information is not linked to the amount of data. In addition, qualitative data concerns the meaning, and not the generalization of a certain hypothesis. In this current study, the data sample size included one physiotherapist, who was a CBR expert, for the in-depth interview, and six physiotherapists, who were previously students, but currently staff members at AUW for the focus group discussion. Participants were chosen according to their knowledge and experience in the field of physiotherapy education at AUW. Participants got their degree in physiotherapy from AUW and they are working as teachers themselves, thus having useful experience of the curriculum and research topic both as students and as teachers. The CBR expert was chosen due to the rich experience of CBR in another, but very comparable African setting. Although the informants were few, they could provide rich knowledge about the study's topic.

2.4.3.3. Data collection

In this part of the study, one focus group discussion was conducted with six participants from the physiotherapy department at AUW. The focus group discussion guide was focused on the research question to provide direction for the discussion. A range of opinions and a diversity of views were explored, to collect

rich information. Both the focus group discussion and the in-depth interview continued until no new ideas were forthcoming, and data saturation was reached. The focus group discussion was conducted in a private office at AUW. All data collection was conducted in English.

Additionally, the views and perceptions of a CBR expert were collected through a face-to-face, in-depth, semi-structured interview. An interview schedule, to guide the interview was prepared by the researcher, guided by literature. The questions in the schedule were purposively designed to be open-ended, to allow the participant to explore his/her thoughts freely (Padgett, 2016). The questions started with actual facts, before becoming opinion questions. For example, "Can you tell me about your involvement in CBR?" before asking, "What do you think about CBR?" Probing questions were used to explore for more information, when needed. For example, "Could you quote me example?" or "Can you elaborate on that?" The interview was conducted in the office of the expert's place of employment.

2.4.3.4. Trustworthiness of qualitative data

Literature suggests that it is important to spend more time and effort to explain the purpose of the study, as well as enough time, to assure better chances of participation (Van Teijlingen, Pitchforth, Bishop & Russell, 2006). In this study, much discussion and communication transpired, to select the most convenient time for everyone involved, to conduct the study. According to Korstjens and Moser (2018), the following strategies were employed to ensure the trustworthiness of the data namely, credibility, member checking, dependability, transferability, and reflexivity (Korstjens & Moser, 2018).

Credibility: Data were collected from AUW staff and students, engaged in CBE at the School of Health Science (SHS), as well as a CBR expert (a physiotherapists working at an NGO offering CBR), to satisfy the aim of the study, which was to revise the CBR module for the undergraduate curriculum, using input from a variety of stakeholders. These participants were the rich realistic sources of information. The researcher used the triangulation of methods to check the consistency of the findings from a document analysis, a quantitative survey, a focus

group discussion, an in-depth interview and a workshop. The findings helped to identify new components of CBR training that needed to be included in the physiotherapy curriculum at AUW, which is aligned with the objectives of this study, to adapt the physiotherapy curriculum at AUW, regarding CBR components.

Member checking: As mentioned earlier, the transcripts were made available to the participants, to ensure that they were accurate, and to minimize the possibility of misinterpretation. The participants, therefore, had the opportunity to clarify that their intentions were interpreted accurately, correct errors, and provide additional information, where necessary. In addition, the researcher and assistants summarized the answers for the participants, before continuing with the following question. All the participants were satisfied with the way their ideas were presented in the transcript.

Dependability: In accordance with recommendations by Malterud (2012), the assistance of the study supervisors was sought with the coding of the data, in order to ensure dependability. Therefore, the code/re-code method was employed, with the data being coded at different times, and the results compared.

Transferability: Transferability concerns the aspect of applicability. In this instance, it is the researcher's responsibility to offer enough description of the research context, setting, the procedure and participants, to allow other researchers to repeat the similar study, in a similar setting. Therefore, in this current study, detailed background information about the participants were provided. In addition, detailed descriptions of the context, setting, data collection and analysis procedures were presented. The value of the participants' experience to the study was also explained for the benefit of the reader. The transferability judgment, therefore, is based on the reader's view, as suggested by Korstjens and Moser (2018).

Confirmability: Confirmability refers to the degree that the findings could be confirmed by other researchers (Korstjens & Moser, 2018). In this current study, the assistance of the supervisors was sought to interpret the data collected and transcribed from the audio-tape recorder. The content for the workshop presentation was agreed upon with the supervisors, based on the findings of other studies in this research. This is done to confirm the accuracy of the findings, and to ensure that the findings are supported by the data collected.

Reflexivity: To address reflexivity for this part of the study the researcher included participants from other departments and institutions, besides the physiotherapy department at AUW, in Phase 2, Stage 2 (workshop). This enabled the researcher to obtain more data and perspectives from the different participants. On the other hand, the personal situation of the researcher being a lecturer at AUW influenced the outcomes of the study positively. The researcher's fifteen years of experience in physiotherapy practice in Sudan could help in highlighting the important challenges in health services and education and the positive potential of integrating CBR and CBE respectively. The importance of reflexivity in this study is that the researcher's own reactions, position, and relationships were encountered (Holloway & Biley's, 2011).

2.4.3.5. Data analysis

In qualitative research, the process of data analysis involves systematic text condensation, as explained by Malterud (2012), which occurs in four steps.

- *Step one* involves acquiring the total impression about the data through reading the transcripts, and searching for possible themes.
- *Step two* concerns initiating codes from the themes, by identifying data elements related to the research question, and arranging them in a form of research units.
- *Step three* entails interpreting the codes into meaning, which minimizes the codes.
- *Step four* involves synthesizing the meaning units into descriptions and concepts.

The outcome was that the analysis approached a conclusion, and provided coherent stories, related to the findings (Malterud, 2012).

2.4.4. Objective Four - To revise and adapt CBR components of AUW Physiotherapy curriculum.

2.4.4.1. Phase 2 – Stage 2: Workshop

After the focus group discussion and in-depth interview, and the additional CBR components that needed to be added to the physiotherapy curriculum were

identified during a workshop, to revise the existent physiotherapy curriculum at AUW. A workshop involves a group of people, who learn about, acquire new knowledge of, innovate and perform creative problem-solving for a domain-specific issue (Ørngreen & Levinsen, 2017). In addition, the workshop could be used in health education to determine new components, and revise curricula (Humphrey-Murto, Varpio, Gonsalves & Wood, 2017). In this current study, the workshop was aligned to the study aim, which was to achieve a general agreement on the additional CBR components that were to be adopted into the physiotherapy curriculum at AUW. There are different advantages of such a methodology, as advocated by Ørngreen and Levinsen (2017), who refer to it as a brainstorming method that encourages all the participants to think and contribute to solving a problem, based on their experience. It is a perfect opportunity for all participants to have their voices and opinions heard, as well as considered, by other members in the discussion. It has been applied in numerous healthcare settings and education institutions, as in this current study. In a study to improve the module, and increase students' participation in learning activities at school, Öberg and Hernwall (2016) used the workshop as a methodology for data collection, regarding the teachers' perceptions of the module design.

2.4.4.2. Population and Sampling

For the workshop method, the population was individuals, who were connected to physiotherapy education at AUW. The study was concerned about a specific type of population, linked to AUW, as well as the CBR curriculum. The number of individuals, who could participate in a workshop, could total up to twenty participants (Ørngreen & Levinsen, 2017). In this current study, the purposive non-probability sampling technique was employed to recruit fourteen participants, who were previously students, but currently staff members of AUW, engaged in CBE at the School of Health Science (SHS), as well as physiotherapists employed at NGOs. The staff of the SHS at AUW included physiotherapy staff members, who place, supervise, and monitor students in community settings, to obtain learning in health science. In addition, the NGOs involved, accommodated students for their course placements.

The researcher purposively selected individuals engaged in CBE and in physiotherapy education at AUW, as the aim was to revise the CBR components of the physiotherapy curriculum. Individuals who were not engaged in CBE at AUW were excluded.

The researcher contacted all the physiotherapy lecturers at AUW, as well as the physiotherapy staff at NGOs, who were involved in clinical supervision, as one of their duties. Emails, telephone calls, and face-to-face communication were used to contact the prospective participants. Information regarding participation was collected from the physiotherapy department at AUW. Fifteen lecturers from SHS at AUW and ten physiotherapy staff at NGOs were approached to participate in this current study. Ten lecturers from SHS at AUW and five staff at NGOs consented, as the rest were not available, due to time constraints.

2.4.4.3. Data collection

According to Ørngreen & Levinsen (2017), employing a workshop as a research methodology, aims to achieve agreement of opinion on a particular topic. In addition, it is used in health education, to determine new components and revise curricula (Ørngreen & Levinsen, 2017). In this current study, the workshop included a Power Point Presentation, and feedback on the newly suggested items for the components of the CBR module in the physiotherapy curriculum at AUW.

The purpose of the presentation was to reveal the suggested items to be added to the participants. Subsequently, the participants discussed the added items and provided their feedback, to agree or disagree. During the discussion, the participants also had the opportunity to suggest and discuss additional items. The workshop was conducted in the meeting room of the physiotherapy department at AUW, on Wednesday, 02 August, 2017, as agreed upon by all the participants. All the participants were provided with the necessary stationary and assistance in the workshop, as explained in Chapter Six. The workshop was audio-tape recorded for the analysis process. All data collection during the workshop was conducted in English.

2.4.4.4. Trustworthiness of qualitative data

The same information as for Objective 3 (see Section 2.4.3.4), applies in this part of this current study.

2.4.4.5 Data analysis

In this part of the study, both censuses and deductive methods were used in the data analysis. Each participant voted on whether they agreed that an item should be added, in order to reach consensus (agreement or disagreement), as explained in Chapter Six. For the deductive method of data analysis, the stages of data analysis (Malterud, 2012) are presented in Chapter Six.

2.4.4.6. Ethical considerations

Ethical clearance and approval were sought from the UWC Research and Study Grants Committee before the study commenced (Ethics#13/5/16 – Appendix 8). In addition, written consent was received from AUW Research Committee (Appendix 12), the Directors of Kartoum Cheshire Home (KCH, Appendix 11), National Authority for Prosthesis and Orthotics (NAPO, Appendix 10), Usratuna Sudanese Association for Disabled Children (USADC, Appendix 9), Organismo di Volontariato per la Cooperazione Internazionale (OVCI, Appendix 7), and Al Amal Rehabilitation City (ARC, Appendix 6). The information sheet (Appendix 5) and consent forms (Appendix 13) included the study aim, which was explained to all the respondents/participants before they consented to participate. Therefore, signed, informed consent was obtained from each respondent/participant. The aim of the study was explained to all the relevant administrative bodies, as well.

The participants/respondents were assured that all the information collected from the study would be kept confidential and anonymous. Access to the data was limited, and was stored under high security by the researcher, who was the only person with access to it. The data was kept in locked filing cabinets and storage areas, and only identification codes were used on the data forms, in password-protected computer files. The survey was anonymous, and did not contain information that could identify the respondents, personally.

Should a report or article emerge from this research project, the participants/respondents' identities would be protected to the maximum extent, possible. All the participants/respondents were informed of their right to withdraw from the study, at any time, without negative consequences, implying that their employment, or their treatment would not be affected. The research findings will be made available to all the stakeholders with recommendations, if any.

The following chapter comprises the content analysis of the CBR components in the Physiotherapy curriculum at AUW, as well as 4 other African universities.

2. 5. Limitations of the study

A first limitation of the study is that PwDs involvement in the study was limited to the survey, which only included closed ended questions, and not during qualitative interviews. Therefore, PwDs were not given the possibility to explore other challenges or needs that they may have thought were important to include in the proposed changes.

Moreover, the PwDs included in the survey were all attending physiotherapy or rehabilitation services they therefore had access to rehabilitation centres. Those PwDs who had no access to such centres, for various social, economic or political reasons, were excluded from the study. Information related to needs of PwDs are therefore limited to those who were receiving rehabilitation hence those who might need rehabilitation serves were not represented.

CHAPTER THREE

PHASE 1 – STAGE 1: DOCUMENT ANALYSIS OF CBR COMPONENTS IN THE PHYSIOTHERAPY CURRICULUM AT AUW

3.1. Introduction

In this chapter, the researcher addresses objective one this study, namely, to determine the components of CBR in the current physiotherapy curriculum in AUW. Important terms, related to CBR, are also defined in this chapter. The content of CBR modules at different universities are analysed and compared to WHO and World Conference for Physical Therapist's (WCPT) guidelines for CBR curricula. The methodology and framework, used in this part of the study, are presented, as well as the findings, and a discussion thereof. Finally, a summary of the chapter ensues. It is anticipated that these findings will enable the researcher to inform decisions, related to which additional CBR components are missing from the physiotherapy department curriculum at AUW.

3.2. Background

CBR has been observed to improve the quality of life of people with disability (Magallona & Datangel, 2012), as well as offer equal access to health and rehabilitation services to PwDs in their own communities (WHO, 2011). In addition to access to health services, PwDs need equality in other aspects of their lives, which are included in the CBR matrix. For example, having access to health services, employment, and education will enable PwDs to participate equally in their community, which is one of the aims of CBR. A key aspect of the implementation of CBR, is to train health professions students to appreciate CBR and contribute to its implementation, after leaving university. The need to learn from the community gave birth to the creation of Community Based Education (CBE) (Mpofu & Imalingat, 2006).

The link between CBR and CBE can be explored by investigating the learning valued in the community. For CBR in physiotherapy education, the community provides more intense experiential learning opportunities (Karthikeyan & Ramalingam, 2014). Learning in the

community could bridge the theory and practice, while transformative learning occurs when students are involved with the PwDs and their families. This would add knowledge and experience to the students' future intervention, as physiotherapists in CBR. The curriculum design of CBE includes content, outcomes, and learning activities; however, these may be different across various institutions. The aim of this chapter is to determine which components of CBR are currently in the curriculum at AUW, as well as which components are present in other curricula that could be included in the physiotherapy curriculum at AUW, at some point.

The content of CBR in physiotherapy education has been investigated in various studies, and the importance of including CBR in health sciences curricula, has been demonstrated, but none of these studies were conducted in the Sudanese context. For example, Rule (2010) explored whether the CBR curriculum should alert students to the need for empowerment of PwDs in South Africa, while Magallona & Datangel (2012) investigated the effect of CBR in the allied health profession in the Philippines. In both Rule (2010) and Magallona & Datangel (2012), the studies were aimed at investigating the curricula in higher education. Each community has its own socio-cultural status, as the community in Sudan differs from the community in South Africa or the Philippines, with the possibility of similar aspects, but not exactly the same.

The partnership between the educational institution and the community is very important in curriculum design and review. The needs of both the students and the community should be taken in consideration, to develop a curriculum (Trigwell & Prosser, 2014), which could benefit the community, as well as the students. Therefore, the students gain education, and join the workforce in the same community, which gains more qualified service providers. In addition, the community benefits by having access to more rehabilitation services, as well as other aspects of CBR, such as education, empowerment, livelihood, and social inclusion.

The curriculum is a cycle of development, implementation, evaluation, and revision. According to Trigwell and Prosser (2014), as well as Tannenbaum *et al.* (2011), changes in society may require a certain modification to the design of a curriculum, aimed at incorporating the changes, to address the needs of the society. It is an on-going process that needs to be under continuous review, as society is constantly changing (Talaat & Ladhani, 2014; Trigwell & Prosser, 2014). Society is subjected to change through inner and outer factors, such as war, poverty, diseases, culture, and media. It is important to be knowledgeable about curriculum development, as the curriculum is the tool that reveals what and how the subject should to be inculcated (Talaat &

Ladhani, 2014). The time frame for society change is hard to fathom. In some cases, it could be related to sudden crises; therefore, long term planning could include different types of, and timeframes for, changes in a curriculum (Trigwell & Prosser, 2014).

According to the researcher, developments in physiotherapy education, as well as the number of physiotherapy students, could trigger changes in the Sudanese physiotherapy sector, overall, which could lead to changes in health care delivery to the Sudanese community. The diversity movement could increase quality and accessibility of physiotherapy services in the community. Consequently, having more qualified physiotherapists, could lead to the improved availability of physiotherapy services, as well as the quality thereof, throughout the whole country and beyond its borders.

Physiotherapy students must learn skills and knowledge, in order to perform effectively in different social and medical contexts (Talaat & Ladhani, 2014). In Sudan, physiotherapy students could be taught regarding the need of their society, without being isolated, totally, from other societies. Besides, physiotherapy students in Sudan are expected to be exposed to different cultures, as physiotherapists. At AUW, reviewing the CBR components of the physiotherapy curriculum would help in identifying the course objectives, course content, information on supportive materials, as well as the techniques of assessment, in order to meet the expectation of the learning outcomes. Therefore, changes to the curriculum might be necessary, depending on the outcomes of the evaluation. Conducting this study in Sudan, and identifying the lacking components of CBR in the physiotherapy curriculum, would result in better training for physiotherapy students, as well as more positive outcomes in the future.

3.3. Theoretical framework

Biggs (2014) suggests that the main components are considered to be the learning aims, learning outcomes, teaching and learning activities, and assessment tasks, when designing a module. Biggs (2014) asserts that it is important to align those components, in order to help the students to achieve the learning outcomes of the curriculum. Other literature aver the importance of curriculum review, and conclude that the reason is to ascertain whether the alignment could be more effective, to achieve the intended learning outcomes (Trigwell & Prosser, 2014; Tannenbaum *et al.*, 2011).

Those modifications could be summarized as recommendations, following the guidelines on the reviewing and evaluation of the curriculum (Harden, 2001). The guidelines are based on what the priorities are for the students to learn, as well as what kind of knowledge is needed to deliver those priorities. Harden (2001) summarizes these guidelines in the mapping of the curriculum as four issues that the curriculum designers and evaluators need to address. Firstly, *what is taught*, which includes the curriculum content, the area of expertise addressed, as well as the expected learning outcomes; secondly, *how is it taught*, which includes the learning resources and opportunities; thirdly, *when is it taught*, which includes the timetable and the curriculum sequences; and fourthly, *what are the measures used* to ensure that the students achieve the learning outcomes, including assessment.

Biggs (2014) discusses curriculum development, and highlights the need to understand the importance of the teaching and learning processes, as well as the assessment process. In the teaching and learning process, there are numerous sources that contain rich learning activities, which could be performed inside and outside the classroom, namely, group work, and community visits. Therefore, lectures and tutorials are not the only sources of the teaching and learning process. Therefore, one way of using these rich teaching and learning activities in the classroom, would be to bring community members into the class (Wilson & Greig, 2017). The success thereof would depend on the way it is planned, in order to reap the maximum benefit of the resources. In the assessment process, the teaching activities of teachers, and the learning activities of learners, need to be directed towards the same goal, which is the quality of performance. Therefore, the assessment should clearly indicate that the student's actual learning outcome has been judged against those qualities (Biggs, 2014).

Linking different aspects of the curriculum, namely intended learning outcomes, main contents, teaching and learning activities, as well as assessment tasks, to fulfil the anticipated objective, is the way to construct a curriculum (Biggs, 2014). When constructing a curriculum, the intended outcomes of the course that the students need to gain, should be considered. In the CBR course of physiotherapy education at AUW, the learning outcomes should be focused on how the physiotherapy students could provide physiotherapy rehabilitation for PwDs in the community, as health professionals in rural areas. Therefore, the main topics of the CBR course in the physiotherapy education should be related to issues such as disability, rehabilitation, and health (WHO, 2011). Simultaneously, teaching and learning activities should be developed, to enable physiotherapy students at AUW to understand how their health role, towards PwDs in

rural communities, could be fulfilled. Assessment tasks should be conceived to assess whether the students understand their role in providing services to PwDs in rural communities.

The constructive curriculum alignment framework, designed by Biggs (2014), was used in this current study. The concept of *constructive* in the model refers to the fact that the students have to construct meaning from the learning activities they are required to perform in the course. This is not information or material that the instructors/teachers/lecturers will divulge/ provide to the students, as they have to create the significance by themselves from the learning activities, which are aligned to enable students to do so (Biggs, 2014; Brown *et al*, 2012). In this exercise, the students learn how to use the available resources to create an activity, which is one of the important skills they will need in their community. In CBR, creating learning and preventive activities in the community could help to involve the community in the health promotion. In education, the learning process, as well as the acquisition of skills to create learning-outcomes-activities, is a good exercise for the students' future responsibility.

Alignment refers to what the instructors do to support students in reaching the learning outcomes. For example, if the intended learning outcome is to discuss the CBR approach, the teaching and learning activities should encourage such a group discussion on the CBR approach. In addition, the constructive alignment model aims to explore whether the assessment and teaching methods are aligned to the learning activities for the intended outcomes. For example, providing feedback on the group presentation of the CBR approach, would enable students to become involved in the discussion, which is the intended learning outcome.

Biggs (2014) reveals the components of a module design that started with the learning aims and objectives, which is what the students need to learn. The teachers and students should be aware of the activity that needs to be performed in the module, in order to achieve the intended learning outcomes. In constructive alignment, the students, by themselves, have to create a meaning of what they have to execute, in order to achieve the intended learning outcomes, through the learning activities. According to (Brown *et al*, 2012), teachers set up a learning environment, and support learning activities, to reach the learning outcomes. In this case, it can be referred to as aligning the teaching and learning activities to the desired learning outcomes (Trigwell & Prosser, 2014; Biggs, 2014).

3.3.1. Defining the desired learning outcomes

The desired learning outcomes describe what the students should learn after completing the learning activities. Therefore, the connection between topic content and learning outcomes needs to be clearly understood and as logical as possible. For example, if the intended learning outcome is to enable students to differentiate between their role in the rehabilitation team, relative to other rehabilitation professionals, the content needs to focus on the physiotherapy role, as well as what other professionals contribute, as part of the team (Olson & Bialocerkowski, 2014). Curricula that include topic content unrelated to the learning outcomes, are not aligned, according to the Biggs (2003) framework, implying that it might not lead students to achieve the intended learning outcomes.

3.3.2. Choosing teaching/learning activities

According to Biggs (2003), lectures could be used as methods of teaching/learning activities, where the student is only a passive listener and memorizer. Lectures could be used when the intended learning outcomes involve verbs, such as know and describe. However, group work, or community work activities could be used when the verb for the intended learning outcomes is to demonstrate or plan. Group work and community work require memorization; however, they could also motivate critical thinking, depending on how the activity is set up, as well as what activities are required during the activity. Additionally, tutorials could include a wide range of activities and learning outcomes, depending on the way it organized. Biggs (2003) refers to several activities that could be used as teaching and learning activities, which are not located in the classroom, such as group work and field visits. These types of learning activities could also be practiced with simple resources, which is advantageous, as resources might be limited on the educational campus.

In addition, physiotherapy students could work in inter-professional practice, in teaching and learning activities, to learn about their role in conjunction with other disciplines (Pelham, Skinner, McHugh & Pullon, 2016). This activity could be in the form of various activities, such as delivering a presentation on their inter-professional practice.

3.3.3. Assessing student's actual learning outcomes

Assessment refers to an appraisal of the student's performance, by the student or the teacher (Biggs, 2014). The achievement of learning outcomes could be screened by

summative and formative assessment, which are aligned to the teaching methods, revealing whether the learning outcomes had been achieved, or not (Biggs, 2014). In *formative assessment*, no grades or judgment are used, as it is a way of providing feedback to the students, to help them to improve their knowledge (Trigwell & Prosser, 2014). The aim is to provide on-going feedback to students. In *summative assessment*, the aim is to appraise the student's performance by using some kind of criteria. In addition, it could include allocating grades to provide judgment about the student's performance (Trigwell & Prosser, 2014; Biggs, 2014).

Formative refers to students learning, while summative is concerned about the students' performance. Biggs (2014) recommends a strong alignment between summative and formative assessment. These two types of assessment are used to track the student's progression towards the achievement of the intended learning outcomes. In many cases, students only focus on what will be requested in the exam, without giving enough attention into what is in the curriculum (Biggs, 2003). Literature reveals ways of avoiding this, by designing high level tasks (Trigwell & Prosser, 2014; Biggs, 2014). Measuring the level could be based on Blooms (1956) taxonomy, for example, asking the student to perform a task includes differentiating between techniques, or evaluating strategies. This example of task design could be used in both forms of assessment, to enhance student's learning and performance.

3.4. Methodology

3.4.1. Setting

Curricula from various universities were included in this current study for three reasons. Firstly, all the universities offered a bachelor degree in physiotherapy, which is the issue/subject of this current study, the Bachelor physiotherapy degree at AUW. Secondly, all the universities ware located in Africa, and the similarity in the economic setting, would provide a realistic comparison. The socio-economic situation in Africa is more likely to be different from other continents, and those differences influence the community. Thirdly, the accessibility to documents was convenient, as the researcher was registered at UWC, to pursue post-graduate studies with colleagues from different countries within the region.

The documents analysed, included curricula from five African universities, as follows:

- **University of the Western Cape (UWC):** UWC is located in the northern suburbs of Cape Town in South Africa. The university was established in 1960, by the South African government, as a tertiary institute only for people of mixed identities, referred to as *Coloureds*, by the Apartheid regime (Abdelnour, 2008; Reddy, 2004; University of the Western Cape [UWC], 2013). Currently, around 22 000 students are enrolled in different programmes. The Department of Physiotherapy at UWC offers internationally recognized undergraduate and postgraduate programmes. The curriculum is aligned with the healthcare system and burden of disease of the country. There are different physiotherapy focus areas in the department, including disability and rehabilitation.

- **Rwanda, University of Rwanda (UR):** UR is a higher education institution founded in 2013. Previously, since 1963, it was known as the National University of Rwanda. The university's head office is in Kigali, which is the capital of Rwanda. There are about 30 445 students currently registered in different programmes at UR. The Physiotherapy Department falls under the College of Medicine and Health Sciences. The Bachelor of Physiotherapy, with honours, is offered as a 4-year full-time course (Samuel, 2013).

- **Tanzania, Kilimanjaro Christian Medical College (KCMUCo):** The Christian Medical Centre (KCMC) was established in 1971, as a hospital. In 1997, KCMUCo was established, as a constituent college of Tumaini University. It is situated in Moshi, in north-eastern Tanzania**.** The Bachelor of Physiotherapy programme course of four years, falls under the Faculty of Rehabilitation Medicine (Lisasi *et al.*, 2014).

- **Zambia, University of Zambia (UZ):** UZ is a public university, located in Lusaka, and established in 1965. It is the oldest public university in Zambia. The language of instruction is English. The Physiotherapy program falls under the School of Medicine. The University of Zambia is responsible for student training at Bachelors and Master's Degree levels. The University Teaching Hospital Department of Physiotherapy is concerned with physiotherapy clinical training and placement (Chifwepa, 2003).

- **Sudan, Ahfad University for Women (AUW):** AUW is a university that enrols only female students, and is located in Omdurman, established in 1966. There are around 5 000 students attending 6 faculties, namely, Medicine, Pharmacy, Health Sciences, Rural Extension, Management, and Psychology. The Physiotherapy programme was initiated in 2007, under the School of Health Sciences, and provides a five-year Bachelor's degree in physiotherapy. English is the medium of instruction (Magied, 2009).

3.4.2. Study design

The design used in this part of the study (Phase 1 – part 1) was a retrospective document analysis. For the purpose of analysing the content of the documents, a constructive curriculum alignment framework was used in this current study, as explained in the theoretical framework of this part of the study (Biggs, 2014). According to Anthony and Landeen (2009), retrospective research requires less time to complete, and it is more cost effective. In this current study, missing data regarding the content, intended learning outcomes, learning and teaching activities, and assessment in the documents were identified. One limitation of retrospective studies is the lack of control over events that could occur during the interval from the time of data collection to the current time. In this current study, the selection was based on documents related to CBR curricula, in different countries, at the time data collection. However, the institutions were contacted later, to determine whether any changes had occurred. It was established that no changes had been applied in the interval period.

Documents are rich sources of evidence that could be used to gather information and explore modules (Rule, 2010). Rule (2010) asserts that document analysis could be useful in discovering the goals and rationale of a curriculum, as well as the background history of the topic under investigation. In this current study, documents were used to increase the credibility of this part of the study, as the models are documented in each physiotherapy programme, including detailed descriptions of the module components, with the rationale and goals of the curriculum.

3.4.3. Procedures

Document selection was conducted in the form of purposive document selection. Purposive documents selection is commonly used in qualitative research, and refers to

a non-probability technique, which aims to select the available cases that contain information (Etikan *et al.*, 2016). Therefore, the researcher decides what information is required, and who/what could provide this information (Etikan *et al*, 2016). In this current study, the researcher examined each curriculum, and identified modules related to CBR at the various universities. In cases where no separate CBR module existed in the curriculum, modules related to disability and rehabilitation were used, because of the relationship between CBR and disability, as CBR helps and rehabilitates PwDs. It is a holistic approach that covers aspects, which are not covered in other physiotherapy modules, such as, the empowerment of PwDs.

The institutions were conveniently selected, using previous engagements with colleagues from the respective institutions. The documents were accessed in May 2015, via emails, in Zambia, Tanzania, and Rwanda. In Sudan and South Africa, data were requested by the researcher, in person, from the Heads of Departments (HOD) of Physiotherapy. The Physiotherapy HOD at each university was approached and requested to provide the documents via email, after the aim of the study was explained.

3.4.4. Instruments

The data were captured by the researcher on data capture sheets (Appendix 1), which were divided into different sections, as per the component of the study framework. The framework was based on learning outcomes, main content, learning activities, and assessment. Therefore, the data capture sheet was designed to analyse the CBR (or related) course, regarding the learning outcomes, main content, learning activities, and assessment (Appendix 1). Each CBR (or related) course of each curriculum included separate sections for the learning outcomes, main content, teaching and learning activities, and assessment. Learning outcomes in some curricula were referred to as learning objectives (UR, UZ, and KCMUCo). In order to design the data capture sheet and increase its validity, the researcher adhered to constructive alignment, held discussions with supervisors, and reviewed the literature (Biggs, 2014; Broberg *et al.*, 2013). Literature revealed that constructive alignment was a valid tool, used in developing and evaluating curricula in higher education (Boberg *et al.*, 2013; Rust, 2002). In addition, it has been used to improve teaching quality and educational programmes at different universities (Trigwell & Prosser, 2014: Rust, 2002).

3.4.5. Analysis

In this current study, the constructive curriculum alignment, as an analytical and conceptual framework was employed (Biggs, 2014). Data capture sheet was designed as follows: identified similarities across all five universities; identified similarities in two/or more universities; and, identified differences in the learning outcomes, main content, learning activities, and assessment in each university (Appendix 1). The differences and similarities were compared to establish whether the CBR course in the physiotherapy curriculum at AUW, was unusually disparate from other African universities. According to Gibson (2012), comparing the similarities and differences of curricula helps educators to attain different perspectives, as well as transfer knowledge and good application in a curriculum. In addition, it helps curriculum developers and educational authorities to improve education, with curricula revision in the future ensuring that missing content is included, as is the case in this current study. According to Öztürk & Öztürk (2015), comparing the similarities and differences of curricula in two or more institutions facilitates the evaluation and revision of a curriculum. Öztürk and Öztürk (2015) add that implementing similar curricula should not be perceived as negative, as using other education models, experiences, and examples in a curriculum, is necessary and helpful in curriculum development.

The objectives of this current study were to identify the components of CBR in the current physiotherapy curriculum at AUW, as well as determine the components of CBR that should be included in the physiotherapy curriculum at AUW. Simultaneously, all the new components are to be investigated and discussed, before deciding to add any to new CBR components to the physiotherapy education curriculum at AUW. Data were captured by categorizing the data according to learning outcomes, main content, learning activities, and assessment. After capturing the information on the data capture sheet, data with similar meaning were allocated the same codes, to help with the summarizing of the content. Therefore, related concepts were grouped into the same categories.

A peer review was implemented to confirm the data analysis. An independent reviewer followed the same process, and compared the findings with that of the researcher's. The independent reviewer, a physiotherapy postgraduate student, with experience in document analysis, agreed to conduct an independent analysis after a thorough

explanation of the study objectives, data captured sheet, and study framework. No discrepancies emerged in the reviewer's findings. The components in the learning outcomes, main content, teaching and learning activities, and assessment, were similar, as illustrated in Table 3.2. Blooms taxonomy and the associated verbs for each level of cognitive functioning was used to match the verbs contained in the learning outcomes (Blooms, 1956). Table 3.1 was used as a guide for judgment.

Table 3.1: Blooms taxonomy and the associated verbs for each level of cognitive functioning (Blooms, 1956)

Level of cognitive functioning	Verbs describing the learning outcomes
Knowledge	Define, describe, identify, know, label, list, match, name, outline, recall, recognize, reproduce, select, state.
Comprehension	Comprehend, understand, discuss, convert, defend, distinguish, estimate, explain, extend, generalize, give examples, infer, interpret, paraphrase, predict, prepare, produce, relate, show, solve, use.
Application	Apply, implement, change, compute, demonstrate, discover, manipulate, modify, operate, predict, prepare, produce, relate, show, solve, use.
Analysis	Analyse, break down, compare, contrast, diagram, deconstruct, differentiate, discriminate, distinguish, identify, illustrate, infer, outline, relate, select, separate.
Synthesis	Categorize, combine, compile, compose, create, devise, design, explain, generate, modify, organize, plan, rearrange, reconstruct, relate, recognize, revise, rewrite, summarize, tell, write.
Evaluation	Appraise, appreciate, compare, conclude, contrast, criticise, critique, defend, describe, discriminate, evaluate, explain, interpret, justify, relate, summarize, support.

3.5. Results

3.5.1. Data source

Data were collected from the module guides that were provided by the physiotherapy departments at UWC, AUW, RU, KCMUCo, and UZ. All the module guides included learning outcomes, main content, learning activities, and assessment. As presented in Table 3.2, CBR and rehabilitation modules from five different physiotherapy bachelor programmes in Africa are described. The countries were South Africa, Sudan, Rwanda, Tanzania, and Zambia. In South Africa and Sudan, the module is referred to as *CBR*. In Rwanda, the module is referred to as *Disability and Rehabilitation*. In Tanzania, the module is referred to as *Orthopaedic technology and Rehabilitation*. In Zambia, the module is referred to as *Rehabilitation*. In Rwanda, Tanzania, and Zambia, the modules included disability and rehabilitation, which were the closest related modules with CBR

components, due to the relationship between the *disability*, *rehabilitation*, and *CBR* definitions, as stated in Chapter One**.**

Table 3.2: Similar or different components of Curricula included in the study

Results	South Africa: University of the Western Cape: CBR	Sudan: Ahfad University for Women: CBR	Rwanda: University of Rwanda: Disability and Rehabilitation	Tanzania: Tumaini University (K.C.M College): Orthopedic technology and Rehabilitation	Zambia: Teveta: Rehabilitation
Learning outcomes	1. Define & discuss the principles, concepts, technology (assistive devices) & terminology used in CBR & CBR projects. 2. Describe & apply the principles of adult education by means of training. 3. Plan, implement and evaluate a project based on the identified needs of people with disabilities.	1. Know and define the principles, strategies and elements of Primary Health Care 2. Appreciate the concept of CBR as a choice for Community responsibility to the disabled people. 3. Prepare the students with strategies for rehabilitation, equalization of opportunity, poverty reduction and social inclusion of people with disabilities. 4.How to collaborate to ensure the benefits of the Convention on Rights of Persons with Disabilities reach the majority	1. Define and understand the terms commonly used in disability and Community Based Rehabilitation (CBR) 2. Describe the principles and approaches in CBR and interdisciplinary health team Skills 3. Demonstrate ability to identify the approaches that can be used in rehabilitation 4. Demonstrate ability to assess the needs and situation analysis of the Persons with Disabilities and the community 5. Demonstrate ability to apply knowledge in planning, implementing and evaluating CBR 6. Appreciate the role of community and approaches, and the importance of their link to institutional services.	1. Describe the concepts of disability and rehabilitation. 2. Apply these concepts to specific situations in order to benefit the client. 3. Be aware of the social and psychological consequences of the client's residual functional disability and how rehabilitation can influence this. 4. Identify the role of a physiotherapist in the rehabilitation team.	1. Apply rehabilitation approaches 2. Apply concepts of rehabilitation 3. Apply Research and Project Principles 4. Apply concepts of Primary Health Care (PHC) 5. Use Rehabilitation Services 6. Apply Quality Health Care Services 7. Apply Ergonomic principles
Main content	1. Definition of the following: Community Based Rehabilitation	1.Primary health care/community health : Definition , principles and	1. Primary Health Care (PHC) : Introduction to PHC, PHC Philosophy,	1. Definitions, causes and predisposing factors of disability.	1. Applying rehabilitation approaches,

	(CBR), Community, Community-development, empowerment, involvement 2. Methods of implementing CBR 3. Community & Family involvement in CBR using and adult education approach. 4. Dynamics of group work. 5. CBR technology (appropriate assistive devices) 6. Development of a CBR project (Assessment of needs of people with disabilities Setting objectives Project implementation Monitoring of the project) 7. Evaluation of a CBR project	strategies of PHC 2. Organization of Primary Health Care in Sudan (also with a review of the topics of the Health Services Management) 3. History of CBR 4.CBR Definition, Concept and Role 5. WHO & CBR 6. Convention on Right of Persons with Disabilities. 7. CBR multi-system approach 8. Involvement & participation of people with disabilities and their families 9. Importance of the integration with the local network of services and association for supporting the people with Disability	PHC elements & principles, Role of the Physiotherapist in PHC 2. WHO Disability Assessment Schedule II (Activities and Participation) 3. Models of disability: Medical, social, Biopsychosocial (ICF) 4. Causes of disability. 5. Prevention of disability Attitudes towards disability. 6. Rehabilitation: the role of rehabilitation personnel, 7. Major strategies for Rehabilitation, models of rehabilitation. 8. Community Based Rehabilitation (CBR) definition and concept 9. CBR Components 10. Community and Health organization structures. 11. Community Resources including assistive devices and appropriate technology	Disability classification & prevention. 2. Historical background, definitions & types of rehab. The relationship between PHC & rehab. 3. Orthopaedic appliances: the measurement & fitting of KAFO, AFO & foot orthosis. And the essential components thereof. The assessment of a pt. fitted with the above mentioned devices. Measurement & fitting of spinal cord corsets. Common problems of the fitting of KAFO, AFO & foot orthosis. 4. Types of prosthesis. Components of AK & BK prosthesis. The assessment, measurement & fitting of these prostheses. Management & follow up of clients supplied with prosthesis /orthosis	methods and processes 2. Disability concepts, incidence, statistics, identification of disabilities, implications, preventions. Traditional beliefs and culture. Low cost aids and facilities. 3. Principles of research, proposal writing, steps in a research design, data collection and analysis. Project monitoring and evaluation. 4. Concepts and components of PHC. Communicable diseases. Health, disease patterns & attitudes. Health problems & their management. Maternal & child health. 5. National & international policies on rehab. Structure & organization of services. Implication of rehab services, community services. 6. Concepts of quality assurance, use of information in the healthcare system. Identification of problems & approaches in solving them. 7. Concepts of ergonomics, analysis of workplace and postural load. Musculoskeletal effects on repetitive movement. Development of optimal functional ability,

					educational challenge in ergonomics. Role of functional capacities after rehab.
Learning activities	Interactive lectures, group work, tutorials (consolidation of practical techniques), multi-media presentations, open forum discussions, field (community) work, review of literature.	- Lectures, Tutorials, Group work in small groups.	Interactive lectures, lectures, demonstrations/ Return demonstrations, group discussions, team teaching.	Books, audio-visual aids, visits to community/ rehabilitation centre, orthopaedic workshops	Not specified.
Assessment	Formative (work done throughout year) Evaluation: 50% of total mark: Needs analysis presentation (60%) Proposal write-up (40%) Summative Evaluation: 50% of total mark: Final project (75%) Peer evaluation (25%) Form of Tests, exams, presentation and assignment	Continuous assessment/ report 40% Final examination 60%	Continuous Assessment Individual and small group assignments Test Summative evaluation Final Exam	(2) Continuous Assessments = 50% An end of semester examination	Formative Evaluation Summative Evaluation Questionnaire, structured interviews, observations, projects, check lists, records of work and examination results.

3.5.2. Findings of the study

The associated verbs for each level of cognitive functioning, used in the learning outcomes, were analysed, as presented in Table 3.3.

Table 3.3: Blooms taxonomy and the associated verbs for each level of cognitive functioning

Blooms levels of cognitive functioning	South Africa: University of the Western Cape: CBR	Sudan: Ahfad University for Women: CBR	Rwanda: University of Rwanda: Disability and Rehabilitation	Tanzania: Tumaini University (K.C.M College): Orthopedic technology and Rehabilitation	Zambia: Teveta: Rehabilitation
Knowledge	Describe the principles of adult education by means of training	Define the principles, strategies and elements of Primary Health Care Know the principles, strategies and elements of Primary Health Care	Define the terms commonly used in disability and Community Based Rehabilitation (CBR)	Describe the concepts of disability and rehabilitation Identify the role of a physiotherapist in the rehabilitation team	
Comprehension	Discuss principles, concepts, technology (assistive devices) & terminology used in CBR & CBR projects	Prepare the students with strategies for rehabilitation, equalization of opportunity, poverty reduction and social inclusion of people with disabilities	Understand the terms commonly used in disability and Community Based Rehabilitation (CBR)		
Application	Apply the principles of adult education by means of training Implement a project based on the identified needs of people with disabilities		Demonstrate ability to identify the approaches that can be used in rehabilitation Demonstrate ability to assess the needs and situation analysis of the Persons with Disabilities and the community Demonstrate ability to apply knowledge in planning, implementing and evaluating CBR	Apply these concepts to specific situations in order to benefit the client	Apply rehabilitation approaches Apply concepts of rehabilitation Apply Research and Project Principles Apply concepts of Primary Health Care (PHC) Apply Quality Health Care Services Apply Ergonomic principles Use Rehabilitation Services
Analysis					
Synthesis	Plan a project based on the identified needs of people with disabilities				

Evaluation	Describe the principles of adult education by means of training. Evaluate a project based on the identified needs of people with disabilities	Appreciate the concept of CBR as a choice for Community responsibility to the disabled people Collaborate to ensure the benefits of the Convention on Rights of Persons with Disabilities reach the majority	Appreciate the role of community and approaches, and the importance of their link to institutional services. Describe the principles and approaches in CBR and interdisciplinary health team Skills		

CBR and rehabilitation modules from five different physiotherapy bachelor programmes were analysed in categories, as presented in Table 3.4.

Table 3.4: Findings of the study

Findings	Similarities identified across all five universities	Similarities Identified in two or more universities	Differences identified
Learning Outcomes	Principles and concepts of rehabilitation, approaches and strategies to rehab. The use of rehabilitation services. Benefits and social inclusion for people with disabilities. The link to patients' rights and quality of client/patient care.	At all universities as a learning outcome the students would be able to **define rehabilitation**. Only, Rwanda, UWC and Ahfad university highlight **CBR**. In AUW, the students will be able to understand **CBR concepts**, **strategies, equalization, poverty reduction, and social inclusion**. In Rwanda, the student will be able to describe **CBR principles and approaches.** In UWC, the student will be able to discuss **principles, concepts, technology** used in CBR. The understanding **of teamwork** in the context of an interdisciplinary team, group work and a rehab team were mentioned at AUW and Rwanda. In AUW, the students will know how to **collaborate** and in Rwanda the students will be able to describe **principles** and **approaches** of **interdisciplinary team.** **Community** is highlighted in Rwanda and Ahfad university respectively. Namely, by the students appreciating the **role of the community** and the **concept of CBR** as a choice for communities as a responsibility to people with disabilities.	Zambia had two differences namely, to apply **research & project principles** & the application of **ergonomic principles.** Only UWC indicated that the students should be able to describe & apply the principles of **adult education** by means of training.
Main Content	There is a common thread of disability across all five universities.	**PHC** was highlighted at four universities, (except UWC as it is a separate module). CBR was mentioned in different ways at the University of Rwanda, UWC and Ahfad. The **role of community** was also explored in Rwanda and Ahfad as these universities also included CBR in their main content. **WHO** was mentioned at the university of Rwanda and Ahfad. The WHO disability assessment for activities in participation was mentioned in Rwanda and WHO definition, concepts, and role was mentioned in Ahfad.	UWC used **an adult education** approach which is not mentioned anywhere else. Teveta has the following listed as their main contents, which no one else mentions: **research project writing, and concepts of ergonomics.**

		Rehabilitation and the **concepts** thereof were highlighted at Rwanda, Tumaini and Zambia respectively. The concepts were role of rehabilitation personnel in Rwanda, types in Tumaini, and application, methods, national and international policies, and process in Zambia. **CBR technology** was mentioned at Rwanda, UWC and Tumaini. In UWC and Rwanda, it was about appropriate assistive devices and in Tumaini, it was about assistive devices types, fitting, measurement, problems, and follow up. Mentioned at Rwanda and Zambia university. In Rwanda, health structure and in Zambia, health policies and services were mentioned.	
Learning Activities	Lectures	Working in **groups** was common for Rwanda, UWC and Ahfad. **Tutorials,** as a learning activity, were common for UWC and Ahfad. The use of **audio-visual aids** was common for UWC and Tumaini, as well as the use of engaging with literature. Zambia, UWC and Tumaini were common in the use of **field work,** as a learning activity.	**Team teaching** was specific to Rwanda as **open forum discussions** were encouraged at UWC.
Assessment	Continuous/ Formative Assessment Summative Assessment	The percentage weighting of the continuous/formative assessment. UWC and Tumaini university weights their formative assessment at **50%** whereas AUW weights their continuous assessment at **40%** of the total mark students will receive for the module.	N/A

3.6. Discussion

The objective of this current study was to determine the content of the CBR course in physiotherapy education at AUW. The CBR module was reviewed in the physiotherapy curriculum at AUW. The curriculum alignment framework was used to investigate the learning outcomes alignment to other components of the CBR module, namely content, learning and teaching activities, and assessment. Blooms (1956) taxonomy was used to grade the levels of the verbs used in the intended learning outcomes. The AUM curriculum was compared to other CBR modules in physiotherapy education at universities in various African countries, to determine the similarities and differences, which would help to identify the gaps in the AUM CBR module of the physiotherapy curriculum.

3.6.1. Similarities

The modules were aimed at enabling students to understand the concepts of rehabilitation, and using them to benefit PwDs. Disability, therefore, was a common theme in all the modules reviewed, particularly revealing a definition of disability.

Teaching and learning activities were designed to include activities inside and outside the classrooms. Both summative and formative assessments were used in the CBR module of the physiotherapy curriculum at all the universities.

3.6.1.1. Learning outcomes

Students need to achieve learning outcomes. Bloom's Taxonomy, developed by educational psychologist, Dr Benjamin Bloom in 1956, is a model of classifying learning outcomes, using specific verbs, to encourage elevated educational thinking, for example analysing and evaluating concepts, processes, procedures, and principles, rather than merely remembering details. It is used, most often, when designing educational activities, training, and learning processes (Bloom, 1956). Bloom's Taxonomy, comprises three domains/dimensions/categories of educational activities or learning, namely, Cognitive, Affective and Psychomotor. This current study focusses on the cognitive domain. The cognitive domain involves the knowledge and development of intellectual skills, and includes the recall, or recognition of specific facts, procedural patterns, as well as concepts that serve in the development of mental abilities and skills. There are 6 levels/major categories in Bloom's taxonomy model, namely, knowledge, comprehension, application, analysis, synthesis, evaluation (Bloom, 1956). However, Lorin Anderson, an ex-student of Bloom's, reviewed the cognitive domain, and changed the categories from nouns to verbs, as well as their order, to remembering, understanding, applying, analysing, evaluating and creating (Anderson *et al.*, 2000). These categories apply to the cognitive domain, as well, on 3 levels (Level 1: Remembering; Level 2: Understanding; and Level 3: Applying, analysing, evaluating and creating), reflecting a more active approach to thinking. These can be achieved in various ways. In the following section, a brief explanation of these terms are discussed, accompanied by one example of each.

Additionally, according to Structure of the Observed Learning Outcomes (SOLO) taxonomy developed by Biggs (2003), verbs used in defining the desired learning outcomes are classified from lowest to highest in the hierarchy. Verbs that seem to be more quantitative in sound, such as *numerate* or *list*, are classified in the lower level, such as knowledge and information, while verbs that sound qualitative, such as *compare* and *reflect* are classified on a higher level, such as evaluation (Biggs,

2003). Therefore, the value of verbs is different in the measuring of learning outcomes. For example, the verb, *numerate*, expects the student memorize facts. Alternatively, the verb, *compare*, requires the student to numerate concepts, as well as understand them, in order to compare them, and explain the differences.

In this current study, verbs such as *describe, apply, implement, demonstrate, define, identify, discuss, appreciate, use*, and *plan* were used, which all sound qualitative, and therefore, classified on a higher level, according to Biggs (2003). However, these verbs could be used at a superficial level, and not necessary lead to deep thinking. For example, verbs, such as *define* and *describe* could be used to test what students have memorised.

Revisiting cognitive domain of educational activities, the different categories, referred to earlier, are discussed as follows:

- *Remembering* refers to the recall of previous learned information, which depends on memorization from a book, or flash card. It could be acquired by marking the book, and repeatedly reading the information (Lee, Kim & Yoon, 2015). In this current study, verbs related to memorization, such as *define, know, identify,* and *describe* were used at most of the universities. At AUW, it concerned the principles, strategies, and elements of Primary Health Care.
- *Understanding* implies the interpretation of the instructions and problem, in the students' own words, which could be done by taking notes (in their own words), or seeking more information via books, internet or other relevant resources. In this current study, the universities expected students to understand concepts related to CBR strategies (Lee, Kim & Yoon, 2015).
- *Applying* means the application of what was learnt in the classroom, or work place, and requires that individuals create and practice the process; for example, applying the statistical law to test the reliability of a written test (Lee, Kim & Yoon, 2015).
- *Analysing* involves dissecting the concept into parts for easy understanding, which could be achieved by debating the case, for example, in clinical cases

students can discuss and debate the treatments. In this current study, the focus was on the application of the CBR principles (Towns & Ashby, 2014).

- *Evaluating* refers to assessing ideas or materials to select the most effective treatment plan, for example, when the student evaluates the patient's progress s/he is evaluates what has been done, in order to improve the patient's condition. In this study, universities required students to evaluate the values of the CBR approach to the community (Wright *et al.*, 2018).
- *Creating* refers to generating new ideas. It is the ability to perceive, design and plan, using knowledge and skills. For example, students using patient information to devise a treatment plan, not only based on health needs, but more aligned to the CBR components (Morton & Colbert-Getz, 2017).

Remarkably, none of the five universities had *analysing* included in their learning outcomes. As the fourth level/major category of Blooms taxonomy, it is the way that students proceed to construct ideas from different sources, and integrate them to provide new meaning. For example, the location of Sudan is near the equator; therefore, the climate is hot. In this instance, the student needs to integrate that the equator is equidistant from the cold poles and their influences, there is little temperature change throughout the year, and the sun's path is nearly perpendicular to the horizon; therefore the heat is due its exposition to sun.

Regarding learning outcomes, all five universities included rehabilitation as a learning outcome, in some way. This, probably, was due to the nature of the models analysed, as rehabilitation was the concern of this current study. Only RU, UWC, and AUW highlighted CBR, as well.

The understanding of teamwork in the context of an inter-disciplinary team, group work and a rehab team, were also mentioned at RU. The rehabilitation process involves different professionals, namely, the physician, psychologist, occupational therapist, physiotherapist, nurse, and social worker, working as a team. Teamwork is collaborative, independent use of shared health experience, to deliver patient care, referred to as a multi-disciplinary or inter-disciplinary team approach

(Körner, 2010). It is important for the physiotherapy student at AUW to know the differences and similarities of both, in order to understand and know how the rehabilitation process functions. They will also be able to appreciate the value of using both multi-disciplinary and inter-disciplinary approaches, and will be motivated to start thinking about which approach is more effective in the Sudanese community setting, as well as what the challenges are of both.

The importance of collaboration is clear in CBR module of the physiotherapy curriculum at AUW, as one of the intended learning outcomes that the module targets. However, the health services challenges in the Sudanese community include the availability of enough health workers to cover the population needs. Therefore, the health system in the Sudanese community is more inclined to adopt the multi-disciplinary approach. Therefore, physiotherapy students at AUW need to understand how all health team members work in unison, with clear role definition in the multi-disciplinary approach (Körner, 2010). Currently, they work and communicate with the physicians, as the health team coordinators, and expect little, or no communication with other members of the rehabilitation team. However, literature has revealed that the inter-disciplinary approach is recommended, as the level of communication is high, and all the team members meet with the patient to decide, plan, evaluate, and implement the process, together, on a regular basis (Körner, 2010). More data regarding the extent to which the inter-disciplinary approach could be applied in the Sudanese community, could assist in the improvement of the CBR module, in the physiotherapy curriculum at AUW, as it would enable the curriculum developers to develop tools on the inter-disciplinary approach training.

In CBR, the rehabilitation of PwDs needs different health professions, working as a team, to deliver the services. Studying the CBR components, it is clear that health issues and social issues are very important for PwDs to interact in their communities. Therefore, it is important to include all the relevant CBR components in the CBR module of physiotherapy education at AUW. In addition, the collaboration between health professionals, including social workers, is crucial, to cover all the CBR components (Magallona & Datangel, 2012).

Physiotherapy students need to be knowledgeable about both approaches as they could be future team members. In the CBR course of physiotherapy education at AUW, neither the multi-disciplinary nor inter-disciplinary approaches were covered in the main content or learning outcomes, which needs to be investigated within AUW, as well as the health system in Sudan. The course content on both approaches are required to educate students about the importance of the roles of health professionals in the CBR rehabilitation team. Therefore, it is recommended that health professions learning institutions equip students with information and training, regarding the roles of health professionals in rehabilitation (Magallona & Datangel, 2012). This could be achieved by introducing inter-disciplinary experience into the curriculum under the section on rehabilitation (Körner, 2010). Appreciating the role of the community is highlighted in the AUW learning outcomes, which is linked to the main content about the concepts and role of CBR, in understanding the function and value of the community, to assist with the social integration, as well as strengthening of the PwD's role in society (Barzallo & Gross-Hemmi, 2017).

3.6.1.2. Main content

Curriculum content is one of the main elements that influence education quality and should be relevant to equip students with the skills on how to seek knowledge (Biggs, 2014). When assessing the main content of the course module at each university in this study, a common thread of *disability* was evident across all five universities, which, as previously indicated, revealed the strong relationship between disability and CBR. Therefore, if students at AUW were knowledgeable about disability in the CBR curriculum, they would be able to define and understand the terms commonly used in disability, which would aid them in addressing disability problems.

During the document analysis, it was observed that a basic introduction to health and disability was absent from the physiotherapy curriculum at AUW. For example, the main content included topics regarding the Convention on Right of Persons with Disabilities (CRPD), involvement and participation of PwDs and their families, and how this can be achieved in CBR, which is aligned to the learning

outcomes. However, in the main content, there was no topic, or topics introducing health and disability. For physiotherapists, it is important to understand disability as a condition (WHO, 2011). It is commonly agreed that PwDs need greater long term health services, including disability services; therefore, having a basic knowledge of disability, such as the definition, causes, prevalence, and models, is crucial, which was lacking at AUW. In addition, this would enable physiotherapy students at AUW to start developing an appropriate perception of disability and the needs of PwDs (Magallona & Datangel, 2012).

Similarly, regarding the topic of health, physiotherapy students would have a better understanding of their role in health services. Therefore, including information on health and disability in the CBR course of the physiotherapy curriculum at AUW, would improve its alignment to the learning outcomes. For example, the CBR course of the physiotherapy curriculum at AUW endeavours to enable students to appreciate the concept of CBR, as a choice for community responsibility to disabled people. The students, therefore, need to know about disability, in order to achieve this learning outcome. Another example, the CBR course of the physiotherapy curriculum at AUW seeks to enable students to know and define the principles, strategies and elements of Primary Health Care (PHC). Therefore, they need information on health, in order to know what PHC is (WHO, 2011).

3.6.1.3. Learning activities

The learning outcome of studying about the participation of PwDs in the CBR curriculum at AUW is for the student to understand the effect of opportunity equalization, poverty reduction, as well as the social inclusion of PwDs. This needs/requires learning activities that facilitate the students' achievement of these learning outcomes.

- **Group work:** Working in groups was common in Rwanda, South Africa, and Sudan. Group work as a learning activity was commonly used at all educational levels. It involves dividing the class into smaller groups, depending on class size, to perform specific tasks, or discuss certain topics. The students are engaged in active and cooperative ways (Cohen & Lotan, 2014). However, this does not imply that students *will* achieve what was

intended in the learning activities, at is all depends on what the groups were expected to achieve. The idea of group work enables students to apply what was learned from the discussion, and experience different perspectives, to encourage innovative and critical thinking.

The benefits of group work could help students to think about solving rehabilitation problems in the community, as well as what could be expected when they are placed in the community. It could involve including a community member or PwD, to participate in the group and discussing. According to Cohen and Lotan (2014), group work could be an effective technique to achieve social learning goals, as well as facilitate creativity in the students' problem solving abilities, which could be an effective strategy for physiotherapy students attending the CBR course. In additional, the students are encouraged to be more involved in their work inside the classroom, which helps them to grasp the content of the subject (Cohen & Lotan, 2014). However, there is no guarantee that the students will achieve what was intended in the learning activities.

- **Tutorials:** Tutorials are very effective learning activities, depending on how well they are implemented (Menezes, Burgess, Clarke & Mellis, 2016). Tutorials as learning activities were common at UWC and AUW. In tutorials, the students are engaged in active and constructive ways, to take what they had learned from the activity, to be applied in another context. In Australia, studies revealed that tutorials were valuable methods with medical students, providing them (tutees and tutors) with opportunities to engage in the community environment and practical skills, according to the curriculum content (Menezes *et al*, 2016). In addition, it provides a safe space for practice and the reinforcement of curriculum content, and fosters a sense of community among junior and senior peers, providing learning experience that bridges the gap between community and curriculum (Menezes *et al*, 2016). For the CBR course in physiotherapy education at AUW, tutorials could be conducted in the community, and involve community members as well, as it depends on what the activities are that take place in the tutorial.

In this current study, tutorials were aligned to the learning outcomes of the course. Tutorials assist students in building communication skills, through group presentations and contributions in class, and other assignments, which help them to develop experience in discussion that will increase their confidence, in order to add knowledge, as well as assist in decision making Wright *et al.*, 2018). In the learning outcomes of the CBR in physiotherapy education at AUW, preparing students with strategies for rehabilitation, was highlighted. Strategy development requires good knowledge of the topics, communication skills, discussion, and decision making. Tutorials could be effective in learning, because it places more responsibility on the students, as they are required to do more. Additionally, lecturers are required to work closer with students, to observe the immediate reactions of students, as well as promptly identify where they require assistance. Tutorials could be extended to include community members, by offering the tutorial in a community setting (Menezes *et al*, 2016). Besides, the close interaction between the lecturers and students in this learning and teaching process, facilitates better academic relationships between students and lecturers in the physiotherapy department. Building an academic community at AUW, after the establishment of the physiotherapy department, has been challenging (Haugland *et al.*, 2014). Understanding the responsibilities of physiotherapists and lecturers inside and outside the department, was complex in the early stages, probably because the physiotherapy profession, and education, were unfamiliar at AUW, as well as in Sudan. Presently, the responsibilities within the department have been clarified, and new staff members have been recruited, after the graduation of the first AUW physiotherapy graduates, in 2013. Tutorials are expected to become more valuable teaching and learning techniques, to strengthen the academic community, which will benefit lecturers and students in the CBR course of the physiotherapy department at AUW.

- **Audio-visual aids:** Similar to tutorials, audio visual aids are very effective learning activities, depending on how well they are implemented (Hurst, 2016). According to Wilson and Greig (2017), audio visual aids could be used in a way that promotes self-constructive feedback and encourage a

problem solving approach. For example, students could view a video on community resources, and be allocated a task to demonstrate how those resources could be used to help PwDs in the same community.

The use of audio-visual aids was common at UWC and KCMC, as well as the use of engagement with literature. Audio-visual aids involves engaging students in intentional and constructive ways. It entails attracting and holding the student's attention, to ensure that the student not only observes, visually, but also reacts, physically. The audio-visual aids could be useful learning activities that could be employed by teachers and students, in cases of large numbers of students.

With audio-visual aids, a number of senses are stimulated, which reflects positively for the learning process, implying that the students' relevant senses would be stimulated to receive knowledge, through vision and audio in the classroom. Concurrently, it is the students' responsibility to pay attention to what is being presented. According to Hurst, 2016, the use of audio-visual aids is intended to grasp students' attention and interest. In addition, this author explains how the information is processed in the students' brains to facilitate learning, as well as increase memory, comprehension, understanding, and deeper learning. In the CBR course of the physiotherapy department at AUW, using audio-visual aids as a learning technique could be discussed, regarding its alignment with the learning outcomes, as well as the possibility of including it in the curriculum at AUW.

Regarding the alignment with learning outcomes, several theoretical topics were included in the CBR course of physiotherapy education at AUW, and teaching those topics would facilitate the achievement of those intended learning outcomes. Therefore, the use of audio-visual aids would help in delivering the topics' content, as well as achieving the learning outcomes, in a more intentional and constructive way. For example, the main content of the CBR course of the physiotherapy education at AUW includes topics on the importance of its integration with the local network of services, and its association with support for the PwDs. One of the learning outcomes for

those topics is, to appreciate the concept of CBR, as a choice for community responsibility to the disabled people. Using video stories of PwDs, as well as how networking in their community helps in rehabilitation, is possible in the classroom. In the classroom, the stimulation of students' senses will assist the learning process, while they watch and listen to the video.

At AUW departments, in general, and physiotherapy, in particular, each classroom, meeting room, and computer lab are supplied with overhead projectors, speakers, and laptops. Therefore, using audio-visual aids are common and easily accessible at AUW. Outside the classroom, students could use this learning technique, as well, and they are free to search for whatever topics and information they require. The availability of online sources, facilitates the use of audio visual aids as learning and teaching activities. Several studies investigated the use of audio visual aids as teaching and learning activities in health education, such as, nursing, physiotherapy, and medicine (Wilson & Greig, 2017). The outcomes were mainly positive towards achieving the intended learning outcomes. In physiotherapy, studies revealed that e-learning resources packages support the enhancement of clinical reasoning, but this could be compromised if poor quality resources are used.

- **Field work:** Several learning and teaching activities could be conducted in ways that facilitate learning; however, they could also be obstacles to learning, depending on how they are implemented, in order to achieve the module learning outcomes (Menezes *et al,* 2016). Learning from the community could be done inside the classroom, by involving community members to participate in the lecture, or tutorial. In this current study, the use of field work as a learning activity was common at UZ, UWC, and KCMC. Field work engages the student in an active and intentional way, outside the classroom. In this learning activity, learning from the community is addressed, which adds value to the student's knowledge. Fieldwork requires an academic fieldwork coordinator, to coordinate and monitor the process. In addition, it requires a clinical coordinator to address the administrative details of the placement, as well as to support both students and fieldwork educators, who participate in the placement.

The fieldwork educator works closely with the field work coordinator, and together, their responsibility is to support the student's learning. Good preparation of the student is beneficial, in the form of orientation, which includes the structures, organizations, facilities, and practice areas of the fieldwork (Hanson & DeIuliis, 2015). Therefore, resources requirements are necessary, to apply the above-mentioned process.

Field work could be a valuable learning technique for physiotherapy students in CBR education at AUW, as it enables students to learn from the community. Learning from the community in CBR education is an important teaching technique, in order to achieve the CBR course learning outcomes of physiotherapy education at AUW. Students' visits to the community, during their CBR course, allows them to see, and think about, the challenges of PwDs, such as poverty and participation restrictions (McMahon *et al*, 2016). The student's, consequently, are obliged to think about and understand why and how the CBR course components prepare them with strategies for rehabilitation, including dealing with poverty and inclusion restrictions. This is stated, in the CBR course of the physiotherapy curriculum at AUW, as course learning outcomes.

The main challenge in field work is the availability of sufficient supervisors. For example, at the University of Limerick in Ireland, each physiotherapy clinical educator supervises two physiotherapy students, during the fieldwork (O'Connor, Cahill & McKay, 2012). This requires many physiotherapy staff members at the university, as well as in the field, which cannot be used as a standard for resource-constrained universities.

At AUW, providing sufficient clinical placements and clinical educators is a problem (Hauglands *et al.*, 2014). With the expected numbers of students graduating and employed in the community, as well as the physiotherapy department at AUW, the problem is expected to diminish in the near future, as more graduated physiotherapy students suggests more physiotherapists. This is the strategy that AUW is using to employ more physiotherapy staff. The number of students in one physiotherapy cohort at AUW is, approximately, 30 students. However, currently, the situation in Sudan and

AUW makes it quite difficult to have physiotherapists in the field, only supervising AUW students (Hauglands *at el*, 2014).

Literature describes how clinical supervision could work, or has worked, in a variety of clinical settings. Literature also reveals who can be a clinical supervisor, as well as what clinical supervisors do (Mpofu *et al.*, 2014). The clinical supervisor's role, in physiotherapy education at AUW, is to help students to learn practical skills that they would need in their profession. The clinical supervisor should acquire the skills to develop a formal policy for training (Murphy, Dalton & Dawes, 2014). At AUW, formal meetings with clinical supervisors are arranged to plan and develop supervision. In addition, physiotherapy students are always accompanied by one clinical supervisor from the physiotherapy department, in each clinical setting. The physiotherapy department at AUW usually explain and discuss the supervisor's role with clinical supervisors. One of the bigger challenges in clinical supervision is that the clinical supervisor receives no financial incentive, or recognition for the time and effort involved in providing and planning quality supervision. The physiotherapy department at AUW usually have a contract agreement with the clinical supervisors. However, the clinical supervisors' perceptions of the agreement would be valuable, to clarify the challenges facing clinical supervision at AUW.

Additional teaching and learning activities would be useful in the CBR course of physiotherapy education at AUW, provided they achieve the learning outcomes of the CBR course in physiotherapy education at AUW. The *availability* of resources also plays a role in increasing the value and reliability of the current teaching and learning activities. All the teaching and learning activities, discussed above, could be employed in Sudan and the AUW setting, with varying challenges. For example, the use of audio-visual aids is less challenging at AUW, because the resources are available there. The use value of audio-visual aids, compared to field visits, and field activities, is lesser. Consequently, resources challenges are more in field visits, and field activities application, as mentioned earlier, which might compromise the learning outcomes of the course. Therefore, it is ideal to maximize the benefits from the available resources, such as in audio-visual

aids, while planning and developing long and short term strategies, to overcome the challenges posed by the use of other teaching and learning activities.

3.6.1.4. Assessment

Regarding assessment in this current study, AUW used formative and summative assessment, as did UWC and KCMC. The final exam was considered 60% of the total course mark. However, this could cause students to concentrate more on the final exam, and what they would be tested on, while paying less attention to the summative assessments, which occur during the learning process. According to Biggs (2003), students will concentrate on what they will be tested on, and not what has been covered in class, or curriculum. Therefore, the challenge is, how to make students pay more attention to the formative component of assessment. The solution might be that interesting learning strategies and techniques, which engage the students more in the learning process, need to be strategically designed. The focus should be shifted from teaching, to learning, so that it could be student-centered knowledge.

These learning activities should be aligned to the assessment, as well as the learning outcomes, as mentioned in the constructive alignment. For example, tutorials and group work, as mentioned in the learning activities section, already included in the CBR course of physiotherapy at AUW, need to be aligned to the assessment. The focus could be shifted from the process of course design, to the stages of Biggs model, namely, to identify clear learning outcomes, design appropriate assessment tasks, and design appropriate learning opportunities for the students. This could lead to the effective measuring of the student's achievements of the intended learning outcomes, as recommended by Quality Assurance Agency of Higher Education [QAA], which oversees the standardizing of quality in UK higher education. Rust (2002) advises educational institutions that strive to achieve QAA standards, following the Biggs model, to relate all assessment tasks, and criteria, directly to the learning outcomes.

Literature also reveals that assessment has a significant effect on teaching and learning, as it indicates what the students should be learning, during the educational

process (Woreta, Kebede & Zegeye, 2013). Including several activities in assessment is important, to engage students in deep learning, and the motivation to search for knowledge, while they observe their performance, and become aware of where they need to be more focused. This could be a guide to students, to evaluate themselves. For this to transpire, students need assessment tasks, assignments, and exams with feedback, for them to be aware of any inaccuracies in the capturing of information and knowledge (Van Gaal & De Ridder, 2013).

- **Designing assessments:** According to Van Gaal and Ridder (2013), the more students practice, and receive feedback, the more they learn, are engaged and motivated. Therefore, designing proper assessment contents is important for the student to identify with ease, what went wrong, as well as what was required to rectify the error. In addition, the student needs a clear understanding the required assessment task. For example, an assessment sheet that contains a clear instruction of the proposed technique to practice with the patient, could encourage the student to focus on demonstrating, or applying his/her knowledge of, and skill in performing the technique.

  For physiotherapy students at AUW, in assessments, such as practical examinations, several students' abilities could be tested simultaneously, more than written examinations would (Van Gaal & Ridder (2013). For those with adequate self-confidence, this would be the opportunity to practice their skill, and enhance their future as professionals (Van Gaal & Ridder, 2013). Alternatively, for those who need to build self-confidence, the assessment would be an opportunity to pay attention to the appropriate way of approaching patients, and therefore, help them to focus on learning, as well as acquiring that self-confidence, at the institution of learning, and later as professionals (Van Gaal & Ridder, 2013).

  Ultimately, it is important that both examiners and students understand what the examinations objectives are. This could help education experts, such as lecturers, to observe students' performance, and modify teaching and learning activities, where and when required (Van Gaal & Ridder, 2013). In this current study, the assessment rates are presented in percentages, and separated into summative and formative assessments. The

importance is that both forms of assessments contain useful activities and guidelines to achieve the intended learning outcomes of the CBR module of physiotherapy education at AUW.

- **Information and Communication Technology (ICT) and assessment:** The findings of a study by Woreta, Kebede and Zegeye (2013) revealed that using ICT could motivate student more, as they would receive feedback promptly. Additionally, reasonable evidence exist that students, more than likely, prefer to complete on-line assignments, than written ones (Vissers, Rowe, Islam & Taeymans, 2018: Woreta, Kebede & Zegeye, 2013). At AUW, the use of ICT is probably limited, as is the case with other education programmes in developing countries, due to challenges with financial resources, trained teachers, internet access, and proper policies (Rowe, Bozalek & Frantz, 2013: Woreta, Kebede & Zegeye, 2013). Recently, developing countries, particularly Sudan, have specifically focused on decreasing the challenges to the use of ICT in educational settings, by expanding their internet access. At AUW, the main library and the physiotherapy department library has internet access; however, this could be the point of departure, to design a policy that helps to increase the number of computers in the libraries, as well as the internet network at AUW, while training of AUW staff and lecturers in the use of ICT.

3.6.2. Differences

There were different components included in the CBR modules of the physiotherapy curricula among the five universities. The discussion in this part of the study focused on components that were not included in the CBR module of the physiotherapy curriculum at AUW. The comparison started with the verbs used in the learning outcomes of the CBR module in the physiotherapy curriculum at AUW, according to Bloom's taxonomy. There were no verbs related to *synthesizing/creating* in the CBR module of the physiotherapy curriculum at AUW. According to Bloom's taxonomy, *synthesizing/creating* implies building structure to create an idea or feature. Creating in this context implies putting different parts together, in order to create a whole new concept, which seems to be opposite to *analysing*. In this current sense, the students

would need to design a treatment plan for a patient, which would require extensive networking with others.

3.6.2.1. Learning outcomes and Main content

The learning outcomes for students to learn about rehabilitation in the CBR course curriculum at AUW, are that the students will have the knowledge of rehabilitation and the rehabilitation professionals in the inter-disciplinary health care team, as well as the ability to describe principles and approaches in CBR with the inter-disciplinary health team. This will help students to implement the different rehabilitations strategies to prevent disability, as well as appreciate the skills and values of team work. In addition, an introduction to rehabilitation was not included in the course content, which required some focus, in order to align the course learning outcomes with the course content.

Regarding the main content, UWC informed students about an adult education approach, which was not mentioned in any of the other curricula. This was linked to the learning outcomes at UWC, which included the application and description of principles of adult education. Adult education refers that courses that are offered at universities, community colleges, and other learning institutions, to prepare students to enter a new industry, or advance their career (Lindeman, 2015). The strategy of adult education is that the students are self-motivated to search for knowledge, deciding what knowledge, as well as how to acquire that knowledge. Therefore, information on the adult education approach would prepare physiotherapy students to use adult education, as physiotherapist, along with community members, to improve knowledge, after graduation.

At AUW, adult education is practiced as a learning technique, but not mentioned in the content, or learning outcomes. Physiotherapy students need to use adult education, when working with community members; therefore, it is relevant to be included in the course content and learning outcomes. However, its importance needs to be assessed, to decide whether it should be included, as well as how it contributes to the learning outcomes. Adult education is already adopted by 144 UNESCO members states (Lindeman, 2015).

Adult education is an ongoing process, which continues after graduation. It could be in a formal way, when it is required, or informal, if it is voluntary, but in both forms, the process and outcomes are similar, and simply requires a decision on how to learn (Lindeman, 2015). Since physiotherapy education depends on CBE and EBP, student confidence and decision making is important in problem solving. Adult education educates students to take responsibility for their own actions, with less pressure from teachers, as they are free to decide on its structure. Including components on what adult education is to physiotherapy students in the CBR course at AUW, would enable students to understand its meaning, and why they should practice different techniques in learning. For example, students will understand why they had been asked to choose a topic to discuss, or present on their own.

Similarly, when asked to participate in voluntary activities in the community, the students would think about what could be learned from the decision to create formal or informal activities. This is what the community needs, as physiotherapists could be a valuable community resource, conducting formal or informal activities. WHO and CBR are mentioned in the AUW main content, and were well aligned to achieve the learning outcomes. The World Health Organisation [WHO] is relevant to health issues, including CBR; as disability, rehabilitation and, health are what WHO, as an organisation, is focussing on, currently. Besides, CBR was initiated by WHO, to enhance the quality of life for PwDs and their families, to meet their basic needs, as well as ensure their inclusion and participation. These are the learning outcomes of the CBR course in the physiotherapy education at AUW.

Regarding the main content, UZ had two differences, namely, the application of research and project principles, and the application of ergonomic principles, which were not observed in the curricula of the other universities under scrutiny. These were linked to their learning outcomes. Additionally, the findings of a study by Broberg *et al.* (2003) refer to these as important in the rationale of curriculum design, specifically in the content. Research aims to develop new knowledge, motivate inquiry-based learning, and drive own knowledge. Therefore, this new

knowledge in the rehabilitation of PwDs could lead to the development of the required services. For the students, it would add skills and knowledge. The CBR module in the physiotherapy curriculum at AUW could include ergonomics, as one of the module contents, to expose students to knowledge of ergonomics, as two of the CBR objectives are inclusion, and empowerment of PwDs in society.

Ergonomics fulfils an important role in the employment of PwDs in the workplace (De Guimaras, 2015). In Brazil, a study conducted by Guimarães, Martins and Barkokébas Jr (2012), revealed that 45.6 million of the population were PwDs, and companies with more than 100 employees, were required to employ PWDs, at between 2% and 5% of their workforce. This was challenging to both the companies as well as the PwDs; therefore, the need for ergonomics, and for the different sectors to work together, to establish suitable a work environment for the inclusion of PwDs in the labour market. Different professionals, namely, physiotherapists, engineers, architects, designers, as well as PwDs, the employer, and co-workers, needed to engage in planning and developing this strategy. The conclusion of the Guimarães *et al.* (2012) study, revealed the importance of ergonomics, as a way of including PwDs, both in the social environment, as well as in the workplace.

At AUW, including ergonomics aligns to the learning outcomes of the CBR course, which is appreciating the concept of CBR, as empowerment is one of the CBR components. Ergonomics would help PwDs to participate, with less challenges, in the work environment. Teaching students the concept of ergonomics would increase their knowledge of how ergonomics reduces participation restrictions (Moreira *et al.*, 2018: Guimarães *et al.*, 2012).

3.6.2.2. Learning activities

Regarding the learning activities, Team teaching was specific at RU in Rwanda, and open forum discussions were encouraged at UWC in South Africa. Team teaching, also referred to as *coordinated teaching,* is a group of teachers working together (Olson & Bialocerkowski, 2014: Korner, 2010). It is employed when high numbers of students are involved. At AUW, this could be useful if inter-

disciplinary or multi-disciplinary teaching approaches are applied. This requires the addition of new topics, learning outcomes, and learning strategies into the CBR course curriculum of physiotherapy education at AUW, and necessitates further investigation, as will follow later in chapter five and six of this current research.

This study current suggests the use of open forum discussions as a learning activity. Open forum discussions involves assembling members from different communities, to discuss and share ideas. In this way, students will be enabled to learn from other communities' experiences, as well as share their experiences with others. Currently, internet services help to facilitate the process of open forum discussions (Rowe *et al.,* 2013). For AUW, this form of discussion will helps in supporting the inter-professional approach, as it opens discussion between individuals from different health professions. The idea is involving individuals from beyond the classroom borders, who could discuss and share knowledge and experience, depending on the topic, or course. For the CBR course in the physiotherapy education at AUW, this could bring different health professionals and community members together to discuss ideas, experience, challenges, and techniques about disability and CBR in Sudan. In addition, it would help to acquire knowledge of circumstances in other settings worldwide.

Rowe *et al.* (2013) used Google drive as an open forum discussion, via the internet at UWC, which revealed several changes in students' perceptions of learning. For example, students could choose their own topics of learning, and controlled how to learn it. In addition, the relationship between the students and lecturers were less demanding, regarding what was wrong and right, as it revealed that both students and lecturers were not necessary right. It also motivated critical thinking, while developing a critical stance and point of view. Regarding alignment, the study suggests including an inter-professional approach in learning outcomes and main content. Therefore, including open forum discussions is aligned with learning and teaching activities.

3.7. Summary

In this chapter, the researcher aimed to determine the components of CBR in the current physiotherapy curriculum at AUW, as well as the components of CBR that could be included in the physiotherapy curriculum at AUW. Curriculum constructive alignment was employed. Discussing additional components in the course learning outcomes, main content and teaching techniques was suggested, in order to achieve better learning outcomes for the students in the physiotherapy department at AUW, and aligning the outcomes with the main content and learning activities.

There was no intention of analyzing the concepts of CBR in the learning outcomes of the CBR module in physiotherapy education at AUW; however, thinking of new learning outcomes, regarding rehabilitation concepts and approaches to inter-disciplinary teamwork, was proposed. In addition, the application of ergonomics principles and adult education were discussed. Consequently, components on health, rehabilitation, CBR matrix, adult education, and ergonomics were recommended to be included in the main content. Community visits before placement was suggested, to prepare students for their placement in the community. The visits could be planned during the course, in the form of organized group work, as there is no mention of community visits in the learning activities of the components of CBR in the current physiotherapy curriculum at AUW. Finally, additional teaching techniques, such as the use of audio-visual aids, team teaching, field work, and open forum discussion were suggested.

CHAPTER FOUR

PHASE 1 – STAGE 2: DETERMINE THE NEEDS OF PEOPLE WITH DISABILITIES REGARDING REHABILITATION SERVICES

4.1. Introduction

To address the objective of this current study, the researcher conducts a survey in this part of the study, to determine the needs of People with Disability (PwD) in the Khartoum State of Sudan. Background information about the types of disability services offered to PwDs in Sudan, the satisfaction of PwDs with the rehabilitation services, the participation challenges of PwDs, as well as the expectations and needs of PwDs, regarding rehabilitation services, are included, with the aim and objectives of this quantitative phase. The methodology of the study, design, setting, sampling, data collection, analysis, as well as ethical considerations, are presented, followed by the study results. The chapter is concluded with a discussion of the results and a summary of the chapter.

4.2. Background

4.2.1. Types of disability

The 20th century unfolded with increasing violence against civilians, during armed conflicts, starting with the First World War, up to the current conflicts in various zones. According to the WHO (2011), it has been estimated that, at least, 10% of the world's population are living with disability, most of them in developing countries. The percentage of children with disability in developing countries is between 0.4% and 12.7% (WHO, 2011).

According to WHO (2011), disability is defined as an umbrella term that covers impairments, activity limitations, and participation restrictions. Impairments refer to the body functions and structure. An activity limitation refers to the execution of activities, such as walking and driving. Participation restrictions are problems that involve any area of life, such as discrimination in employment or transportation. The three terms are interconnected, as a problem of the body structure, could limit the execution of activities, which restricts the individual from using transportation, or working. According to the

WHO (2011), types of disability could refer to one aspect of disability, such as impairment (sensory, physical, mental, and intellectual). Each type of disability needs specific health, education, rehabilitation, social, and support management.

From the definition of physiotherapy, it is clear that physiotherapy rehabilitation is concerned, specifically, with the physical type of disability. Physical disability is defined as the inability to perform Activities of Daily Living (ADL). It concerns mobility and body functioning, when the physical ability is restricted, due to a congenital problem since birth, or an acquired problem caused by trauma, disease, or infection. A combination of physical disability, as well as other types of disability could be integrated into the physiotherapy rehabilitation plan. For example, children with CP and intellectual disability, are less likely to respond to the physiotherapists in a physiotherapy session. Therefore, the physiotherapist should expect less response in treatment progression. Another example is that a physically disabled adult might need physiotherapy services, as well as a job, to empower his/her socio-economic status, while a disabled child might need education and physiotherapy rehabilitation. In both examples, the CBR programme is aimed at improving the PwD's condition, through the CBR components.

In Sudan, the civil war and poverty caused a high rate of physical injuries among the inhabitants (ILO, 2004). According to the WHO and UNICEF (2014), the proportion of disability within the whole population in Sudan, is 10%, and the percentage of children with disability in Sudan, is 2%. However, the expectations, no doubt, are higher, as the screening for disability is challenging, due to policy, security, and transparency (ILO, 2004). Censuses do not cover the whole country, due to the tough civil war conditions. In a paper presented at the International Population Conference (IPC) in 2005, it was stated that children in Sudan were exposed to different types of disability (Nour, 2005); however, physical disability appeared to be the most common, as indicated in Table 4.1.

The needs of PwDs depend on the disability type. People with physical disability need mobility devices, to help them to participate in their communities, while people with hearing disability need hearing aids, to participate in their communities. The physiotherapy profession offers medical services to manage physical disability. Physiotherapy aims to manage functional problems, and maximize functional ability.

Physiotherapy training programmes prepare students for the rehabilitation of physical impairments. In Sudan, physiotherapy training programmes has to be linked to the needs of the Sudanese community. Being knowledgeable about the types of disability in the Sudanese community, facilitates in the development of better training programmes for physiotherapy students.

Table 4.1: Types of children disability in Sudan

Type of disability	Percentage %
Intellectual disability	9.7
Visual impairment	23.5
Hearing impairment	14.5
Physical disability	38.5
Multiple disability	3.1
Other disability	10.0
Not stated	1.0
Total	**100**

Nour, (2005).

4.2.2. Services offered to People with Disability in Sudan

Sudan is located in North East Africa, and is one of the largest countries in Africa. Sudan experienced the longest civil war in Africa, between the North and South (1983 – 2004), which has resulted in a low socio-economic standard among large parts of the population. This has impeded the development of good infrastructure, and has limited various aspects of the Sudanese community, including education and health. The current number of health professionals does not satisfy the population's needs, as there is only one community health worker per 10 000 inhabitants in the country (WHO, 2010).

The government's focus on health services has generated various developmental programmes, aimed at improving the health conditions in the country, and PwDs were regarded as a targeted group. The Sudanese government has established an Office on Disability in the Ministry of Social Planning that has established a forum on disability, with participants from governmental and non-governmental organizations, as well as the

private sector. In addition, certain resolutions have been taken for cases of disability, such as, the exemption from all study fees for disabled persons; conducting a comprehensive survey of all persons with disabilities, as well as elderly persons in Sudan, in collaboration with the Islamic World Council on Disability and Rehabilitation; the establishment of a city, named Al Amal in Khartoum, equipped with the most advanced instruments for the care and rehabilitation of disabled persons; as well as a review of current disability laws in Sudan (Hobeika, 2011). For children with disability, there are various special institutions, mainly in Khartoum state, which cater for them, and cover around 68.3% of disabled children in Khartoum, implying that 31.7% of the disabled children are without services in Khartoum (ILO, 2004). Institutions like Volontarito per la Cooperazione Inernazionale **(**OVCI), Khartoum Cheshire Home (KCH), and AL Amel institute are located in Khartoum state (Kjellgren, Jones-Pauly, El-Tayeb Alyn, Tadesse & Vermehren, 2014; Hobeika, 2011; KCH, 2007).

However, such institutions are limited outside Khartoum (KCH, 2007). In Northern Sudan, in state of Atbara, there is one institution, working in collaboration with KCH, named the Border Horizons Institute (KCH, 2007). Education at these institutions has been supplied by public efforts and voluntary organizations, which is encouraged by the government. The curriculum is geared towards the needs and abilities of children with disabilities. In addition, it is aimed at integrating disabled persons into society, by providing them with the necessary skills. In 1994, the total enrolment comprised 976 students in 7 institutions, with 110 teachers (ILO, 2004). However, access to information limits the evaluation and follow-up of such programmes, as the available information does not cover guidance services, vocational training, or job placements (ILO, 2004).

It is crucial to increase awareness about CBR, which does not only involve delivering medical services, but also includes education, employment, and other health services (WHO, 2015). One of the successful CBR programmes, which provides free care for children with disabilities in Sudan, is conducted by the KCH. It covers the needy areas and displaced camps around the capital of Sudan, and is registered as a Non-Governmental Organization (NGO), under the Ministry of Human Affairs, Ministry of Social Affairs, and Ministry of Health. It has been treating more than 15 000 disabled children since it commenced in 1973. In addition, KCH reaches disabled children from

outside the capital, through collaborations with institutions in other cities in Sudan (KCH, 2007).

Being well-informed about the services available to PwDs in the community, would enable the physiotherapy training programme to organise the training of students. Knowing what resources are available in the community, as well as its needs, is important to identify the focus areas of training, as well as how students should be prepared for the actual circumstances in the community.

4.2.3. Satisfaction of PwDs, regarding the rehabilitation services

Several studies have expressed the dissatisfaction of PwDs with healthcare-related services (Wilkinson, Dreyfus, Cerreto & Bokhour, 2012), specifically, the skill and experience of healthcare providers. Therefore, health education has paid more attention to the training of students, regarding the needs of PwDs. For instance, health professionals could offer the best health services to their patients; however, if they lack good communication skills with their patients, the outcomes could be negative. If good services are delivered, but the patient's response is low, the rehabilitation service provider did not maximize the patient's well-being. The satisfaction of PwDs with the rehabilitation services currently provided, is considered crucial in the quality of care. In rehabilitation, the satisfaction of patients is used to evaluate the outcomes associated with their quality of life.

For PwDs, rehabilitation services assist in achieving ADL, and consequently, participation in the community. Therefore, it is crucial to establish what PwDs' opinions are, regarding the services offered to them. The patient's satisfaction could highlight relevant issues related to patient care in the physiotherapy curriculum; therefore, the patient's response could assists in standardizing effective intervention (Greenfield & Musolino, 2012). It could highlight issues related to physiotherapy intervention, and services in the community. In addition, it could highlight challenges in the community, while training physiotherapy students in the CBR module. For example, probing the satisfaction of PwDs with assistive devices services, would enable the physiotherapy training staff to understand how, and when, to integrate assistive devices.

In CBR, regarding the socio-economic aspect of PwDs, using both the social and medical model, the psychological status of PwDs is as important as their physical status (Nganwa, Sserunkuma & Mbugua, 2017). Various studies have revealed that communication skills in health education are vital to patient satisfaction (Hurst, 2016). Therefore, a high level of communication between the physiotherapist and the PwD, strengthens collaboration in the rehabilitation process, and produces satisfactory outcomes (WHO, 2010).

4.2.4. Participation challenges of PwDs

Disability is a condition that could cause impairment for the individual. This impairment limits the functioning of the disabled individual, which affects his/her participation in the community (WHO, 2011). Globally, different challenges cause different barriers for PwDs to be involved in the community. Science and research studies have focused on how to maximize the potential of PwDs, how to deliver the services to PwDs, and how to create a better environment (WHO, 2011). Disability could cause PwDs to be isolated from the community, and unable to access services in the community, to improve their socio-economic status. There is a link between disability and poverty, as PwDs are more likely to have economic and social disadvantages, such as being less likely to attend school, being unemployed, needing to pay extra medical costs, as well as having poor housing (WHO, 2011). People in under-developed countries, enjoy less support and services, due to the socio-economic environment in developing countries. Community support programmes could benefit PwDs through financial, medical, transport, and educational support.

People with Disability (PwD) need access to education and employment in their community. According to the Sustainable Development Goals (SDGs), including PwDs in education is vital, to develop any society. Similarly, including PwDs in the labour market is important to maximize human resources, promote dignity and social justice (WHO, 2011). Several modules have been designed to investigate the participation restrictions of PwDs in their community. It is of concern, not only regarding the medical condition, but also the affect it has on society and the environment. For example, the International Classification of Function (ICF) classifies restrictions based on the body structure and function, activities, and participation. In addition, the Participation Restriction Score (PRS) assesses the impact of public health interventions on the lives of

disabled people (Mont & Loeb, 2010). It describes the restrictions experienced by PwDs in domestic life, the community, social, as well as civic life, and provides an indicator of their functioning range within the community. Therefore, the impact of disability on the individual, is related to their participation challenges in the community, for example, performing basic activities in the community, such as shopping and participating in community organizations (Mont & Loeb, 2010).

Rehabilitation programmes, such as CBR programmes, have been implemented; however, there are restrictions and difficulties, regarding the cost of these programmes. One restriction is the availability of health professionals. Health professionals could contribute positively to health complications that restrict PwDs from participating in their community. Preparing health professionals to rehabilitate PwDs in the community, commences when health professionals understand the needs of the PwDs, as well as how the CBR programme aims to satisfy those needs. This could be done in the early stages, while training health professionals in CBR. For example, physiotherapy students need to know how disability restricts PwDs from attending school and obtaining proper qualifications, which would restrict them from receiving a decent income, causing them be at risk of poverty. In this current study, knowing the restrictive challenges that PwDs in Sudanese society face, helps AUW to address those challenges, while training physiotherapy students in CBR.

4.2.5. Expectations and needs of PwDs, regarding the rehabilitation services

The needs of PwDs are essential to facilitate successful integration into rehabilitation. In addition, the expectations that patients bring to treatment are important to the service providers, as well as the treatment strategies (McCrum *et al.*, 2016). It highlights the service provider/patient relationship. McCrum *et al.* (2016) highlights the need for a better understanding of patients' expectations, regarding rehabilitation services, in order to facilitate more effective, high quality services. Consequently, exploring prospective responses to patients' expectations of rehabilitation services, has been employed commonly. Health care has to evolve into an evidence-based and cost-effective practice, to include a larger segment of the population, at a lower cost, so that services would cover the whole community; however, this affects how care is provided. The concern should be beyond medical or technical facts, and should focus more on a proper care system.

Similarly, this could apply for CBR, by focusing on the PwDs' expectations, regarding rehabilitation services, at the lowest costs, and with resources in the community. The expectations of PwDs, could help to shift the traditional understanding of PwD rehabilitation, as a medical condition (McCrum *et al.*, 2016). The expectations of PwDs could include facts related to inclusion and participation in the community, which could contain components of both the medical and social module. For example, the expectations, regarding the centre's policy, treatment system, and staff improvements, could be to improve the health components, as one of the CBR components. Therefore, it could help to improve other CBR components, as the relationships between all CBR components are linked, and function together to improve the conditions of PwDs in the community.

It is important to investigate the needs of PwDs in developing training programmes for students in health professions (Reyes & Arteaga, 2018). Students are the future health professionals, who are expected to deliver the rehabilitation services to PwDs. Including the needs of PwDs in the physiotherapy training programme, could equip students with knowledge that would make their future role more effective, as physiotherapists. In addition, it would be a way of preparing students for what they would encounter in the community, as well as an indirect way of *hearing* PwDs, in the development of a physiotherapy curriculum. The CBR strategy, therefore, is aimed at involving PwDs in the rehabilitation process, in order to offer services that are relevant to the community's needs, while the techniques and skills learned in the physiotherapy education programme is relevant to the needs of PwDs.

According to Reyes and Arteaga (2018), exploring the needs of PwDs facilitates the design of rehabilitation training programmes, in several aspects. For example, in Occupational therapy, it helped to develop an interactive environment for PwDs. The Occupational therapy training programme focused on explaining the importance of the environment, in offering support for PwD rehabilitation. Exploring the expectations and needs of PwDs, therefore, helps physiotherapy training to address and integrate it into the physiotherapy training programme. This is a way of involving PwDs in the CBR

rehabilitation programmes design in Sudan, the importance of which is clearly highlighted (WHO, 2010).

4.3. Methodology

4.3.1. Study design

This current study employed a quantitative, cross-sectional, exploratory research design. The study form, based on a cross-sectional one-time survey, is one of the most common forms of research, with a clear, strong, and appropriate designs (Driessnack *et al.*, 2007). According to Mitchell and Jolley (2010), with exploratory research, the researcher is free to discover any relationship that exists between any variables to be explored. In addition, quantitative research plays an important role in developing evidence-based knowledge, as it could be used to quantify relationships between, and among, variables (Driessnack *et al.*, 2007).

4.3.2. Research setting

This current study was conducted in public and Non-Governmental Organization (NGO) centres that offer CBR services to PwDs in Khartoum State. The population of Khartoum State is 5.2 million, 17% of the total Sudan population (El Tayeb, Abdalla, Heuch & Van den Bergh, 2015). According to the National Council for Medical Professions (NCMP) in Sudan, there are two public, and three NGO centres offering free physiotherapy services to PwDs, in both rural and urban communities, in Khartoum state. The public ones are the National Authority for Prosthesis and Orthotics [NAPO], and Al Amal Rehabilitation City [ARC]. The NGOs are the Organismo di Volontariato per la Cooperazione Internazionale **[**OVCI], the Khartoum Cheshire Home [KCH], and the Usratuna Sudanese Association for Disabled Children [USADC] (Kjellgren *et al.*, 2014: Hobeika, 2011: KCH, 2007).

The *NAPO* is a rehabilitation centre in Khartoum, providing prostheses, orthotics, walking aids and physiotherapy treatment for physically disabled patients. The idea was introduced in 1967, with the supply prosthesis and orthotics to war-injured people, and included patients with all types of physical disabilities, who needed prosthesis and orthotics, due to amputation, Cerebral Palsy, Congenital Deformity, Poliomyelitis, and neurological injuries (Kjellgren *et al.*, 2014). Between January and September 2011, this

centre had treated more than 2 500 patients. Currently, this centre admits approximately 90 patients per month, including follow ups and new patients (Kjellgren *et al.*, 2014).

The *Al Amal Rehabilitation City (ARC)*, according to the International Labour Office (ILO, 2004), was established by the Sudanese government, and equipped with the most advanced instruments for the care and rehabilitation of disabled persons. The services offered, included medical screening, physical assessment, physiotherapy treatments, psychological counselling, prosthetic and orthotic devices, as well as small business management training for mine survivors and PwDs (Hobeika**,** 2011).

The *Organismo di Volontariato per la Cooperazione Internazionale (OVCI)* is an Italian NGO that commenced its activities in Sudan, in 1991, providing services for disabled children. Currently, it provides various CBR programmes in rural areas around Omdurman.

The *Khartoum Cheshire Home (KCH)* is a charitable organization, founded in 1973, by Lord Leonard Cheshire, the founder of Cheshire Organizations in the World. The aim of KCH is to provide free care and cures for physically disabled children. The services are provided through various home departments and projects, namely, a clinic for new patients' assessment and evaluation, physiotherapy, an orthopaedic workshop, an orthopaedic surgery, board and lodging of disabled children, as well as an outreach and CBR programmes that cover the needy areas and displaced camps. There were 2 977 new cases processed at the clinic in 2006. Orthopaedic operations had started in 2002, and 300 operations had been performed each year since (KCH, 2007).

The *USADC* is a national NGO established in 1999. The mission of the USADC is to participate, effectively, in the development of local communities in Sudan, by caring for disabled children, providing them with better opportunities in life, lifting the burden off their families, and integrating the disabled children into society. In order to achieve this mission, USADC offers various CBR services to PwDs, namely, education and vocational training.

4.3.3. Target population

The targeted population in this current study were 1 868 people with physical disabilities, attending physiotherapy and CBR services in Khartoum State. In this current study, the disability and physical disability definitions of the WHO (2011) are used. Disability is wide term covering impairments, activity limitations, and participations restrictions. Physical disability refers to mobility restrictions, limiting ADL, due to congenital or acquired problems.

4.3.3.1. Inclusion criteria

- Persons with physical disabilities, who had received rehabilitation services at the research settings, and the community.
- Persons with both physical and other types of disabilities, who had received rehabilitation services at the research settings, and the community.

4.3.3.2. Exclusion criterion

- Persons with other types of disabilities, besides physical disability.

4.3.4. Sample size

The sample size was selected according to the probability proportional size of the registered people with physical disability, in centres offering physiotherapy and CBR services in Khartoum State. There were 1 868 registered PwDs receiving physiotherapy services at these centres in 2015. The study involved 25% of this targeted population, determined as explained in the Methodology section in Chapter two of this study (Sullivan & Feinn, 2012: Finer & Zolna, 2011). The number of respondents were distributed, as indicated in Table 4.2.

Table 4.2: Distribution of respondents

Centre	Location.	Total registered (100%)	Respondents (25%)
NAPO	Khartoum	640	160
ARC	Khartoum	148	37
OVCI	Omdurman	340	85
KCH	Khartoum	540	135
USADC	Omdurman	196	49
Total		**1868**	**467**

4.3.4.1. Sampling criteria

Convenience sampling was used to select the study respondents. Convenience sampling is a non-probability sampling method, in which the first available source of information would be used. In this current study, these were people with a physical disability, attending physiotherapy sessions at NAPO, OVCI, KCH, ARC, and USADC, between January and March 2015. The whole targeted population did not receive an equal opportunity to be included in this study; however, the selected respondents reflect the descriptive comments about the sample (Baker *et al.*, 2013). Including the whole population in this study would have proved difficult, due to the time and resources limitations.

4.3.5. Instruments for data collection

A questionnaire was designed according to the study objectives, and included open- and close-ended questions, regarding socio-demographic information, type of disability, participation restrictions, assistive devices, and rehabilitation services. As indicated in Appendix 2, the socio-demographic information included questions related to gender, age, residence, marital status, level of education, occupation, and monthly income. Socio-demographic data are useful in health surveys, such as this current study, as it could reveal information on the inequality of health accessibility. In this current study, it could

reveal the PwDs socio-economic status, enabling the researcher to investigate the relationship between their status and other factors related to disability, such as disability type and cause, as well as health services accessible to PwDs. Information about PwDs, included in CBR services and their community, could be obtained in this manner, which AUW could use in the training of physiotherapy students.

Questions relating to the type of disability, included the diagnosis of the patient and the cause of disability, as well as the duration of the disability, indicating how long the respondent had endured the disability. This enabled the researcher to explore the experiences of PwDs in their community. In addition, it highlighted the prospect of having rehabilitation services, as well as how the duration affected the needs of PwDs in their community. The answer to the question on duration was confined to four responses, namely: since birth; less than 10 years; more than 10 years; and I don't know. In addition, the respondents were asked to express to what extent the disability affected them, as well as to provide information on the relationship between the effect of the disability and the rehabilitation needs in the community.

In this current study, the Participation Restriction Score (PRS) indicators were used to investigate the participation restrictions of PwDs (Mont & Loeb, 2010). The PRS investigates restrictions regarding the domestic life, community, social, and civic life. Therefore, in this current study, the needs of PwDs in the community were investigated through PRS, which provided important insight into how community conditions could create functional and participation restrictions for PwDs. In addition, PRS was linked to the International Classification of Function (ICF), which classifies restrictions, and the social model of disability, which provides important indicators to measure the needed integrations of rehabilitation in the community, as is the issue of this current study (Mont & Loeb, 2010). It also measures the effectiveness of the services offered to PwDs in the community and investigates whether PwDs could do shopping, preparing meals, do housework, take care of personal belongings, as well as take care of others. Additionally, it assesses whether PwDs could participate in community life, such as clubs and organizations, as well as leisure and recreation, namely sport, art, and cultural activities in the community. Finally, it evaluates whether PwDs could participate in political life and related activities in their community. The answers to the participation restrictions

questions were subject to a yes or no response, as it determined whether the individual met the specific activity challenge. Therefore, the survey could determine whether there were distressing problems restricting PwDs in their environment, such as poverty and the intervention of rehabilitation for PwDs in the community.

Assistive devices are meant to improve the mobility of PwDs. It is also referred to as assistive technology, and considered as a CBR component (WHO, 2011). Therefore, it was important to investigate whether these technologies benefitted PwDs in the community, as well as why (Riener, 2016). The questions regarding assistive devices explored information about the type, use and maintenance of assistive devices, which provided evidence of the rehabilitation services offered in the community, as well as the challenges experienced by the PwDs. The most common types of assistive devices used by PwDs were identified as walking aids, prosthesis, orthotics, and wheelchairs. Additionally, the participants were given the opportunity to specify any other type of assistive device, where applicable. The questions also explored the respondents' perceptions on how the device helped them, as well as how difficult it was to use. A 4-part Likert scale was employed to record the answers as, so much, moderately, slightly, and not at all. In order to determine the maintenance services on the assistive devices, the respondents were asked whether their devices were maintained by themselves, the government, NGOs, or their families. Additionally, two options were added (I don't know, and other) for those who did not know, or had other options regarding the maintenance of their assistive devices.

Questions regarding rehabilitation services explored information about the types of rehabilitation services that were needed by PwDs; the ones that were available in the community; the PwDs' access to these rehabilitation services; as well as the barriers that challenged PwDs' access to such services. Physiotherapy, occupational therapy, psychotherapy were included as options to be selected by the respondents. Regarding physiotherapy, the types of treatments included the most commonly used physiotherapy management, such as gait training, therapeutic exercises, electrotherapy, and hydrotherapy. A Likert scale was used to answer questions on the perceptions of respondents, regarding rehabilitation services.

The questions also explored community-based social support offered to PwDs in financial, educational, transportation, and medical contexts. The researcher endeavoured to clarify meaning of the questions to each respondent to ensure that the social community service was understood. In this current study, the questions related to social networks that provided support to PwDs in financial, educational, medical, and transportation contexts, to help PwDs to improve their physical activities (Barzallo & Gross-Hemmi, 2017: Forouzan *et al.,* 2013). Community-based social support reveals important evidence of assistance to PwDs in community participation, which forms part of the basic human rights, specified in the United Nations' Convention on the Rights on Persons with Disabilities (UNCRPD).

Regarding patients' expectations, not enough information is available on the subject, not enough attention is paid to it in hospitals and clinics, although it is important for research and the policies of health services (Manary, Boulding, Staelin & Glickman, 2013). Patients' expectations regarding rehabilitation services could help to highlight information about the medical and social aspects of rehabilitation. According to Manary *et al.* (2013), patients' expectations and experience in health care could reflect the quality of rehabilitation care. In this current study, the rehabilitation services in Khartoum state are under scrutiny; therefore, the views and expectations of PwDs could contribute to the knowledge of the PwDs' needs, regarding rehabilitation services in Khartoum state. The patients' expectations regarding the facilities, staff, policies, and therapy programmes at the various centres were explored by asking the respondents to indicate what improvement/s they expected, given four options to choose one, or more, for their responses.

4.3.5.1. Pilot study

Validity and reliability are two of the most important criteria through which a quantitative instrument's adequacy is evaluated (Polit, Beck & Hungler, 2004). Validity refers to the extent to which an instrument measures what it is supposed to be measuring (Sarantakos, 2013). To ensure the validity of this current study, a pilot study was conducted in AL Emlaq City, for PwDs located in Khartoum North, Sudan. Questionnaires were distributed to 15 respondents, with similar characteristics to those who would be involved in the main study, specifically,

people with physical disability. Al Emlaq City is a centre for PwDs in Khartoum North, established by the Ministry of Social Affairs and Ministry of Human Affairs, as a facility for PwDs, living in Khartoum North, to organize social activities. People with Disability (PwDs) attended on a daily basis, as part of their routine.

The researcher met with the secretary-general of the centre to request permission and assistance with the conducting of the pilot study. The response was positive, with the secretary-general guaranteeing access; therefore dates and times were arranged. At the appointed time, on the appointed date, the researcher and the research assistants conducted the pilot study with each individual respondent, in the secretary-general's office, whiles other respondents attended their daily social activity in the centre's open yard. The researcher explained the aim of the study and pilot study to each respondent. Subsequently, the researcher posed all the questions to each respondent, individually. Each questionnaire took 7 to 10 minutes to complete. The respondents did not experience any challenges in understanding and answering the questions; therefore, no changes were made to the questionnaire for the main study.

4.3.6. Data Collection

The data were collected over a period of two months, from January to February 2015. During the first month, data were collected from three NGO centres that offer CBR to PwDs. The three assistants, as well as the researcher, collected data from 9 am to 3 pm, the working hours of the NGO centres. During the second month, the team collected data at the two public centres, from 9 am to 3 pm, as well.

The research assistants were two physiotherapists, employed as teaching assistants, in the physiotherapy department at AUW. They were instructed by the researcher on the data collection process, through a discussion and explanation of the questionnaires content, covering the research background, the context, sampling, and the timeframe. In addition, they were involved in the testing of the questionnaires, by means of the pilot study.

Research assistants administered the questionnaires in Arabic to the respondents, who were PwDs. For the children attending with their parents, one of the parents would answer the questionnaire. Each respondent completed the questionnaires at the rehabilitation centre, after attending a physiotherapy session. The research assistants provided the respondents with consent forms for signing, after explaining the details of the study, and answering any questions, the respondents might pose. The respondents and the research assistants met in the waiting area of each centre, due to the lack of space, and completed the questionnaires, in the form of a simple conversation, which the respondents found acceptable.

The original questionnaires were developed in English. Translation of the questionnaires into Arabic took one month. The department of English at AUW were consulted and relevant language experts assisted. The department used two language professionals for the forward translation from English into Arabic. Afterwards, the Arabic questionnaires were translated back to into English by two different translators. There were no differences in the final translations.

4.3.7. Data analysis

The collected data were captured on spread sheets, using the Microsoft Excel programme in preparation for analysis. Subsequently, the data were exported into the Statistical Package for the Social Sciences (SPSS), version 21.0. The researcher employed *descriptive statistics* to report the findings of the survey data. *Tables* were used to describe *categorical data*, while *means* and *standard deviations* were used to describe *continuous data*. Cross tabulation and inferential statistics were used to explore the relationships between variables.

4.4. Results

4.4.1. Response rate

The response rate of the study was 100% (467 of the 467 respondents), which was the targeted response rate, according to the sample size equation. The highest number of respondents (34.3% – 160/467) was from NAPO, and the lowest (7.9% – 37/467) was from ARC, while the missing data 0.2% (1/467), emanated from the question about the name of rehabilitation centre, as shown in Table 4.3.

Table 4.3. Rehabilitation centers

Rehabilitation center	Frequency	Percentage
OVCI	85	18.2
NAPO	160	34.3
USADC	49	10.5
KCH	135	28.9
ARC	37	7.9
Missing	1	0.2
Total	**467**	**100**

4.4.2. Demographic Information

Table 4.4: Demographic data

Gender	Frequency	Percentage %
Males	261	55.9
Females	202	43.4
Missing	4	1.6
Total	**467**	**100**
Age		
Less than 1	150	32.1
1 to 10	75	16.1
10 to 20	50	10.7
More than 20	192	41.1
Total	**467**	**100**
Residence		
Khartoum	74	15.9
Omdurman	167	35.8
Khartoum north	63	13.5
Out of Khartoum	162	34.7
Missing	1	0.2
Total	**467**	**100**

Occupation		
Student	77	16.5
Employed	25	5.4
Self-employed	35	7.5
Unemployed	330	70.7
Total	**467**	**100**
Monthly income		
Less than 500 SG	123	26.3
500 SG to 1000 SG	123	26.3
1000 SG to 2000 SG	20	6.4
More than 2000 SG	32	6.9
No income	159	34.1
Total	**467**	**100**

Table 4.4 contains the demographic information of the respondents of this study. Males comprised 55.9% (261/467) and females, 43.3% (202/467). In addition, 41.1% (192/467) of the respondents were older than 20 years of age, followed by 32.1% (150/467), who were children under one year, and the missing data were 0.4% (2/467). The mean age was 12.8 years old. Most of the respondents were residing in Omdurman (35.8% – 167/467), followed by those residing outside Khartoum (34.7% – 162/467), while the missing comprised 1.5% (7/467). The findings revealed that 70.7% (330/457) of the respondents were unemployed, and 16.5% (77/467) were students. Among those who were 20 years old, and older (192/467), 63% (121/192) were unemployed. Additionally, 26.3% (123/467) earned less than 500SG, 26.3% (123/467) earned between 500SG and 1000SG, and 34.1% (159/467) had no income.

4.4.3. Disability type and cause

Table 4.5: Types and causes of disability

Type of disability	Frequency	Percentage	Cause of disability	Frequency	Percentage
Acquired Brain Injury	66	14.1	Congenital	67	14.3
Muscular Dystrophy	133	28.5	Delivery	129	27.6
Amputation	138	29.6	Injury	193	41.3
Cerebral Palsy	139	29.8	I don't know	71	15.2
Parkinson's Disease	9	1.9	Missing	7	1.5
Others	61	13.1			
Total	**467**	**100**		**467**	**100**

Table 4.5 shows that Cerebral Palsy and Amputation were common types of disability among the respondents, while Parkinson's disease was the less frequent type of disability. Additionally, 41.3% (193/467) of the respondents got disability because of injury, while 27.6% (129/467) suffered the disability at birth, during delivery. Approximately 15.2% (71/467) did not know the reason for their disability, while for 14.3% (67/467), the reason was congenital. Only 1.5% (7/467) comprised missing data.

Table 4.6: Perception on the effect of disability

Effect	Frequency	Percentage
Affect so much	261	55.9
Affect a little	165	35.3
Do not affect at all	39	8.4
Missing	2	0.4
Total	**467**	**100**

Table 4.6 reveals that 55.9% (261/467) reported being *affected so much* by their disability, while 35.3% (165/467) reported being *affected a little*, and 8.4% (39/467) reported not being *affected at all*. There was 0.4% (2/467) with missing data. The study findings revealed that the respondents, who suffered amputations, were more likely to be *affected so much* in their perception, with significant association (P=value 0.002).

4.4.4. Participation restrictions

Table 4.7: Activities restricted

Participation restricted	Frequency	Percentage
Shopping	93	48.4
Preparing meals	80	41.6
Doing housework	91	47.4
Taking care of personal objects	102	53.1
Taking care of others	97	50.2
Taking parts in clubs/organization's	95	49.4
Taking part in recreation/leisure	89	46.3
Taking part of political life and citizenship	83	43.2

Table 4.7 shows the restrictions that PwDs deal with, in some daily activities, such as shopping and housework. In addition, community participation activities, such as being active in political life and citizenship, are included. This data only included PwDs at 20 years of age, and older (192/467). The findings revealed that more than 41.6% of the respondents were challenged in daily activities, such as shopping, preparing meals, and doing housework. The challenges increased to more than 50.5% in daily activities, like taking care of personal property, as well as taking care of others. Regarding participation in the community, more than 43.2% experienced challenges with participation in clubs/organization's, recreation/leisure, as well as political life and citizenship.

4.4.5. Assistive devices

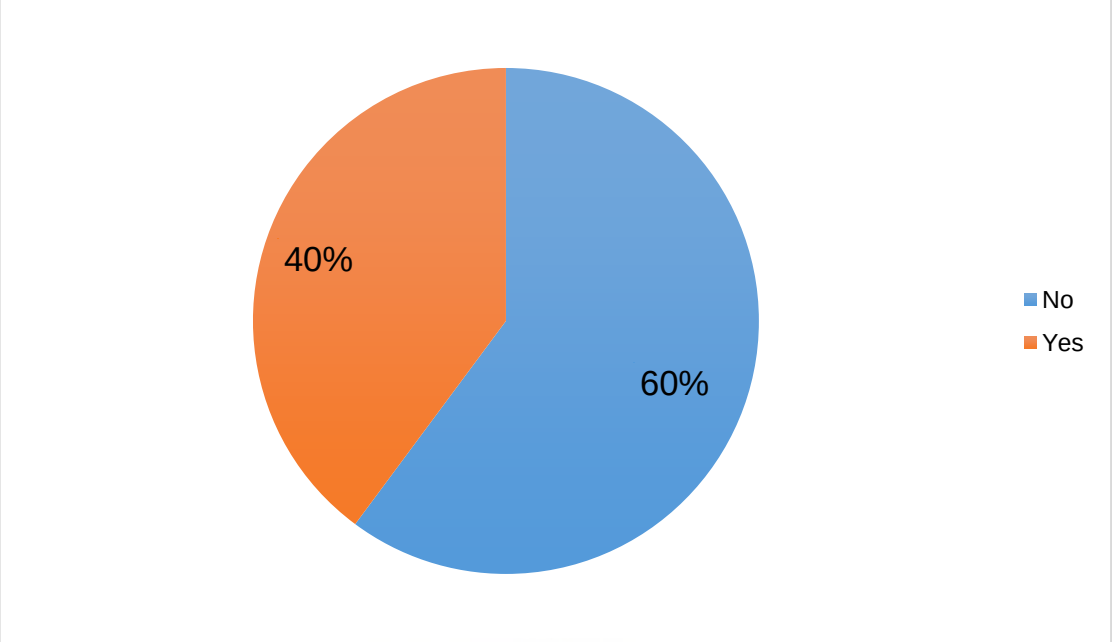

Figure 4.1: Using assistive device

Figure 4.1 illustrates that 60% (279/467) were using assistive devices, and 40% were not. The findings revealed that the respondents with Acquired Brain Injury were more likely to use assistive devices (P=value 0.02), while the respondents with amputation challenges were more likely to use wheelchairs (P=value 0.04).

Table 4.8: Help of assistive device

Help of assistive device	Frequency	Percentage
Not at all	4	1.4
Slightly	86	30.2
Moderately	88	30.9
Very much	107	37.5
Total	**285**	**100**

In Table 4.8, 37.5% (107/285) of the respondents reported that their assistive devices helped them *very much*, 30.9% (88/285) reported being helped *moderately*, 30.2% (86/285) *slightly*, and only 1.4% (4/285) reported *not at all*. The findings of this current study revealed that the respondents, who used assistive devices, were more likely to have transportation problems (P=value 0.0001). In addition, the findings revealed that the respondents, who obtained information about their devices, were more likely helped by

using their devices (P= 0.0001), and were more than likely repairing their assistive devices (P= 0.0001).

4.4.6. Rehabilitation services

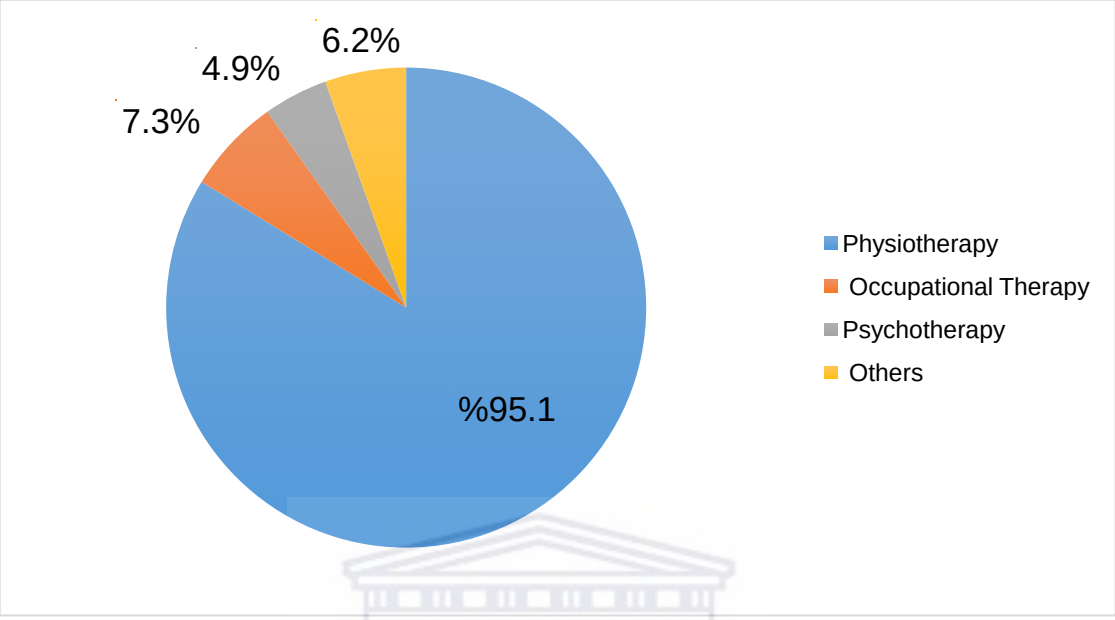

Figure 4.2: Rehabilitation services

In Figure 4.2, 95.1% (443/467) of the respondents attended physiotherapy sessions, 7.3% (34/467) attended occupational therapy sessions, 4.9% (23/4467) attended psychotherapy sessions, and 6.2% (29/467) attended other forms of rehabilitation sessions. In this section of the survey, the respondents could choose more than one option; therefore, the sum total percentage is be more than 100%.

For those who received physiotherapy treatment, 48.2% (224/443) were receiving gait training exercises, 74.3% (343/443) therapeutic exercises, 9.7% (44/443) electrotherapy treatment, and 9.5% (44/443) hydrotherapy treatment. In this section of the survey, as well, the respondents could choose more than one option; therefore, the sum total percentage is more than 100%.

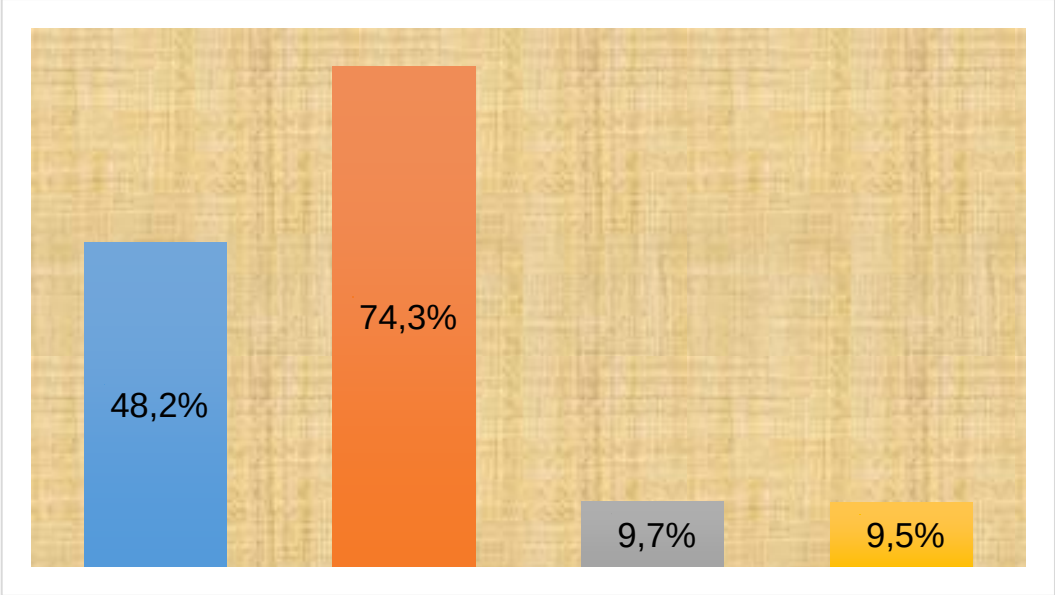

Figure 4.3: Physiotherapy treatments

Most of the respondents (92.9% – 434/467) expressed that the rehabilitation exercises were effective, and only 7.1% (33/467) were of the opinion that they were not. The findings revealed that the respondents, who attended physiotherapy sessions, were more than likely to hold positive perceptions of the effectiveness of the rehabilitation (P=value 0.001). Similarly, those who attended occupational therapy sessions, were more than likely to have positive perceptions (P=value 0.01).

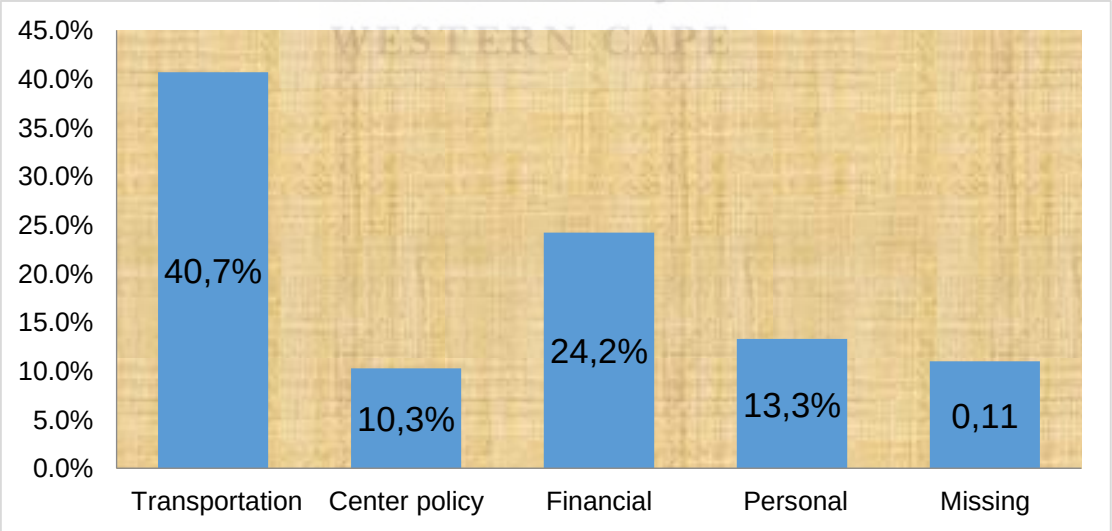

Figure 4.4: Barriers restricting rehabilitation access

Regarding the barriers that restrict access to rehabilitation services, transportation was perceived by 40.7% (190/467) of the respondents, the centre policy, by 10.3% (48/467),

financial barriers, by 4.2% (113/467), personal problems, by 13.3% (62/467), and 11% (51/467) were missing, as illustrated in Figure 4.4.

Significant association was observed between, residing in Khartoum North, and access restrictions to the rehabilitation services, as the respondents who resided in Khartoum North, more than likely met restrictions with accessing the rehabilitation centre (P=value 0.03). In addition, there were significant relationships between, residing in Khartoum North, and experiencing transportation challenges (P=value 0.003).

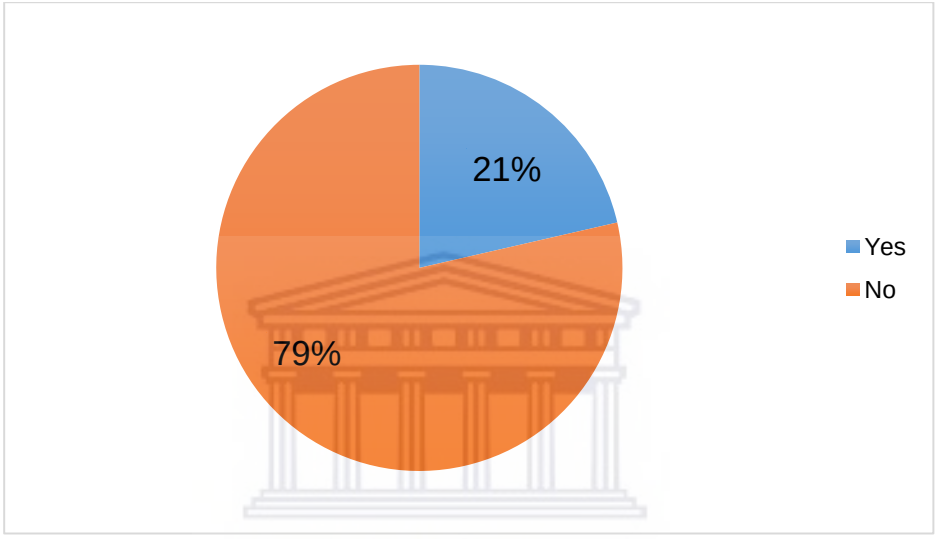

Figure 4.5: Rehabilitation services at home

As illustrated in Figure 4.5, 21.5% (100/467) of the respondents received rehabilitation services at home, while 79% (367/467) did not.

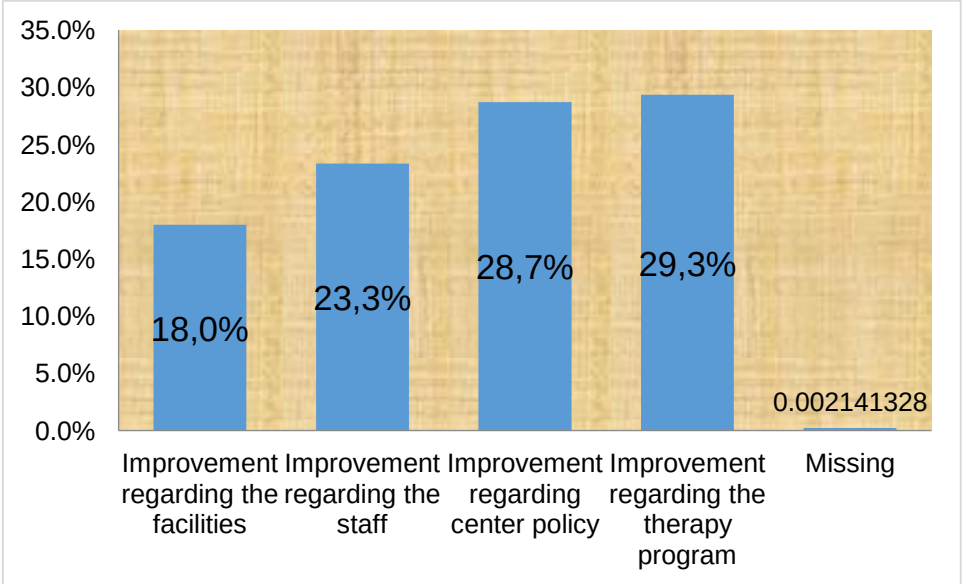

Figure 4.6: Improvements expected

For improvements expected for rehabilitation services, 18% (84/467) of the respondents expected improvements of the facilities, 23.3% (109/467) expected improvements with staff, 28.7% (134/467) of centre policy, 29.3% (137/467) of the therapy programme, while 1% (3/467) were missing, as illustrated in Figure 4.6.

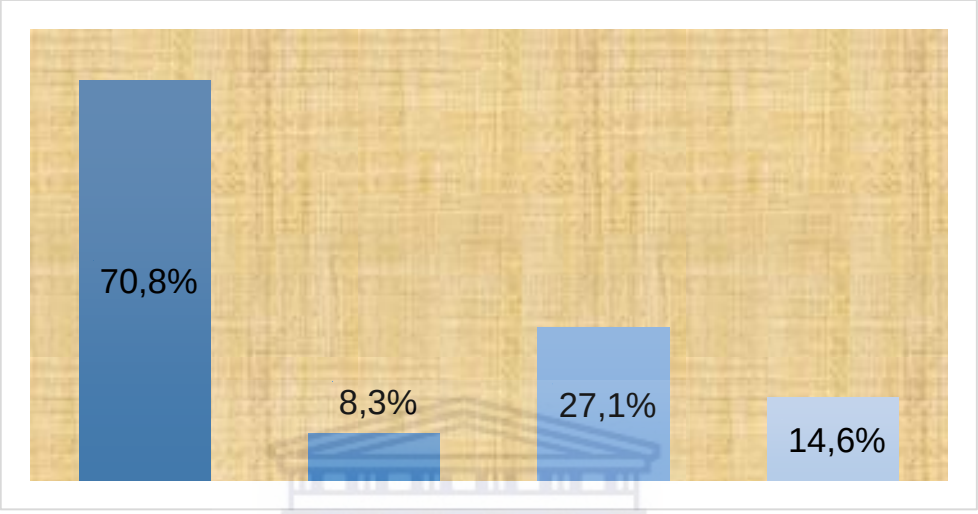

Figure 4.7: Type of community based/societal support

Community/societal support are services provided to PwDs, to decrease the disadvantages they experienced, including poverty, education, transport, and medical services. This was explained to each respondent. Financial support referred to small loans, or pension. Education support referred to services in accessing education, such as, accessing special education schools, or tools to facilitate classrooms. Transportation support included access to public transportation, free of charge. Medical support involved accessibility to medical care, such as benefiting from medical aid. Only 10.3% (48/467) of the respondents were receiving community/societal support, while 88.9% (415/467) were not, and 0.9% (4/467) were missing. Among those who received community/societal support, 70.8% (34/48) received financial support, 8.3% (4/48) received educational support, 27.1% (13/48) received transportation support, and 14.6% (7/48) received medical support, as illustrated in Figure 4.7. In this section of the results, the respondents could have selected more than one option; therefore, the total might be more than 100%.

The findings revealed that 54.4% (254/467) of the respondents had received counselling services previously, while 44.7 (209/467) did not, and 0.9% (4/467) were missing. Among those had received counselling previously, 84.6% (215/254) received it from physiatrists, 6.7% (17/254) from psychologists, 21.3% (54/254) from social workers, 9.4% (24/254) from school counsellors, and 8.7% (22/254) received counselling from others, as illustrated in Figure 4.8. In this section of the results, the respondents could have selected more than one option; therefore, the total might be more than 100%.

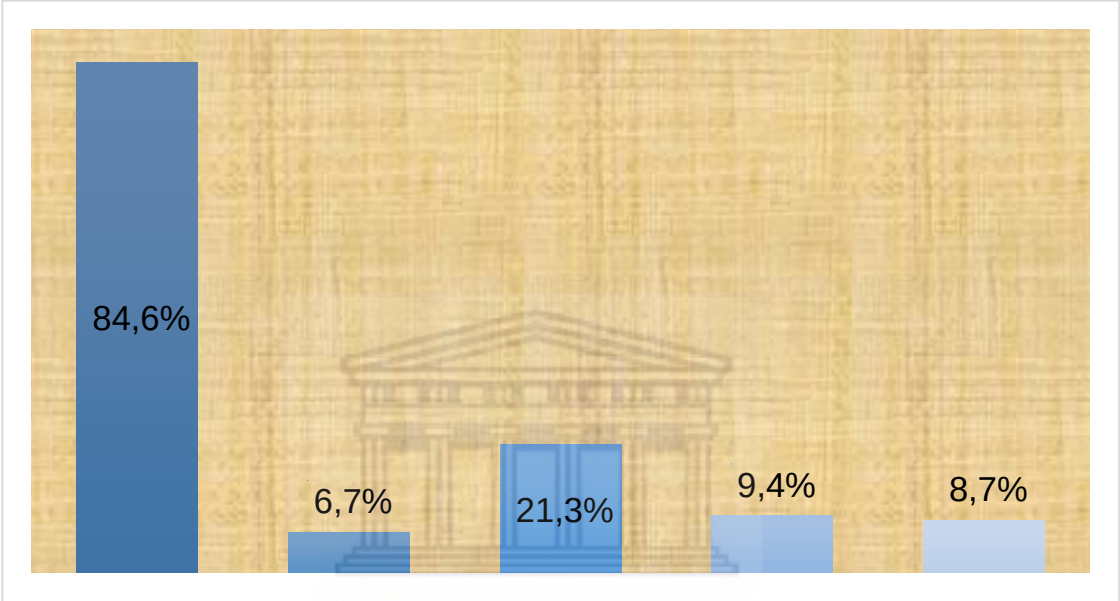

Figure 4.8: Had counselling services by whom

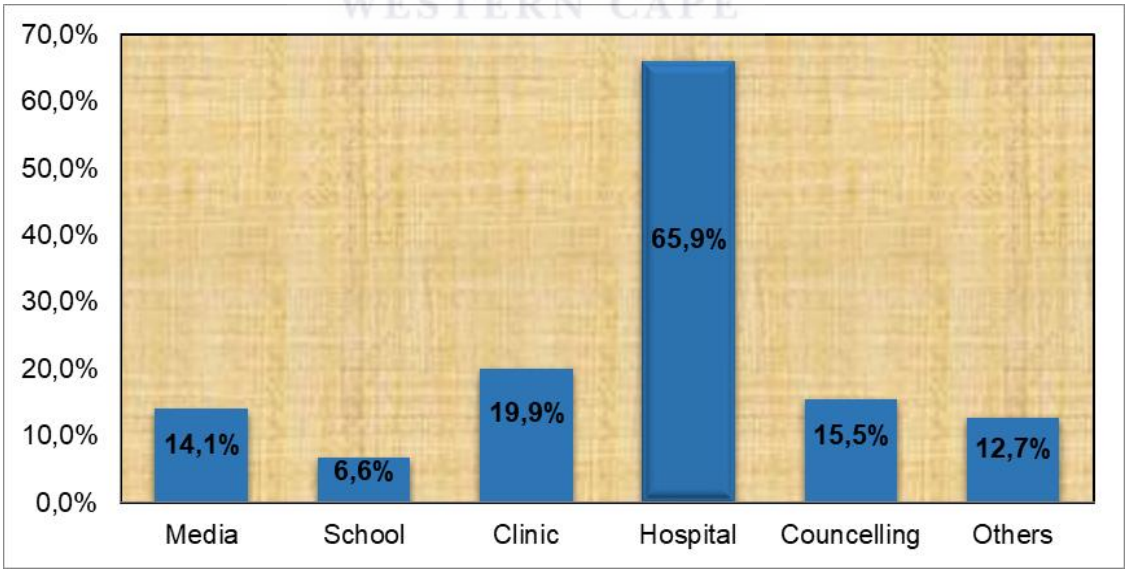

Figure 4.9: Sources of health information

The findings revealed that 77.3% (361/467) of respondents received health information, while 21.6% (101/467) did not, and 0.8% (4/467) were missing. Approximately 14.1% (51/361) had received the health information through the media, 6.6% (24/361) at school, 19.9% (72/361) at the clinic, 65.9% (238/361) at the hospital, 15.5% (56/361) through counselling, and 12.7% (46/361) from other sources, as illustrated in Figure 4.9. Others sources were friends, relatives, and internet searches. In this section of the results, the respondents could have selected more than one option; therefore, the total might be more than 100%.

4.5. Discussion

4.5.1. Socio-demographic information

The proportion of males and females in the country is 50.4% for males and 49.6% for females. This is similar to a survey conducted by El Mubarak (2015, cited in El Tayeb *et al.*, 2015), which reveals 17.8 per 1000 of the total male population are disabled in Sudan, while the rate is 14.0 per 1000 for females. In this current study, the male respondents comprised a higher percentage (55.9%), compared to the female respondents (43.3%). Various studies assert that this is probably the case, because males are more exposed to violence, accidents, work related injuries, and war injuries (El Mubarak, 2015, cited in El Tayeb *et al.*, 2015). The study of El Tayeb *et al.* (2013), reveals a high prevalence of death due to injuries, as well as a greater number of disabilities in Sudan, than anywhere else in the world; therefore, prevention programmes, targeting both males and females, are required. On the other hand, Commons (2011) related the differences in gender prevalence, to the gender-biased facts in each community. For example, culture and religion, in some cases, affect the community setting, regarding the prevalence of disability and CBR strategies (Commons, 2011). Therefore, this could be reflected in the CBR education of the physiotherapy curriculum, as a part of both the medical and social module. However, in this study, no evidence of the gender-biased effect in the prevalence of disability was observed.

The findings of this current study revealed that 48.2% (200/467) of the respondents were children under 10 years of age, 41.1% (192/467) were more than 20 years old, while 10.7% (50/4476) were between 10 and 20 years old. The mean age was 12.8 years old.

There are 100 million children living with disability, of whom 80% are in developing countries (WHO & UNICEF, 2014). The National 2008 Sudan Census estimated that there were 720,000 disabled children, among a total of 15 million children in Sudan (WHO & UNICEF, 2014). According to the number of disabled children worldwide (100 million), and number of disabled children in Sudan (720,000), it is calculated that 0.72% of disabled children, worldwide, reside in Sudan.

Khartoum State is divided into three cities, namely, Omdurman, Khartoum, and Khartoum North. In this current study, most of the respondents were resident in Omdurman (35.8%; 167/467), followed by those residing outside of Khartoum State (34.7%; 162/467). The reason that most respondents were residing in Omdurman, could be that it is the largest city in Khartoum State, with a high population, which increased from 963,301 in 1993, to 3,099,711 in 2014, due to displacement, migration and natural population growth, and has become the national centre of commerce in Sudan (Mohammed, Alawad, Zeinelabdein & Ali, 2015). According to Mohammed *et al.* (2015), the main reasons for migration to Omdurman, basically, was to seek education and health services. In this current study, most of the respondents originated from outside Khartoum State, than from Khartoum and Khartoum North.

The relationship between disability and poverty is that PwDs are commonly poor, with less access to employment (Dan & Paneth, 2017). Regarding the respondents' monthly income, the findings reveal that 26.3% (123/467) earned less than 500SG, which is equal to less than 30US$. Only 6.9% (32/467) earned more than 2000SG, which equal to 120US$, while 34.1% (159/467) had no income. Livelihood and empowerment as items in the CBR components, could be useful to reduce the poverty for PwDs in the community; for example, a policy to include PwDs in the labour market, so that they could be employed. According to the findings of a study conducted by Agho and John (2017) in India, employment is a way to increase PwD participation in social life, facilitates recovery, and reduces symptoms and disability. Agho and John (2017) observed that employed PwDs are less likely to be hospitalized, and spend less time in hospital, when hospitalized. According to Prasad (2018), article 27 of the United Nations Commission on Population Development [UNCPD] acknowledges the right of PwDs to

have equal access to work and employment in the labour market, in an accessible environment.

According to Eltayeb & Khalifa (2013), various researches indicate that PwDs experience higher unemployment rates. According to WHO (2010), 80% to 90% of PwDs are unemployed in developing countries, while 50% to 70% is the rate in developed countries. In this current study, the rate of unemployed PwDs, above 20 years of age, was 63%. Even though it was below the reported rate of the WHO (2010), it could still have a negative effect at individual and society level. Economists relate this to a decrease of the individual's standard of living (WHO, 2010). It is a challenge for unemployed individuals to gain access, participate in, and enjoy community services, as unemployed individuals cannot access the basic needs for life, such as food, home, and medicine (WHO, 2010). This could cause higher crime rates in society, as well as a higher mortality rate.

In addition, physical disabilities could cause the loss of jobs, as some studies have reported that most employed people could lose their jobs, after they had sustained injuries (El Tayeb *et al.*, 2015). This reflects on the income of the respondents in this current study, as many of them had no income (32.5%). Partnerships between the Ministry of Health, Ministry of Labour, labour organizations, employees, employers, and disability organizations in Sudan, therefore, need to be strengthened.

4.5.2. Disability types and causes in Khartoum State

There are different types of disability, such as visual, hearing, mental, and physical disability (WHO, 2011). In this current study, the respondents were individuals with physical disability. Physical disability is the most common type of disability, worldwide (WHO, 2011). Cerebral Palsy and Amputation were the most diagnoses associated with disability in this current study, with 29.8% and 29.6%, respectively. This might be because this current study included 49% of respondents under 10 years of age, as Cerebral palsy (CP) is a movement disorder, which appears in childhood. It occurs during the development period of the child's brain. Various acknowledged reasons for CP include, negligence, infection, improper medical care, and injury (Dan & Paneth, 2017). Studies reveal that there is an association between the prevalence of CP and a low socio-

economic level (Dan & Panteth, 2017). In this current study, a large number of PwDs, or their families, have no source of income (34.1%), and (52.6%) earned below 1000SG (approximately 60US$) per month. Additionally, the findings of this current study revealed a strong association (P=value 0.002) between PwDs, who suffered amputations, and their perception that they were affected so much with this type of disability. Amputation is the removal of a limb by trauma, medical illness, or surgery (Abdelgadir, Elbagir, Eltom & Berne, 2006). Diabetic and war injuries are common causes of amputation (El Tayeb & Khalifa, 2013: Abdelgadir *et al.*, 2006). The diabetic rate among adults in Sudan is reaching 10.4% in the Northern state (Abdelgadir *et al.*, 2006). In addition, Sudan has had the longest civil war in Africa, which has probably resulted in a higher injury rate and amputations (El Tayeb & Khalifa, 2013). The study conducted by El Tayeb *et al.* (2015), in Khartoum State, revealed 28 deaths, due to injuries, out of the total of 129 reported deaths, over 5 years, and 320 of 441 injured persons suffered physical disability, due to injury, of whom 34.1% received artificial limbs (prosthetics).

4.5.3. Services offered to PwDs in Khartoum State

Services and support are offered to PwDs by government or other institutions, for them to participate in community life (WHO, 2011). These services are related to CBR, which is related to health, education, empowerment, livelihood, and social life. Rehabilitation services is under the component of health, as is health promotion, health prevention, medical care, and assistive devices (WHO, 2010). In this current study, 60% of the respondents were using assistive devices, such as, walking aids, prosthetics, orthotics, and wheelchairs, which they found to be helpful. In the study of Cornman, Freedman and Agree (2005), which was conducted in six different national surveys, the findings revealed that assistive devices were used among 14% to 16% of 65-year-old and older populations.

The findings of this current study revealed a significant relationship (P=value 0.0001) between information that the respondents received, regarding their assistive devices, and the repair of these devices. This implies that PwDs, who received information about their assistive devices from the rehabilitation team, were more likely to repair their assistive devices, when required. They would repair their assistive devices, either by themselves, or via families, NGOs, or governmental organizations, which indicates the importance of

increasing PWDs' awareness of assistive devices. This helps them to gain the maximum benefit of their assistive devices, in their mobility, as well as participation in the community, which is the CBR objective, and significantly proven in this stage of this current study. In addition, the findings of this current study revealed a significant relationship (P=value 0.001) between the information received about the assistive devices, and the benefits thereof, implying that PwDs, who received information about their assistive devices from the rehabilitation team, were more likely to benefit from the devices' assistance with their disability.

A significant association (P=0.02) was also observed between Acquired Brain Injury (ABI), as a type of disability, and using assistive devices, as well as between amputation, as a type of disability, and using a wheelchair as an assistive device (P=0.04). A wheelchair was commonly used after amputation, before preparation for prosthetics. In this current study, it was not clear at which stage the respondents, who had been amputated, started to use wheelchairs, as they were most probably attending physiotherapy rehabilitation, instead of occupational therapy (7.5%) and psychotherapy (4.9%). The fact that physiotherapy is concerned with the physical status and movement, might be the reason for this result, as all the respondents were physically disabled. However, occupational therapy is also concerned with the assessment and treatment, to develop the daily living and work skills of people with a physical disability, in their communities (Pedretti & Early, 2001). Therefore, the rehabilitation professional is very important to people with physical disabilities; however, the shortage, as well as difficulty in training and recruiting occupational therapists, worldwide, is well documented (Hoffmann & Cantoni, 2008).

In this current study, 21.5% of the respondents received rehabilitation services at home. This is a positive benefit that PwDs in this current study gained from services in their community. Various literature place emphasis on home-based rehabilitation, as useful management, to improve functional capacity and quality of life (Moreira *et al*, 2018: Thomas, Simpson, Riley & Grant, 2010). Therefore, physiotherapy training programmes in Sudan could use this type of activity, to expose physiotherapy students to the community. This would allow physiotherapy students to do home visits and observe

rehabilitation services in the community of the PwDs. However, the possibility of home rehabilitation services in Sudan needs to be explored to a greater extent.

A few of respondents (10.7%), were receiving community/societal support, such as financial, educational, transportation, and medical support. Many literature studies reveal that the lack of social support could compromise the participation of PwDs in society (Forouzan *et al.*, 2013; Davey *et al.*, 2017). In addition, PwDs, who lack social support, are at higher risk of death, due to a variety of diseases (Forouzan *et al.*, 2013). In contrast, Forouzan *et al.* (2013) avers that PwDs with higher social support, have an increased likelihood of survival. In addition, the relationship between social support and disability reveals that an individual with low social support is at higher risk of having functional disability and pain (Forouzan *et al.*, 2013).

In this current study, the low percentage of PwDs, who received social support, indicates that PwDs in Khartoum State are at higher risk of disability complications. This fact highlights the need of other CBR components in the community, namely, health, education, empowerment, and livelihood. The findings of this study revealed that transportation and finance barriers were restricting PwDs from accessing rehabilitation services in Khartoum State. Therefore, social support could decrease those limitations at community level. Additionally, this could be used to guide what the social module of CBR course of the physiotherapy curriculum at AUW should include and highlight. According to Barzallo & Gross-Hemmi (2017), societal community-based support should be increased in the community, enabling PwDs to participate in the community.

Education is a key feature of employment (ILO, 2004). In order to access education, the government should implement policies to include PwDs in the educational system, which may require environmental adjustments, for students with disabilities to access the educational system, with the community, at least, offering transportation support. A low percentage of PwDs receiving community social support, is also an indication of their restricted access to assistive devices, infrastructure and transportation, insurance availability and cover, work and education, pension and funds (Barzallo & Gross-Hemmi, 2017), which is the case in this current study. Therefore, a Community Based Rehabilitation module could help to reduce PWD's limitations, at community level.

According to the findings of this current study, 54.6% of the respondents received counselling services from psychiatrists, psychologists, social workers, and school counsellors. Most of PwDs received counselling from psychiatrists (84.7%); however, the involvement of other rehabilitation team members was very low. A few respondents received counselling from other professionals, namely, psychologists (7.1%), social workers (21.6%), and school counsellors (8.6%). Some respondents received counselling from more than one professional in the rehabilitation team; for example, a social worker and a physiatrist offered counselling services for the same respondent. The findings of a study conducted by Clauss-Ehlers (2010) concluded that the civil conditions of society are related to receiving counselling services in society. Societies affected by challenges, such as poverty and war, are more likely to have limited rehabilitation services and developmental strategies (Clauss-Ehlers, 2010). In this current study, challenges, such as war and poverty, limited the rehabilitation services offered by psychologists, and social workers, as well as the services at schools.

The PwDs in this current study received health information mostly from hospitals (66.2%), more than any other sources, such as media, schools, and clinics. Therefore, it would appear that health promotion for PwDs is mainly executed through hospitals in Khartoum State. Consequently, the health promotion role of media, schools, and clinics needs to be reinforced, to increase the awareness of disability (Haig, Im, Adewole, Nelson & Krabak 2009). Various studies provide examples that using the media, schools, and clinics helped PwDs in ADL and participation in their communities (Davey *et al.*, 2017; Mont & Loeb, 2010). The importance of increasing awareness in the community needs to be prioritized, as awareness programmes could be arranged in many places, other than hospitals.

4.5.4. Satisfaction of PwDs with the rehabilitation services offered in Khartoum State

Patient satisfaction is identified as the key element of outcome measurement with prospective patient. Satisfaction could be considered as an outcome in itself, or a factor that promotes other outcomes, such as quality of life (Thomas *et al.*, 2010). However, the challenge with measuring patient satisfaction, is that patients might feel coerced into reporting high satisfaction, while they feared that negative responses might compromise

their treatment (Batbaatar, Dorjdagva, Luvsannyam, Savino & Amenta, 2017). In this current study, the data collectors were not involved with any patient treatments. The perceptions of patients, who use rehabilitation services, are important, as their level of choice is highlighted, initiating feelings of involvement in their rehabilitation decisions and opinions. The respondents' opinions, regarding the effectiveness of the rehabilitation services, were positive, as most rated it highly, which evidenced that CBR services were improving PwDs' quality of life. However, in this current study, the data were collected immediately after a physiotherapy session, which could explain the high level of patient satisfaction, compared to data collected a long while after receiving rehabilitation services (Manary *et al*., 2013). Regarding PT and OT services, the findings revealed a significant relationship between these services and the level of satisfaction (P=value 0.001) for PT and (P=value 0.01) for OT.

4.5.5. The participation challenges of PwDs in Khartoum State

Participation challenges refer to difficulties that affect PwDs' participation in their communities (WHO, 2011). Mont and Loeb (2010) assert that PwDs meet challenges in their communities, in addition to their medical conditions, and rehabilitation plans need to address these challenges, in order to implement proper programmes for PwDs in their communities. Normal domestic life highlight how disabilities restrict the execution of activities such as, buying and cooking food, doing housework, maintaining and protecting their personal effects, and taking care of other family members. In addition, activities related to civic and social life highlight how PwDs are restricted from participation in community life and organizations, such as joining community clubs and playing a role in the decision making (Mont & Loeb, 2010). In this current study, more than half of the respondents, over 20 years of age (53.1%), were restricted from taking care of their personal effects. According to Mont and Loeb (2010), there is a relationship between restrictions and how the environment accommodates disability. Therefore, the limitations that PwDs experience, in terms of taking care of their personal effects, could be due to socio-economic realities, rather than their medical condition. This concurs with the CBR approach, which contains social and medical aspects (WHO, 2011). Consequently, students receiving physiotherapy education at AUW should start to think seriously about exploring this realistic fact.

In this current study, the socio-economic information also revealed that unemployment and low income were important barriers, which were reflected in other factors, such as mobility aids. The most common form of long-term care is self-care, and rehabilitation is aimed at equipping PwDs with the tools and techniques to maximize self-dependency (Urdiales, Annicchiarico & Cortés, 2013). Various studies reveal that through the use of assistive technology, many disabled older persons were enabled to participate in their community, and perform their ADL (Riener, 2016: Mittler, 2015: WHO, 2011). In addition, Riener (2016) state that millions of people worldwide use assistive devices to improve their quality of life. However, the findings of this current study revealed that only half of the respondents were using of assistive devices, while the others were experiencing difficulties, taking care of their personal effects. Therefore, more information regarding assistive devices was necessary, to clarify why PwDs' were experiencing these challenges.

The study findings also revealed that transportation and finance were barriers for PwDs. Consequently, approximately less than half of the respondents were experiencing restrictions regarding community participatory activities, such as, shopping, participation in clubs/organizations, political life and citizenship, as well as recreation/leisure, because all these activities required a level of mobility, with proper transportation facilities. However, a few respondents (10.3%) were receiving financial and transportation support from their community.

In addition, the findings revealed a significant association between PwDs residing in Khartoum North, and having transportation as the major cause of restriction to rehabilitation services. In this current study, the rehabilitation centres were located in Khartoum and Omdurman, but none offering CBR services were located in Khartoum North. Transportation difficulty was one of the reasons that could lead to health access, education, employment, and participation restrictions of PwDs in the community. Consequently, without transportation, PwDs would be excluded from services and social contact. In this current study, there was a significant association (P=value 0.0001) between PwDs, who use assistive devices, and transportation challenges to access rehabilitation services. Therefore, what needs to be explored is why PwDs find it difficult to use their assistive devices in public transportation.

Worldwide, the focus has been directed towards improving public transportation, infrastructure and services (WHO, 2011). The concern is about how public transportation could be made accessible to PwDs, for them to participate in their communities. This requires effective programmes and laws; however, in developing countries, there is a limited degree of compliance with law (WHO, 2010). In the USA, transportation was the second reason that PwDs are discouraged from seeking employment (WHO, 2010). Various studies reveal the lack of ramps for vehicles, large gaps between platforms and vehicles, the lack of wheelchair anchoring in buses, as well as inaccessible stations and stops (Fritsch, 2013). The Committee on the Rights of Persons with Disabilities issued a report on Sudan implementation of the Convention on the Rights of Persons with Disabilities, which established that public transportation and buildings were not accessible for PwDs in Sudan (UNHRC, 2018). This highlighted the fact that, to date, the laws on universal building design had not been adopted (UNHRC, 2018).

4.5.6. Expectations and needs of PwDs, regarding rehabilitation services in Khartoum State

Patient's expectations, regarding rehabilitation services, have an important influence on the treatments. McCrum *et al.* (2016) aver that it is important for physiotherapists, other health professionals, and researchers to consider the patients' expectation, as it helps to adjust the care approach and treatment evaluation. In this current study, it could help to involve PwDs in their services evaluation and improvement. The concept of increasing the patient's role in rehabilitation care has been observed in rehabilitation care strategies (Manary *et al.*, 2013). In this current study, requesting the PwDs' opinions and expectations concur with the recommendations of Tambuyzer and Van Audenhove (2015), stating that patients should fulfil a role in their own care. This allows the patients to participate in decision making, evaluating, planning, and training, in partnership with the rehabilitation team. In addition, effective response to patients' needs is very important for positive rehabilitation outcomes, and requires that increased attention be paid to reported patient outcomes, including their needs and satisfaction (Tambuyzer & Van Audenhove, 2015). In this current study, the questionnaire explored the respondents' expectations regarding improvements in the physiotherapy service they were receiving.

However, currently, there is still a debate on whether patients should be involved in their own care, policy development, or broader practice, as their views could be interpreted differently by various people, namely, policy makers, researchers, patients, and politicians, exploring the expectations of services. In this current study, the expectations of centre facilities, staff, centre policies, and therapy programmes were explored, to gain information regarding the PwDs' rehabilitation services offered in Khartoum state. This information could add value to the CBR components of the physiotherapy curriculum at AUW, by highlighting the expectations of PwDs, as well as how these expectations could be addressed within the CBR components, whether in the medical or social aspects of rehabilitation. Some outcomes regarding clinical symptoms and hospitalization duration are assessed by clinicians; therefore, no attention has been directed towards this aspect, as patients might not have enough clinical knowledge (Tambuyzer & Van Audenhove, 2013). In this current study, most of the respondents expected improvements in centre policies (28.7%), as well as therapy programmes (29.3%), which were higher than centre facilities (18%), and staff (23.3%). According to Tambuyzer & Van Audenhove (2015), the expectation of improvements in therapy programmes could be directed towards the medical aspect. Manary *et al.* (2013) add that patient expectations, based on experience, is very significant in the medical and technical aspects of rehabilitation, as patients can perceive the quality, as well as deficiency in the medical aspect of rehabilitation. Therefore, patient judgment is related to clinical guidelines followed (Manary *et al.*, 2013). In this current study, the quality of the rehabilitation programme could be assessed, based on the patients' interpersonal experience, such as communication with the therapy providers, which refers to techniques in therapy care, and reveals to what extent the health providers and patients had reached a common understanding in the rehabilitation process. Similarly, the rehabilitation centre policies could affect the quality of services directly; for example, long waiting times before sessions could affect the patients' physical and emotional state, as well as the patient/health provider collaboration and communication, during the rehabilitation process.

4.6. Summary of the chapter

This survey, which is Phase 1 – Stage 2, aimed to determine the needs of PwDs, regarding rehabilitation services in Sudan, in order to combine its findings with that of Phase 1 – Stage 1 in Chapter 3. The findings revealed that PwDs were experiencing challenges with access to, as

well as the quality of, the rehabilitation services, which the concept of CBR could reduce, if it were to be applied in the community. These challenges are multi-sectoral, and include the socio-demographical and physiological aspects of PwDs, leading to the restrictions in participation and quality of life. In addition, the findings revealed that rehabilitation centres offering CBR services in Khartoum State, are only located in the cities of Omdurman and Khartoum. There were no rehabilitation centre offering CBR services to PwDs in the city of Khartoum North. The findings also revealed the need to explore the livelihood and empowerment sectors for PwDs, as a CBR matrix to reduce poverty. Poverty, unemployment, and PwD restrictions in their community, are connected, as was observed in this stage of the study. The CBR content of the physiotherapy curriculum at AUW, could equip students with knowledge and information on the livelihood and empowerment components, to reduce the financial restrictions of PwDs to access rehabilitation services in Khartoum State. The health component in the CBR content could assist health promotion and disease prevention, to investigate the incidence of conspicuous types of disabilities in the Sudanese community, such as CP and amputation. At present, hospitals are the main source of health promotion and prevention in Khartoum state. Therefore, the health promotion roles of the media, schools, and clinics need to be strengthened, in order to increase the awareness of disability.

In this current study, the prevalence of CP and amputation was high. Consequently, the role of health promotion could propagate knowledge and awareness of CP and amputation in the community. Assistive devices were commonly used by PwDs in Khartoum State, and falls under the health component of CBR. Therefore, knowledge and information of assistive devices, as CBR technology, is relative to the concept of CBR in physiotherapy education. The health component of the CBR matrix includes accessibility to different rehabilitation services. In this study, the participants who had access to physiotherapy and OT, benefited from its inclusion in the rehabilitation services; however, access to OT and psychotherapy were limited.

CHAPTER FIVE

PHASE 2 – STAGE 1: TO DETERMINE THE CBR COMPONENTS THAT NEED TO BE ADAPTED IN THE PHYSIOTHERAPY CURRICULUM AT AUW

5.1. Introduction

The third research question of this current study is: "What are the CBR course components that should be included in the physiotherapy curriculum at AUW, to improve it, and better prepare students for CBR?" To answer this question, the researcher initially investigated the CBR components in the physiotherapy curriculum at AUW, by analysing documents (Chapter 3). Subsequently, the researcher determined the needs of people with disabilities (PwD), in terms of rehabilitation services, through a survey with the use of a specially designed questionnaire (Chapter 4). In this chapter, the views of newly graduated physiotherapists at AUW (former students), as well as a CBR expert (physiotherapist), were explored, regarding the CBR content of the physiotherapy curriculum at AUW. The researcher initially presents the background on the feedback required from experts, staff, and students, regarding the components of the CBR curriculum, followed by a confirmation of the aim and objectives of this current study. The second section of this chapter comprises the study methodology, regarding the sampling, data collection and analysis procedures, as well as the ethical considerations. The third section includes the results of this current phase, followed by the discussion thereof, concluding with a summary of the chapter.

5.2. Background

Physiotherapists are involved in the rehabilitation team for PwDs in the community, and fulfil the roles of health promotion, disease prevention, as well as the education of PwDs and their families (Rajan, 2014). Physiotherapists assist in delivering rehabilitation services to PwDs in rural areas, in collaboration with health teams, community health workers, and CBR workers. Therefore, physiotherapy students need to be well prepared to serve in the community and deliver physiotherapy services. Consequently, there is a need to ensure that the curriculum is aligned with the needs of communities, and that students are trained in a manner that would assist them to work as qualified professionals at all levels of healthcare.

The World Confederation of Physical Therapy (WCPT) and the American Physical Therapy Association (APTA), in the educational strategic plan (2006-2020), recommended that professional bodies assess what is being taught at entry level (O'Donoghue *et al.*, 2011). The Chartered Society of Physiotherapists (CSP) recommended a framework for curriculum development and review, including the assessment and evaluation of the expected learning outcomes, learning process, and main content (O'Donoghue *et al.*, 2011). The WCPT in its position statement entitled, "WCPT Guidelines for Physical Therapist Professional Entry-Level Education", outlined the components that should be included in the CBR content (Audette *et al.*, 2017). As part of the evaluation, feedback about the curriculum is valuable. Therefore, it is reasonable to seek help from individuals involved, to share experience, recommendations, and challenges. The experience of students, patients, community members, stakeholders, and educators assist in the gathering of information for the development of activities and programmes in medical education, as it highlights the strengths and weaknesses of the current programme, and could be used to improve education and training.

The feedback from new graduates could assist with the curriculum evaluation, as they would have experienced the curriculum already, as well as its effect on their work, after the completion of their undergraduate studies (Moraros *et al.*, 2015). Therefore, they can connect experience and service, aid in identifying any challenges, as well as formulating solutions to overcome those challenges. O'Donoghue *et al.* (2011) state that it is important to use student's feedback in curriculum evaluation, in order to identify knowledge, skills, and competence that could help to prepare students to work in the community. Additionally, the students' experience could provide feedback on the theoretical content of the curriculum, which appeared to be mainly directed towards cardiac and pulmonary rehabilitation, while health promotion for public health was identified as a void. The findings of the study of O'Donoghue *et al.* (2011) also highlighted the need to extend the duration of placements, to enable students to glean more knowledge and skills from the community. Consequently, longitudinal integrated clerkships could be one way of filling this void, as recommended in several medical education departments (O'Donoghue *et al.*, 2011). In longitudinal integrated clerkships, students spend an extended period in the same clinical placement. Regarding learning methods, the students feedback revealed that role playing, presentations, case studies, small group work, were the commonly used methods for student teaching (McMahon *et al.*, 2016).

In the study conducted by Tsakitzidis *et al.* (2015), students and staff feedback revealed that student supervision in the community is very important in curriculum planning for health professionals. The findings of the study also concluded that communication skills are very important for education and practice (Tsakitzidis *et al.*, 2015). In another study, conducted by McMahon *et al.* (2016), on evaluating the students' perspective of their curriculum, regarding PHC, the findings revealed the students' lack of communication skills, which reflected on their ability to educate and motivate patients. Physiotherapists are well placed to fulfil a motivational role, as a part of their physiotherapy practice, which requires that these skills be included in the curriculum, to increase their ability to provide physiotherapy service across wide sectors and specialties (McMahon *et al.,* 2016).

In Sudan, the AUW started physiotherapy education and integrated CBR into the curriculum. According to Van den Bergh (2011), there is a need to emphasise CBR components in newly established physiotherapy education, in developing countries. In addition, the evaluation and modification of the CBR content in the curriculum is recommended, to ensure that physiotherapy services are reaching PwDs in rural areas. The evaluation and modification could be done by health educators, curriculum developers, and other community members involved in education and health delivery, as the CBR course should include CBR strategies and principles that are based on the needs of the community. This will enable the physiotherapists to devise appropriate rehabilitation plans, and adapt techniques to suite the community needs and resources. In addition, evaluating the plan would help to monitor the process, to ensure that it is adapted properly (Oostendorp, Rutten, Dommerholt, Nijhuis-van der Sanden & Harting, 2013). Finally, community awareness of disability should be included in the curriculum, as this will facilitate the involvement of community members (Karthikeyan & Ramalingam, 2014). This aim of this chapter, therefore, was to determine the CBR components that needed to be adapted in the physiotherapy curriculum at AUW. This was achieved by exploring the experiences of a CBR expert, as well as AUW staff, who were newly graduated.

5.3. Methodology

5.3.1. Sampling

In this current study, the convenient non-probability sampling technique was used in this stage. In convenient non-probability sampling, subjects are selected, based on their

relevance to the research study. Non-probability sampling provides strong theoretical reasons for the choice of the sample, and allows the drawing of subjective judgments on theoretical topics, such as in the academic field related to this current study (Padgett, 2016). Conventional non-probability sampling techniques are also recommended in exploratory research, when the aim is to explore problems, or gather rich data, in a quick, inexpensive manner (Padgett, 2016). In this current study, the aim was to revise the CBR components of the physiotherapy curriculum at AUW. Therefore, exploring problems and editing the components of the CBR curriculum in physiotherapy education at AUW was necessary.

Data were collected from a targeted population in this current study, using a focus group discussion with AUW graduates (who had become staff members), and an in-depth interview with a CBR expert (who worked with CBR programmes). In this convenient sample, the target group sample was selected because of its availability to the researcher. According to O'Donoghue *et al*. (2011), the views of graduates who had experienced the curriculum are more valuable, which supports the fact that the participants of the FGD of this current study, were previous AUW physiotherapy graduates, who had completed the CBR module, as part of their education programme, and were currently employed as staff members. Therefore, they would be able to explore and share their experiences of the CBR components, as graduates, and also as staff; the idea being to minimize the disparity between expectation and experience. According to Noah, Cho & Kim (2017), the differences between educational expectation and educational experience are significant. In addition, from their experience as graduates and staff, they would be able to identify new components of CBR that needed to be included in the physiotherapy curriculum at AUW. Finally, the advantage of selecting these participants is that it might enhance their commitment to the programme at AUW, when they see their feedback being incorporated into the programme, which will generate more active participation in developing their competencies (O'Donoghue *et al*., 2011).

In this current study, including a participant with experience with CBR in the community, would reveal the reality of PwDs, who receive rehabilitation services, as well as what the rehabilitation components' challenges are in the community. In addition, it could assist

in identifying what physiotherapy education should take into consideration, when training physiotherapy students in CBR.

5.3.2. Data collection procedures

The data were collected in English as all participants spoke English. The data collection procedures for the focus group discussion (FGD) and the in-depth interview, are discussed in the following two sections.

5.3.2.1. Focus group discussion (FGD)

One FGD was conducted with six students, who had graduated from the physiotherapy department at AUW. According to McMahon *et al.* (2016), the FGD encouraged participants to express their views, while allowing time for individuals to reflect on the views of others. In addition, it offered the participants an opportunity to discuss and debate as a group (McMahon *et al.,* 2016). It was challenging to conduct the FGD, due to the participants' tight schedules, which was a limitation for this current study. The participants had full time activities during this research period and were involved in postgraduate studies, as well as several training programmes, simultaneously. This limitation was managed by continued communication with the participants to agree on a convenient time for all.

A focus group guide (Appendix 3) was created with open-ended, unstructured questions, to encourage the participants to explore their views, broadly, as well as guide the conversation, when it deviated from the relevant topic (Padgett, 2016). The research question and study objectives provided direction for the discussion. The questions of the focus group guide were aimed at identifying the components, which the participants perceived, clarified their understanding of CBR, as well as those that did not increase, or develop their understanding of CBR. Finally, the questions were aimed at exploring what changes they would make in the curriculum, to improve their understanding of CBR.

Two weeks before the FGD, all the participants were informed about the study objectives in a meeting at the physiotherapy department, and asked to participate. Each participant received an information sheet (Appendix 5) with an invitation to participate in the focus group discussion. The participants were also informed about

their right to withdraw at any time, as well as the right to confidentiality. Permission to audio tape record the session was requested, as well. In addition, the participants were assured that they could delete anything they might have disclosed, as the transcripts would be made available to them at various stages during the research process. None of the participants in this current research requested the deletion of anything they had disclosed, when presented with the transcriptions.

The participants were accessed while they were participating in an exchange programme between UWC and AUW. The FGD, therefore, transpired at UWC, in a neutral meeting room, to avoid interruptions, and ensure confidentiality. Incidentally, the participants and the researcher were colleagues at AUW, who were attending their training and post-graduation programmes at UWC. To avoid bias, or undue influence on the participants' responses, independent physiotherapy staff from UWC, who had experience in FGD data collection and CBR, were requested to conduct the FGD. The FGD was conducted on 15 August 2016, at physiotherapy department main meeting room at UWC, and was attended by six (6) participants.

5.3.2.2. In-depth interview

The views and perceptions of a CBR expert were collected through an in-depth interview. The participant was included to provide information that addresses the study's second objective, which was to identify new components of CBR that needed to be included in the physiotherapy curriculum at AUW. The idea was to explore the perspectives of different communities, such as Tanzania, which is also located in Africa. The participant gained experience while supervising physiotherapy students in Tanzania. The focus of the interview was on CBR services and PwDs.

An interview schedule to guide the interviews was formulated by the researcher, based on literature, the research objectives, the research question to provide direction for the interview (Appendix 4). The CBR matrix was used to keep the interviewer and participant aligned to the CBR components in physiotherapy

education (WHO, 2010). Consequently, the interviewer explored the participant's experience on how the CBR matrix was applied in his community, and thereafter shifted to the main challenges in applying the CBR matrix, as well as physiotherapy services in the community. Finally, the interviewer explored the participant's views on how physiotherapy education could assist rehabilitation services in the community.

The in-depth interview was conducted, by the researcher, with the participant, a CBR expert from the Comprehensive Community Based Rehabilitation in Tanzania **(**CCBRT**),** on 15 November 2015, at the participant's office in the physiotherapy department of UWC. The participant was involved in a one year exchange programme between UWC and CCBRT. The participant was informed about the study objectives via email and asked to participate in the study. The participant was provided with an information sheet (Appendix x) with an invitation to participate in the study. As with the FGD, the participant was also informed about his right to withdraw at any time, as well as the right to confidentiality. Permission to audio-tape record the interview was requested as well. The participant also assured that any undesirable details could be deleted, if necessary, when the transcripts were made available, at various stages, during the research process. However, the participant did not lodge such a request. The in-depth interview lasted approximately 45 minutes, was conducted in the English language, and audio-tape recorded.

5.3.3. Data analysis

For both the FGD and in-depth interview, the analysis of the data started with the verbatim transcription of the audio-taped records by the researcher. Member checking was employed, and the transcripts were made available to each participants, for them to ensure that the recorded information was accurate in their opinion, and to minimize the possibility of any misunderstandings (Malterud, 2012). The above-mentioned applied for the in-depth interview, as well. The participants were contacted by the researcher one week after the interview and FGD, and none of the participants requested any changes, or deletions. The researcher listened to the recorded data, and read the transcriptions, several times over, to be familiar with the data before initiating the data coding.

Systematic Text Condensation (STC) was followed, as explained by Malterud (2012), based on the following four steps:

- **Step one**

  Acquire a total impression of the data by reading the transcriptions and searching for possible themes. In this current study, the researcher read the transcriptions several times, to become familiar with the data. The themes were generated, based on the experience of the participants with the CBR components in physiotherapy education at AUW, as well as their recommendations, regarding any added items for the CBR components of the physiotherapy curriculum at AUW.

- **Step two**

  Initiate codes from the themes by identifying data elements related to the research question, and arrange them in the form of research units. The research unit is the process of categorizing similar words together. In this current study, the researcher formed the research units with descriptions similar to the text in the transcription. This minimized the text length, without affecting the text meaning.

- **Step three**

  Interpret the codes into meaning, minimizes the codes. In this current study, the researcher categorized the codes, according to similarity in meaning. As with the previous step, the units were categorized again, according to similar meanings, bearing in mind the underlying meaning, concluded from the text, but not included in the text.

- **Step four**

  Synthesize meaning units into description and concepts. In this current study, the final meaning units were elements related to the research question. For example, regarding experience with the CBR components of the physiotherapy education curriculum at AUW, information on the CBR concepts and service delivery in the community were explored, and categorized under one final code. Similarly, with the recommendations of what should be added to the CBR components of the physiotherapy curriculum at AUW, which was the second research question. The proposed items for the components were coded under CBR course design, duration, preparing students, and collaboration with other faculties at AUW.

5.3.4. Trustworthiness

The following strategies were employed to ensure trustworthiness of the data, namely credibility, member checking, dependability and transferability:

- **Credibility:** The participants of this current study were the rich realistic source of information. Collecting data from former AUW physiotherapy students was to link the research findings with the experiences of students in the CBR course. In addition, the participants with CBR expertise were the realistic rich source to link the findings with the second objective of this current study, which was to identify new elements in CBR training components that needed to be included in the physiotherapy curriculum at AUW. The participants of this current study could provide suggestions from their experiences, in order to identify the additional elements that needed to be included in the CBR components of the physiotherapy curriculum at AUW.
- **Member checking:** As mentioned earlier, the transcripts were made available to the participants, to ensure accuracy and minimizes the possibility of misinterpretation. The participants, therefore, had the opportunity to clarify what their intentions were, correct errors, and provide additional information, where necessary. In addition, the interviewers summarised the answers for the participants, before moving on to the next question.
- **Dependability:** In addition to the literature of Malterud (2012), the assistance of the study supervisors was solicited to code the data, in order to ensure dependability. The code re-code method was used, as the data were coded multiple times, by different analyzers, and the results, compared. The various analyzers were the supervisors and a colleague with experience in analyzing data from FGDs.
- **Transferability:** Detailed background information of the participants, the research context, the settings and the procedures are provided in this current study, in order to enable others to repeat a similar study, in a similar setting.

5.3.5. Ethical considerations

The researcher requested approval to conduct this current study from the University of the Western Cape's Senate Research Grant and Study Leave Committee. In addition, the

participants from AUW and CCBRT were temporary UWC Physiotherapy Department staff, at the time of data collection. Consent forms were signed by all the respondents/participants after the study's aim and objectives were explained. Additionally, matters concerning respect, privacy, confidentiality and anonymity were clarified and observed. The participants were informed that the study was anonymous, and would not contain information that could identify them, personally. Therefore, should a report or article emanate from this research project, their identities would be protected to the maximum extent possible. To ensure confidentiality, the participants were assured that the data would be kept in password-protected computer files, to which only the researcher would have access. The participants were also reassured that the data would be destroyed immediately after the submission of the thesis. Finally, the participants were informed that they were free to withdraw from the study, at any time, without prejudice.

5.4. Results

In this section, the researcher presents the results obtained from the analysis of the in-depth interview and the FGD. The emphasis of the FGD was the students' experience of the CBR curriculum of physiotherapy education, while the in-depth interview involved a CBR expert's opinion of the CBR curriculum in physiotherapy education. A range of themes relating these topics were generated. It was not possible to deal with all themes equally, because the information quality was different in weighting, from one topic to another. However, the participants, in some cases, were more interested talking about the physiotherapy profession, rather than CBR components in the curriculum, which was probably due to their awareness of the curriculum content (McMahon *et al.*, 2016). This implied that the students were more focused on their perspectives on the placements, rather than the whole curriculum. Therefore, the researcher concentrated on relating the available information into the study aim. Finally, the data from the in-depth interview with the CBR expert, was compared with the data obtained from the FGD.

5.4.1. Demographic background of participants

The participants in the FGD *(P1 to P6)* were six females, aged between 25-28 years. They had all studied BSc. Physiotherapy at AUW, and were employed in the Physiotherapy Department at AUW, at the time of the data collection. One of the

participants had completed the MSc. degree in Public Health. The participant for the in-depth interview was a CBR expert, with a Diploma in Physiotherapy and 15 years' experience in the CBR field. The results obtained from the analysis of the focus group discussion and the in-depth interview are presented in Table 5.1, under various themes, sub-themes and categories.

Table 5.1: Themes, sub-themes and categories

Main Themes	Sub-Themes	Categories
1. Experience regarding the CBR components of the physiotherapy curriculum.	1.1. Community services.	1.1.1. Collaboration between communities and service providers. 1.1.2. Dealing with assistive devices. 1.1.3. Community participation for PwDs. 1.1.4. Rehabilitation concepts in the community.
	1.2. CBR in the physiotherapy curriculum.	1.2.1. Limited focus on CBR in the curriculum. 1.2.2. Learning opportunities in the community.
2. New components of CBR training that need to be included in the physiotherapy curriculum.	2.1. Teaching and learning activities. 2.2. CBR components. 2.3. Collaboration with other faculties at AUW. 2.4. Communication skills.	

5.4.2. Main theme 1: Experience regarding the CBR components of the physiotherapy curriculum.

The following sub-themes and categories emerged from the main theme of experience regarding the CBR components in the physiotherapy curriculum.

5.4.2.1. Sub-theme 1.1: Community services

The participants believed that the CBR course of the physiotherapy curriculum at AUW revealed the students' knowledge about community services for PwDs, which are discussed under the following categories:

- **Category 1.1.1. Collaboration between communities and services providers.**

  The majority of the participants agreed that the course helped them to understand how collaboration is important in the rehabilitation process of PwDs. This collaboration involves service providers and community

members, and is good experience to prepare students for future work in the community. The following extracts refer:

> *"I think it is great because the community is involved as well, not only physiotherapist in the collaboration, but the community as well. That is why it is good."* ***P5***

> *"I think also it is good because it integrates the students in the community so, like preparing the students to work with community, so it useful as general."* ***P4***

The data collected from the in-depth interview with the CBR expert, revealed how being in the community changed the participant's perception of CBR, as well as how it motivated and encouraged the participant to work in the community, after graduation. The following extracts refer:

> *"To see what is really happening in the community and by doing so am sure it is going to change their way of thinking about CBR and it going also to improve the quality of life of people with disability."* ***CBR expert***

> *I found myself very interested to work in the community and I felt it's my people and there is nobody who will come outside of Kilimanjaro to work with my people I decide to work with community and I wish to keep on serving my community and myself am happy and been satisfied"* ***CBR expert***

- **Category 1.1.2. Dealing with assistive devices.**

The participants agreed that, when students are placed in communities, they are able identify barriers in the community, regarding assistive devices, as well as how to deal with these barriers. The following excerpts refer:

"I think the students will be able to identify the barriers in the environment that PwD are suffering from. In addition, maybe they have a look to the assistive devises if it fitted properly and if it stored in a proper place" ***P6***

"So you have identified that if the CBR program or your experience going out to the community you have identified a short of accessibility within the environment when it is difficult for the patient to use the assistive devices." ***P6***

In the in-depth interview with the CBR expert, the findings revealed the importance of students understanding the whole CBR concept, including environmental limitations related to assistive devices in the community. The following extract refers:

"The wheelchair users don't have a proper buses or taxis to take them with their wheelchairs." ***CBR expert***

- **Category 1.1.3: Community participation for PwDs**

The majority of the participants agreed that the course helped them to understand how important social inclusion is for PwDs and their families. Social inclusion is a way of addressing the need of PwDs, by facilitating their participation in community activities, as per the following excerpts:

"It is also focusing on disabled people and their families and we look also about their need and their participation in the community." ***P2***

"Some of cases or families they don't like to participate or they don't believe that they can participate in these case I think we can prepare them on how to deal with." ***P2***

In the in-depth interview, the CBR expert agreed with the use of CBR in the community to help PwDs to participate in their community.

"Some schools are not accessible so teachers going to have difficulties on how this child is going to access the toilet or classroom so we give them some technical ideas either to have a look around toilets, chairs something like that" ***CBR expert***

- **Category 1.1.4: Rehabilitation concepts in the community**

The majority of the participants agreed that the perception of rehabilitation concepts in the community is still unclear, because it is linked to the hospital. Therefore, the need for ways to increase awareness in the community is immense, as well as the proper application thereof, as per the following extracts:

"The rehabilitation not developed very well like understanding the whole concept of rehabilitation for PwD not only in hospitals and it is not well understood which a very important challenge that we having." ***P1***

"As P1 Said I think the main problem is a lack of awareness for CBR among the community." ***P2***

In the in-depth interview, the CBR expert supported the need to understand the whole concept of rehabilitation in CBR. In addition, NGO's could help with increasing the awareness of CBR in the community. The following excerpts refer:

"According to my understanding, CBR components is to make sure that a person with disability have a holistic approach I mean is not only to look to the part of his or her disability but also is to look to the large context like the environment surrounding him or her, the community, the all facilities and all kind of things." ***CBR expert***

"*We are a bit far ahead because people they know their rights I mean people with disabilities and we have also a nongovernmental organizations which working in the community*

so those kind of organizations they are helping a lot raise awareness." ***CBR expert***

5.4.2.2. Sub-theme 1.2: CBR in the physiotherapy curriculum

The participants were of the opinion that the CBR course of the physiotherapy curriculum at AUW enabled them to identify facts related to the curriculum, which comprised some limitations and suggestions, discussed under the following sub-headings.

- **Category 1.2.1: Limited focus on CBR in the curriculum**

  The participants expressed that the current CBR training in physiotherapy education, was only concerned with pediatrics, and not included in any of the other modules. Therefore, the participants identified the need of integrating CBR into each module of the physiotherapy curriculum. The following extracts refer:

  "I like the idea of P6 but am thinking of the situation of Sudan and AUW for example if we divided the CBR according to the subjects so you have to search about certain incentives for those who applying CBR for example, orthopedic, neurology, and those things and in Sudan nowadays it just for pediatrics. So my idea is on focusing for CBR as a complete course and mainly for children." ***P4***

  "…do agree that it needs to be integrated in each module but within the placement for example, neurology placement add a CBR, Pediatric placement add a CBR as a placement but as a course it needs to be just a separated one." ***P5***

  "*I think we must integrate the CBR to all subjects. If it is pediatric subject, if it is orthopedic subject, because every subject needs."* ***P6***

  The findings of the in-depth interview with the CBR expert, concurred that the main concern was for children with disability in the community, while

service providers were dealing with all PwDs in the community. The following extract refers:

> *"We are working with people with disability but we are concentrating very much on pediatric and we are working with children"* ***CBR expert***

- **Category 1.2.2: Learning opportunities in the community**

The participants agreed that working in the community was an important learning opportunity for the students. Therefore, sending students into the community sooner would be beneficial to them, as well as the PwDs. In addition, visiting more than one community, would enable students to obtain more knowledge. The following excerpts refer:

> *"…think the most important part for me is to engage undergraduate students into community as early as possible because it is more about understanding how to treat disability within the community."* ***P1***

> *"By teaching them it as a wide module and make with them some visit for other communities and not only one community."* ***P3***

The CBR expert, in the in-depth interview, concurred that sending students into the community would help to broaden their knowledge and views. The students assume that CBR training in the community is mainly related to a hospital, as the following quotation clarifies:

> *"They don't have a very clear view about what CBR is so when they come they think it is probably something like a hospital.* ***CBR expert***

In addition, it could reinforce the relationship between the student and the community. Therefore, some students prefer to join the community in their community programmes, as per the following quotation:

"Students used to come to the field during their internship or during their community programme they come to the field to work and to experience the situation." ***CBR expert***

The participants also observed that there was a limitation on the physiotherapy services offered in the CBR programmes, which is probably due to the shortage of physiotherapists in the country. The following quotations refer:

"And also not a lot of centres that apply CBR just starting by certain organizations in Sudan do the CBR." ***P4***

"According to what P1 said I think that is due to the fact that physiotherapy profession just likes new profession in Sudan. It started recently and that many universities establishes physiotherapy education so we still little far to reach that CBR in the community." ***P6***

In the in-depth interview, the CBR expert agreed on the shortage of physiotherapists in the community/country, citing the reason as budget limitations, as expressed in the following direct quotation:

"Last year they come like three physiotherapists to ask a job but we didn't have funds to take all of them so we manage to take only one." ***CBR expert***

5.4.3. Main theme 2: New components of CBR training that need to be included in the physiotherapy curriculum

Various themes/sub-themes emerged from the participants' experience, regarding new components of CBR training that needed to be included in the physiotherapy curriculum. These components were related to teaching and learning activities, course duration, collaboration with other faculties at AUW, and preparing students for the community.

5.4.3.1. Sub-theme 2.1: Teaching and learning activities

The participants agreed that the use of different teaching techniques was useful in the CBR course. In addition, they agreed on the importance of group work,

articulating how group work could be organized in different ways. The following direct quotations refer:

> *"…think presentations and group discussions will be most effective ones and if the students are placed into groups and give one topic and each group share and them they share with all of the class we may find new ideas and new ways."* ***P5***

> *"If I can explain it, if we just went to the community in a group of physiotherapists."* ***P2***

> *"As you said it is good idea for example, like Google drive to share information and brainstorm. I think so."* ***P2***

The participants also expressed how case study presentations enabled students to discuss what they had observed in the community, as evidenced in the following extracts:

> *"Case studies, workshops, placement take the student to placement, seminars to present certain topics related to disability."* ***P4***

> *"Like having case studies presentation and those things after sending the students to the community."* ***P1***

In the in-depth interview, the CBR expert agreed on the importance of case study presentations, especially during the student placements, as a way of sharing their experiences, as per the following quotation:

> *"They should have a presentation of one case so that they can share with us the management and the findings and the challenges."* ***CBR expert***

The participants suggested that *reflection* be added to the course curriculum, as it helps students to identify challenges, as well as facilitators in the CBR course. In addition, the meaning of reflection needed to be clarified for students. The following quotations refer:

"Student needs to have reflection about the challenges and facilitators and whatever." ***P6***

"For reflection I think it will be better if it will be guided because some of the students miss the point they need to focus on so if there are like a format for the reflection it will be better." ***P5***

Sharing experience and knowledge with different communities, inside and outside the country, was also suggested by the participants, as follows:

"I want to suggest that if it is possible we can bring professionals from outside Sudan so we can exchange experiences." ***P1***

"Finally, just want to say if that we invite during the lectures the CBR different discipline to give ideas about the community so we can invite person in the community to give the students theoretical things about the community and how to deal with the people in the community. I think it's better." ***P4***

In the in-depth interview, the CBR expert provided one example, in which someone from the community, was employed in physiotherapy education, as per the following quotation:

"I mean before they come to the placement the school of physiotherapy they ask us to have a lecture with them about CBR and from there we can arrange the logistic things on how to come and work for us." ***CBR expert***

5.4.3.2. Sub-theme 2.2: CBR components

The participants identified the need to develop the CBR course, based on the CBR matrix, due to the importance of the CBR components, included in the CBR matrix. The following extracts refer:

"Another thing just I need to add which is very important that we can develop CBR on it is the CBR matrix. We can focus on CBR matrix because it covers different components." ***P4***

"We must also introduce them to deferent guidelines of CBR like CBR matrix and the different policies as they speaking to the community so we make our students to be aware of all those facts." ***P6***

The CBR expert confirmed that the components of CBR are important in the physiotherapy curriculum. In the in-depth interview, the CBR expert added that the CBR components should be comprehensive, so that professional CBR services could be offered in the community, as per the following direct quotations.

"I think what I can add in term of physiotherapy schools in general is to talk seriously about those components of CBR and if possible to be included into the school curriculum so it can be taught deeply." ***CBR expert***

"We are dealing with component of education, livelihood activities, social, and empowerment." ***CBR expert***

"We are working much with health component and empowerment but for education, for social we are working with other semi providers to make sure those components are fulfilled." ***CBR expert***

5.4.3.3. Sub-theme 2.3: Collaboration with other faculties at AUW

Some comments were expressed regarding the collaboration of the CBR course with other faculties and departments at AUW. Some participants expressed the need for collaboration with the psychology, public health, and nutrition departments, as they were included in the rehabilitation team. The following extracts refer:

"I think the psychology department is so important in CBR module because it helps to understand the situation of the PwD in the community and the way of communication and all those things in the psychology." ***P5***

"Like nutrition's, public health because they are dealing with the policies and those things and dietitian." ***P4***

In addition, the participants highlighted that the course should integrate an IPE component, as the students should be exposed to working together in the community, as per the following direct quotations:

> *"I think the course can't be able to include all these sections but outside it might be supplied with multidisciplinary team from psychologist and everyone."* ***P2***

> *"Physiotherapists, nurse, doctors, maybe it a team of a multidisciplinary approach that is needs to be included in the CBR."* ***P1***

In the in-depth interview, the CBR expert highlighted the need of IPE for the physiotherapist in the future. The following extracts refer:

> *"For the health, we have rehabilitation and we talk about rehabilitation its means that we offer occupational therapy, physiotherapy, speech and language pathology, and also we are working with our referral hospital."* ***CBR expert***

> *"We are networking with other social people because we have for example local groups who are dealing with social activities so sometimes we ask them because we don't have some of those skills so we ask them to have some."* ***CBR expert***

5.4.3.4. Sub-theme 2.4: Communication skills

The participants agreed on the need of communication skills to be integrated in the CBR course in the physiotherapy curriculum at AUW. The following extracts refer:

> *"Also very important thing missing in our curriculum of CBR we just can add the communication skills."* ***P4***

> "So we can add in the content some like communication skills and how we do communicate with the community*."* ***P5***

In the in-depth interview, the CBR expert provided various examples of how communication could be used, in collaboration with, or networking with, other stakeholders in CBR, to achieve a CBR matrix.

> *"We are networking with other social people because we have, for example, local groups who are dealing with social activities, so sometimes we ask them, because we don't have some of that skills."* ***CBR expert***

> *"For empowerment we are also networking with other people for example we are close networking with HAIFA international."* ***CBR expert***

5.5. Discussion

To date, the evaluation of the CBR course in the physiotherapy education curriculum at AUW has not been a major concern, because, at national and international level, the focus has been on other topics, such as pain, electrotherapy, geriatrics, and pediatrics (O'Donoghue *et al.*, 2011). However, it is necessary to explore the perceptions of physiotherapists, regarding CBR, in order to improve physiotherapy rehabilitation to PwDs in the community (Rajan, 2016). In this current study, the researcher indicated that the experience of former students of the physiotherapy department at AUW could help to provide information regarding CBR in the community, as well as CBR education in the Physiotherapy Department at AUW. In addition, it could assist in determining whether any other elements needed to be added to the CBR components in physiotherapy education at AUW (Darlow *et al.*, 2016; McMahon *et al.*, 2016). The researcher's aim, in soliciting the experience of previous students, was the improvement of the CBR curriculum in physiotherapy education at AUW, and the students' feedback on the curriculum was imperative, as they constitute the most important group in the educational enterprise (O'Donoghue *et al.*, 2011). The researcher also utilized the experience of a CBR expert, to corroborate what other elements needed to be added to the CBR components in physiotherapy education at AUW.

5.5.1. Experience of the CBR components in the physiotherapy curriculum

In this current study, placing students in the community, as well as the social inclusion of PwDs in the community, were the major advantages of the CBR components in

physiotherapy education. Regarding the challenges of the CBR components in the physiotherapy curriculum at AUW, the study findings revealed difficulties with the rehabilitation concepts and the CBR service providers.

5.5.1.1. Placing students in the community

In education, the students need an approach that encourages them to explore real problems in life. This is referred to as Authentic Learning, which is an approach, based on the construction of links between the significance of real life situations and the students' experience (Wright *et al.,* 2018). In this situation, the teacher is the guide in establishing such links. The teacher connects what students have been taught in school, to the experience they should embrace in their community. In addition, this aligns with the Theory of Authentic Learning, which suggests that students should be allowed to make their own discoveries, and acquire the ability to translate their theoretical knowledge into practice (Rule, 2010). The theory capitalizes on contextualizing students' acquired knowledge, or skills, in the real world settings; hence, the importance of community placement.

In addition, the findings of this study revealed that the experience gained by AUW physiotherapy students, from working with PwDs in the community, were much to their advantage. For example, students were able to understand how a CBR matrix is multi-dimensional, by understanding that the environment could be a challenge to PWDs, using assistive devices. Another example was that students could observe referral challenges, in their experience of a CBR placement, as they had to work with other professionals, to facilitate the proper referral, according to the patient needs in the community. This concurs with a recommendation by WHO (2010), regarding the need to address the lethargy of the health system to improve the referral system, through CBR programmes. In line with the Theory of Authentic Learning, community-based placements are not only important for the patients, but also for the students, as it contributes to their prospects of acquiring skills to identify and address real world problems, which may not, necessarily, be taught in schools.

The findings of this current study also highlighted the importance of improving communication between health professionals and their patients. This requires improved communication skills from both, the patients and health professionals. Regarding the CBR course content in physiotherapy education at AUW, information about PHC was one of the main contents of the CBR course; however, the lack of communication skills could prevent the rehabilitation team from achieving its goals. In this current study, the importance of good communication skills was observed to be present in most of the important components of the CBR course; therefore, it is deemed necessary in the physiotherapy curriculum. For example, networking and collaboration is important in the CBR components; however, it requires good communication skills.

A study conducted by McMahon *et al.* (2016), on evaluating the students' perspectives of PHC in their curriculum, revealed that they lacked communication skills, which affected their ability to educate, motivate patients, and collaborate with the health team.

5.5.1.2. Social inclusion of PwDs

Social inclusion is defined as improving the condition of disadvantaged people, to enable them to participate in the community (Davey & Gordon, 2017). Social participation of disadvantaged people in various communities could be challenging for various reasons, as PwDs are prone to a series of disadvantages that are linked to their disability, including, the lack of proper assistive devices, as well as mobility restrictions, for environmental and socio-economic reasons. Physiotherapists, working with PwDs in the community, could contribute to improving their social inclusion, as demonstrated by the students and staff in the Physiotherapy Department at AUW. They stressed the importance of social inclusion of PwDs in the community, and therefore, it is one of the learning outcomes of CBR in physiotherapy education. Physiotherapy students are prepared and equipped with skills and strategies to include PwDs, as well as their families in the community. The CBR course in the physiotherapy curriculum at AUW includes topics such as, the importance of the involvement and participation of PwDs and their families, as well as how to achieve it. In addition, topics on the CBR matrix, and how the

components of CBR are connected, to decrease restrictive barriers for PwDs in their community, are covered. This is relevant, in order to reduce the gap between CBR physiotherapy education and practice. For example, the findings of a study, conducted in West India, revealed that there was a gap between CBR physiotherapy education and practice (Rajan, 2012). While there are PWDs in the community, who would benefit from physiotherapy services, most physiotherapists had less interest in, or seemed to be ignorant of, community-based physiotherapy (Rajan, 2012).

5.5.1.3. Concepts of rehabilitation

Regarding the concepts of rehabilitation, the findings of this current study revealed that the rehabilitation concepts were still unclear to community members and students, who assumed that rehabilitation was linked to hospitals only. The curriculum needs to include components of rehabilitation concepts at the community level, so that students could acquire these skills, and use them to educate the community and patients. Their knowledge and skills could also be used to develop and evaluate measures that may assist the PwDs participation in the community.

For the CBR course in physiotherapy education at AUW, equipping students with strategies for rehabilitation, was one of the learning outcomes, as shown in Chapter 3 of this thesis. This intended outcome should be more focused at the community level. However, the findings revealed transportation as one of the main challenges faced by PwDs, and also highlighted the manner in which it affected PwDs' rehabilitation. Rehabilitation concepts go beyond the physical barriers, and extend to environmental issues, such as, how to make transport accessible for PwDs in their community.

5.5.1.4. Community training capacity and physiotherapy curriculum

Regarding the training students in the community, the findings revealed that CBR services in Sudan are mainly provided by NGOs, and there is a shortage of physiotherapists working in the community. This could impact the learning outcomes of CBR in the physiotherapy curriculum at AUW, directly, as, due to lack of CBR physiotherapists, students would not have enough placement

opportunities in the community. Consequently, the outcomes of placements, could be limited, due to the limitation of placements. This is similar to a study conducted by Rajan (2012), who observed that NGOs were more involved in CBR work, because of the shortage of physiotherapists in community physiotherapy. On the other hand, by approaching certain communities and gaining their confidence, NGOs helped to promote preventive, curative physiotherapy rehabilitation strategies. At AUW, even though there are limited placement opportunities, with the help of NGOs, the learning outcomes of the curriculum could be achieved.

The same study, conducted by Rajan (2012), the findings revealed that physiotherapists and patients prefer face-to-face treatment in the rehabilitation process. This fact could clarify why the researcher of this current study observed that rehabilitation awareness was linked to hospitals in Sudan. Another possible reason, as stated by MacMahon *et al.* (2016), is the lack of physiotherapy support for both physiotherapists and students in the community, as services are basically offered in hospital settings. Therefore, regarding health providers in Sudan, the initiation of physiotherapy education at certain institutions, including AUW, might be positive step towards training sufficient physiotherapy service providers for the community (Haugland *et al.*, 2014). With more students graduating, the number of physiotherapists in the community will increase. Therefore, the Physiotherapy Department at AUW should continue to utilize the assistance of physiotherapists, employed by NGOs in the community, to train students in CBR. The positive implications of CBR programmes managed by NGOs are observed with appreciation (Thara, 2015).

5.5.2. New components of CBR training that need to be included in the physiotherapy curriculum

In this current study, the students recommended some components that should be included in the CBR training curriculum in physiotherapy at AUW. Those components are connected to course design, course duration, collaboration with other faculties and departments in AUW, and preparing students for community work.

5.5.2.1. Course design

As mentioned previously, at AUW, the CBR course and placements are offered at the fourth year level, which as common in many physiotherapy programmes, worldwide (Mpofu & Imalingat, 2006). However, the findings of this current study suggest the early involvement, or placement, of students in the community. This is similar to the findings of a study conducted by MacMahon *et al.* (2016), which suggested that it is too late to offer the subject and placements in the final year, when students are completing their studies. On the other hand, Karthikeyan and Ramalingam (2014) cite the reason for not placing students in the community, in the early years of study, as the need for students to concentrate on the basic medical science and physiotherapy subjects in the early years, to be able to identify the physiotherapy needs of PwDs, and subsequently, apply this knowledge in CBR later, in the final years. The opinion of Karthikeyan and Ramalingam (2014) is not necessary applicable in all conditions, and depends on what the students are requested to do in the community. For example, if students are required to observe on their visits to the community, they could return with several questions. Therefore, they may start to think about finding answers, using all the possible tools as learning activities. Observation was used as an example, which does not imply that this is the only activity for students. Students could perform various tasks in the community, designed and supervised by their programme. However, early community visits could prepare students for what they will learn later in the course, as mentioned earlier.

The participants in this current study also recommended the use of different teaching and learning techniques in CBR, including internet learning, group discussions, workshops, and seminars. This is similar to the findings of a study conducted by MacMahon *et al.* (2016), which suggested using multiple teaching and learning techniques, in order to improve the students' ability to communicate with their colleagues, and develop their Evidence Based Practice (EBP), as well as Problem-Solving Skills. This would provide them with additional opportunities, to present their work in public, and receive formative feedback, to increase their learning and confidence (Wright *et al.*, 2018: MacMahon *et al.*, 2016). These could be achieved, when the students seek knowledge individually, using the available

resources and references. Internet learning facilitates the searching process and allows students to access current resources (Olsen *et al.*, 2014). Educators could play an important role, by encouraging students to use various learning activities in the CBR course in physiotherapy education at AUW. Students' attitudes towards various learning activities have been researched in numerous studies, and determined to be effective in the improvement of knowledge and skills, as applied in the clinical settings (MacMahon *et al.*, 2016: Olsen *et al.*, 2014).

As mentioned previously, the findings of this current study revealed a need for early community visits, which could be included during the theoretical part of the course. This would strengthen community-based learning during the theoretical part of the course, while students gain the opportunity to experience life in the community. Various literature expound the benefits of early community visits, to prepare students for CBE (MacMahon *et al.*, 2016). Early community visits could be an excellent introduction for students to view the community structure, which could clarify the topics taught in lectures (MacMahon *et al.*, 2016). Students involved in a study, conducted by MacMahon *et al.* (2016) in Ireland, stated that community visits before the placements, would prepare them for what they would see and do in the community, at a later stage. In a study conducted in New Zealand by Darlow *et al.* (2016), student groups of three visited PwDs living in the community, and later in the class, the students delivered reflective presentations on their visits, discussing with their classmates and educators how PwDs' well-being would be improved by physiotherapy rehabilitation and CBR services. At AUW, early community visits could be planned prior to the placements, which requires good alignment between the learning opportunities available in the community, and the learning outcomes, as recommended for physiotherapy community education (Ernstzen, Statham & Hanekom, 2014). In addition, early community visits could encourage students to consider the importance of integration with the community, as well as how to support PwDs in the community. This is clearly identified as a learning objective in the CBR course in the physiotherapy curriculum at AUW. Consequently, students will be able to fulfil their role as physiotherapists, to enhance the functional ability of PWDs, and appreciate the concepts of CBR to improve PWDs' quality of life, as well as meet their basic needs to participate in

the community. This is a learning outcome of the CBR course in the physiotherapy curriculum at AUW.

This study also revealed that the meaning of *reflection* is not clear in the physiotherapy curriculum at AUW. Reflection represents the highest skill level in the SOLO taxonomy, mentioned in Chapter 3 of this current study, facilitates learning and critical thinking, and is recommended for use in physiotherapy education (Dalley-Hewer & Parkes, 2015). The lack of knowledge about how to reflect, influences physiotherapy students' ability to reflect on their placements. Therefore, in this current study, the meaning of reflection needed to be clarified to the students, prior to their placements. This concurs with the findings of the study of Dalley-Hewer and Parkes (2015) that recommended appropriate training for academic staff and clinical supervisors, to facilitate reflection. The aim of the exercise was to enable them to transfer the reflection objectives to the students, in return. Clarifying the meaning of reflection to staff in the physiotherapy curriculum at AUW is necessary, to facilitate the students' understanding of reflection.

5.5.2.2. Course duration

Various studies highlight the importance of early visits to the community for students, prior to their placements; however, no studies investigate the time and duration of the visits (Darlow *et al.*, 2016; MacMahon *et al.*, 2016; Tsakitzidis *et al.*, 2015; Ernstzen *et al.*, 2014). This findings of this current study revealed that the duration of community visits should be investigated further, as the participants complained about the short and late placement times in the CBR course of physiotherapy education at AUW. In addition, the findings revealed that the length of the CBR course of physiotherapy education at AUW was inadequate, and recommended that it be extended. This finding concurs with those of various studies, which recommended an extension of placements in physiotherapy education, in order to strengthen CBE (Tsakitzidis *et al.*, 2015; Ernstzen *et al.*, 2014).

However, placement challenges at AUW, as mentioned in a study conducted by Haugland *et al.* (2014), were due to difficulties regarding long term contracts with

institutions, or clinical educators, as well as the availability of clinical educators, and the capacity of institutions. Recently, the circumstances have improved, due to two reasons. Firstly, the students who graduated from the physiotherapy department at AUW, have been trained to work as clinical educators at AUW, in PHCs, and NGOs. Secondly, long term contracts have already helped to improve the clinical educators' experience, regarding the physiotherapy curriculum and learning outcomes. According to the researcher's employment experience at AUW, clinical educators usually entered into yearly contracts with AUW.

The findings of this current study further suggested increasing the length of the theory component of the curriculum in two ways, namely, extending the course over more than one semester, or increasing the number of lectures per week. Additional research would be useful, to realistically assess the optimal duration of the CBR course at AUW.

5.5.2.3. Collaboration with other staff and departments

Collaboration was one of the intended learning outcomes of the CBR module in the physiotherapy education at AUW, as highlighted in Chapter 3 of this current study. Regarding collaboration with other faculties and departments at AUW, the findings of this current study established that there are positive underpinnings for collaboration with other faculties that train students, who are involved in the rehabilitation team. Faculties such as psychology, medicine, public health, nutrition, and dietetics offer programmes at AUW; therefore, the idea of applying inter-professional education (IPE) could be possible.

In a study conducted by Darlow *et al.* (2016), students from physiotherapy, radiation therapy, medicine, and dietetics had the opportunity of being taught together in one class, which demonstrated effective learning with, and from, each other. The findings of that study revealed the long term professional benefits of working in rehabilitation teams in community settings, and developing communication skills between different health professionals. At AUW, currently, programmes such as nursing, occupational therapy, and sociology are not developed; however, the CBR programme could still be planned in conjunction

with the available programmes (Darlow *et al.*, 2016). In the future, the AUW will initiate plans for nursing, occupational therapy, and sociology educational programmes. However, establishing IPE requires agreement and coordination among AUW administrators, staff, faculty, and students, and support from the AUW leadership could strengthen this coordination. Faculty deans, board members, and officers could facilitate issues, such as resources allocation, budget, as well as to gain recognition. Experience of other faculties, not related to health, could be used to strengthen the coordination policy, as all professions, however, require coordination skills in the community (WHO, 2011).

The IPE design could involve efforts from various professionals, using one framework to design their curriculum, such as the Curriculum Alignment Framework (Biggs, 2003). Capacity building needed to be enabled, to organize proper logistics needs, and train the faculty staff. Physiotherapy programme at AUW already uses international collaboration experience, as mentioned in Chapter 3, which could enhance the potential success of IPE.

Several community services, offered by the government in Sudan, namely, houses for the elderly, and children born out of wedlock, could be used by physiotherapy students at AUW, as resources for learning. These institutions could help to strengthen the AUW community resources, in addition to hospitals, as well as other practice environments. Therefore, physiotherapy students could benefit, by gaining knowledge about which CBR services are required, and offered, at such establishments.

5.5.2.4. Information and Communication Technology (ICT)

The use of ICT revealed significant advantages in higher education that could be employed in physiotherapy training, at national and international level (Vissers *et al.*, 2018). Therefore, investigating curricula was functional, to determine whether IPE could be used among the various institutions, at national and international levels. Additionally, AUW could initiate discussions about IPE, in order to develop the competencies for inter-professional team work, as well as provide an ideal way

of responding to PwD needs in the Sudanese community, as recommended by WHO (WHO, 2010; 2013).

However, literature highlights several challenges regarding the application of IPE in health education, for example, time and space to run IPE (Pelham *et al.*, 2016). The Physiotherapy Department at AUW planned on-going discussions with partners in the community, as well as other faculties at AUW, to evaluate the teaching and supervision processes. In addition, the Physiotherapy Department and its partners could attempt to reach consensus on the time and space suitable for IPE. Another challenge, mentioned in literature, was community acceptance, which was not related to IPE education in physiotherapy education at AUW, only, but also the use of the community as a learning source. The Physiotherapy Department at AUW already utilised the community as a learning source in the CBR components; therefore, facilitating community access was already being monitored in the department's strategy.

In addition, regarding collaboration with other AUW faculties, the Physiotherapy Department at AUW had experience at national and international levels. The findings of this current study recommended that the Physiotherapy Department continue to use collaboration with various expertise worldwide, to teach and train physiotherapy students in CBR. Vissers *et al,* (2018) concurs that a physiotherapy educational programme should use the knowledge and experience of international colleagues, as cross-country and/or cross-continent collaborations could help with knowledge dissemination, as well as the faster adoption and implementation of effective community physiotherapy models (Rajan, 2016).

The Physiotherapy Department at AUW had cross-country experience, as the programme was established by academic and clinical educators from Norway (Haugland *et al.,* 2014). The collaboration programme with Bergen University College in Norway, included staff exchange, and was developed in 2007. Subsequently, the programme expanded to include UWC in South Africa, and CCBRT in Tanzania. Collaborating with experts from African communities in the Physiotherapy Department at AUW, is aligned to the findings of a study conducted by Haugland *et al.* (2014), which recommended that, in collaboration, it was ideal

to include a university in Africa, with an internationally recognized entry-level (bachelor) physiotherapy education programme, in order to narrow the gap between the two African communities.

5.5.2.5. Preparing students for community work

In this current study, the need of communication skills emerged again to prepare students for community work. Communication skills, as mentioned by MacMahon *et al.* (2016) and Ernstzen *et al.* (2014), prepare students to educate and motivate patients, when they engage in community work, as well as with community and health team members, as mentioned previously.

The findings of this current study also suggested inviting individuals from the community to educate physiotherapy students at AUW about CBR. Therefore, aligned with the CBE definition, the CBR curriculum in physiotherapy education at AUW supports active engagement with community members, in the form of sharing experience and knowledge. For example, experts from the community, namely, field workers, CBR workers, or PwDs from a particular community, could share their CBR experience with physiotherapy students. The community is an excellent source of learning about CBR for physiotherapy students at AUW; therefore, this source is used as a learning activity in the CBR curriculum at AUW, which is supported by literature. According to Arantes *et al.* (2018), involving community partners in CBE, improved the students' knowledge of CBR. This is because of the rich learning experience that the students are exposed to, when community experience is delivered in the classroom. Therefore, the experience of community partners could assist, when the lecture process fails to achieve the intended outcomes of the physiotherapy curriculum. Although, community members might lack teaching experience, this could be managed through the guidance of education experts and coordinators in physiotherapy education at AUW. However, the value thereof will depend on how it is organized and planned.

The Physiotherapy Department at AUW, therefore, has initiated a search for how, when, and by whom this could be implemented. In addition, it is developing a guide for community-engaged teaching in the class, integrating academic content with

community engagement, to improve the learning experience of students, especially in their placement settings. The CBR content in the physiotherapy curriculum at AUW comprises activities in the class that involve people from the community. Consequently, the Physiotherapy Department has initiated a search, with the community partners, on how this should be implemented, by whom, and when.

5.6. Conclusion

The rehabilitation concept is still unclear for both students and the community; therefore, it is one of the challenges facing the CBR components in physiotherapy education at AUW. Therefore, various aspects need to be considered in the CBR components of physiotherapy education at AUW. This current study explored those aspects, as well as how they should be applied, namely, using different teaching and learning activities; for example, how IPE could be organized in CBR education at AUW, using collaboration between the health education departments at AUW. The main concern was to include CBR components in the physiotherapy curriculum at AUW. The findings revealed that early CBR placements for students are useful in physiotherapy education, as it enables students to appreciate how CBR could assist PwDs. However, the shortage of health services providers is challenging to CBR and CBE in the Sudanese community, and needs to be addressed. Therefore, using NGOs could help to minimize the shortage of services providers in the Sudanese community, and collaboration with other faculties at AUW could enhance the current IPE.

5.7. Summary of the chapter

In this current study, the researcher aimed to explore and review the current CBR components in the physiotherapy curriculum at AUW, to determine which components, or elements thereof, should be added, from the perspectives of the respondents'/participants' experience. The findings of this current study revealed several advantages in the CBR course in physiotherapy education at AUW, as the course enabled students to be present, as well as experience what was transpiring, in the community, to prepare them for working as a health professionals in the rehabilitation process, in that community. In addition, the course facilitated the students' understanding of the concepts of CBR and rehabilitation, as well as the importance of social inclusion for PwDs in their community. In addition, the course enabled students to understand the challenges in their community, such as applying the rehabilitation concepts. Therefore, new components, or elements thereof, were recommended to be added to the CBR course in

physiotherapy education at AUW, regarding course duration and design, in order to prepare students for community work. The findings of this current study also revealed that collaboration between educational departments at AUW could help in deriving the maximum benefit from CBR in education and the community.

CHAPTER SIX

PHASE 2 – STAGE 2: REVISION AND ADAPTATION OF CBR COMPONENTS OF AUW PHYSIOTHERAPY CURRICULUM

6.1. Introduction

In this chapter of the study, the researcher presents the background to the feedback required from AUW staff on the adapted CBR course in the physiotherapy curriculum at AUW. In the second section of this chapter, the researcher focuses on the study methodology, regarding the study sampling, data collection and analysis procedures, as well as the ethical considerations. The third section includes results of this stage of the current study, followed by a discussion of these results. Finally, a summary of the chapter, which aims to revise and adapt the CBR course components in the physiotherapy curriculum at AUW, is presented.

6.2. Background

Revising modules is important in academia. It provides theoretical guidance to academic staff and curriculum developers, on how to develop, modify, and evaluate a module, or curriculum (Audette *et al.,* 2017). Exploring the knowledge of experienced individuals could help with module revision, as is the case in this current study. In this chapter, the researcher focusses on the revision of the CBR modules in the physiotherapy curriculum at AUW, with the suggested components from the findings of the document analysis, survey, focus group discussion, and in-depth interview.

Literature reveals some suggested basis for educational developers to review modules; for example, Audette *et al.* (2017) used the American Physical Therapy Association (APTA) outcomes assessment process for physical therapy education. Firstly, the assessment process commences by revising the module goal, known as the module, or course, objectives, which is the desired learning outcomes for the students, after studying the module. Secondly, there is a need for an assessment plan, which comprises the tools to be used in the revision of the module. This could include planned meetings, discussions, and workshops. The content of these activities should be planned in detail, so that the implementation would be facilitated and guided. Thirdly, the assessment plan must be implemented, during which the opinions and data

are collected from individuals, who participated in the revision activities. Fourthly, the result of the revision must be analysed, to provide meaning. The individual's agreements and disagreements are analysed. Finally, providing feedback, a conclusion, and recommendations of the module follows, while the suggestions to be added, or changed are clearly identified.

Another revising model is the Plan-Do-Study-Act (PDSA), which is commonly used in business and industry education (Audette *et al.*, 2017). In this model, the initial step is to identify what the developer aims to accomplish in the module or course, which is similar to the course objectives, or the intended learning outcomes that students need to achieve. The next step is ensuring that the changes are needed in the course, for which the experience of individuals is the solution, implying that discussion among educators and curriculum experts could scrutinize the adjustment of the module. Finally, the same individuals plan how to apply the changes, or adapt the modifications to the module. In this current study, the researcher followed this method to add the suggested components into the CBR module of physiotherapy education at AUW. However, the above-mentioned three steps depends on the methodology that is selected to accomplish the steps; therefore, choosing appropriate individuals, and the manner in which they participate, is crucial.

Community Based Rehabilitation (CBR) aims to enable PwD to access all services, as well as participate equally, in their community (WHO, 2011). According to Karthikeyan and Ramalingam (2014), physiotherapists need a higher degree of flexibility, innovative thinking, a wider range of management, community practice, as well as teaching and learning skills, to contribute effectively in CBR. In addition, physiotherapists needs to understand the need of the individual, within the larger population, beyond medical interpretation (Karthikeyan & Ramalingam, 2014). Therefore, it is recommended that the CBR modules to be included in physiotherapy education, and community practice applied in the physiotherapy curriculum (Karthikeyan & Ramalingam, 2014; Van den Bergh, 2011).

The CBR module in the physiotherapy curriculum at AUW should include all the components of CBR, namely, health, education, livelihood, empowerment, and social components. It also referred to as the CBR matrix, with each component offering different services to PwDs in CBR, as illustrated in Figure 1.1. For example, the health component includes rehabilitation services, which includes physiotherapy rehabilitation. The inclusion of CBR in physiotherapy

education would equip physiotherapy students with knowledge and skills on how to use CBR with PwDs. The CBR components are intended to cover PwDs' needs in the community, for them to participate, and enjoy a better quality of life. In addition, it is intended to minimize the limitations of their disability. Additionally, the collaborative nature in community development, guides physiotherapy education to expose students to inter-professional teams and non-health professionals, namely, community leaders and families of PwDs (Magallona & Datangel, 2012). Community Based Education (CBE) has been focused on preparing students to serve the needs of patients in their communities (Kelly *et al.,* 2014; Talaat & Ladhani, 2014).

Physiotherapy curricula in higher education are designed to guide the knowledge and skills that the physiotherapy students learn during their education. Curricula should be designed to achieve the intended learning outcomes for students (Biggs, 2014). Therefore, the physiotherapy programme, offered at the Ahfad University for Women (AUW), includes CBR modules in the curriculum. However, curriculum changes, in response to the health care conditions, have been demanded, to overcome the reported limitations of the physiotherapy curricula. Involving the students in the learning process, would help to continue the evaluation of the physiotherapy curriculum, as the students' reflections could assist the assessments, so that modifications could be recommended (Rust, 2002). Newly graduated physiotherapists could be the appropriate resource, to determine the needed components in the undergraduate physiotherapy curriculum (Moraros, Islam, Yu, Banow & Schindelka, 2015). This is one of the benefits that AUW enjoy, when employing newly graduated students in the physiotherapy department.

The overall objective of this current study is to investigate the CBR components of the physiotherapy curriculum at AUW. The previous chapters of this study have determined the components of CBR in the current physiotherapy curriculum in AUW, and suggested the components that should be included. Subsequently, the study determined the needs of PwDs, regarding rehabilitation services. Therefore, the opinions of experts, staff, and students regarding CBR components in the curriculum of the physiotherapy education at AUW, have been used to provide suggestions to revise and validate the adapted CBR curriculum in physiotherapy education at AUW.

In this chapter, therefore, the researcher presents the findings of the new revised CBR components, namely, health, education, empowerment, livelihood, and social activities in the

CBR matrix, as well as discuss the revision and adaptation of the modules, according to standards such as APTA and PDSA. In Figure 6.1 a summary of Phase 1: stages one and two, as well as Phase 2: stage one of this research study are presented, which illustrates how the CBR components in the physiotherapy curriculum were investigated.

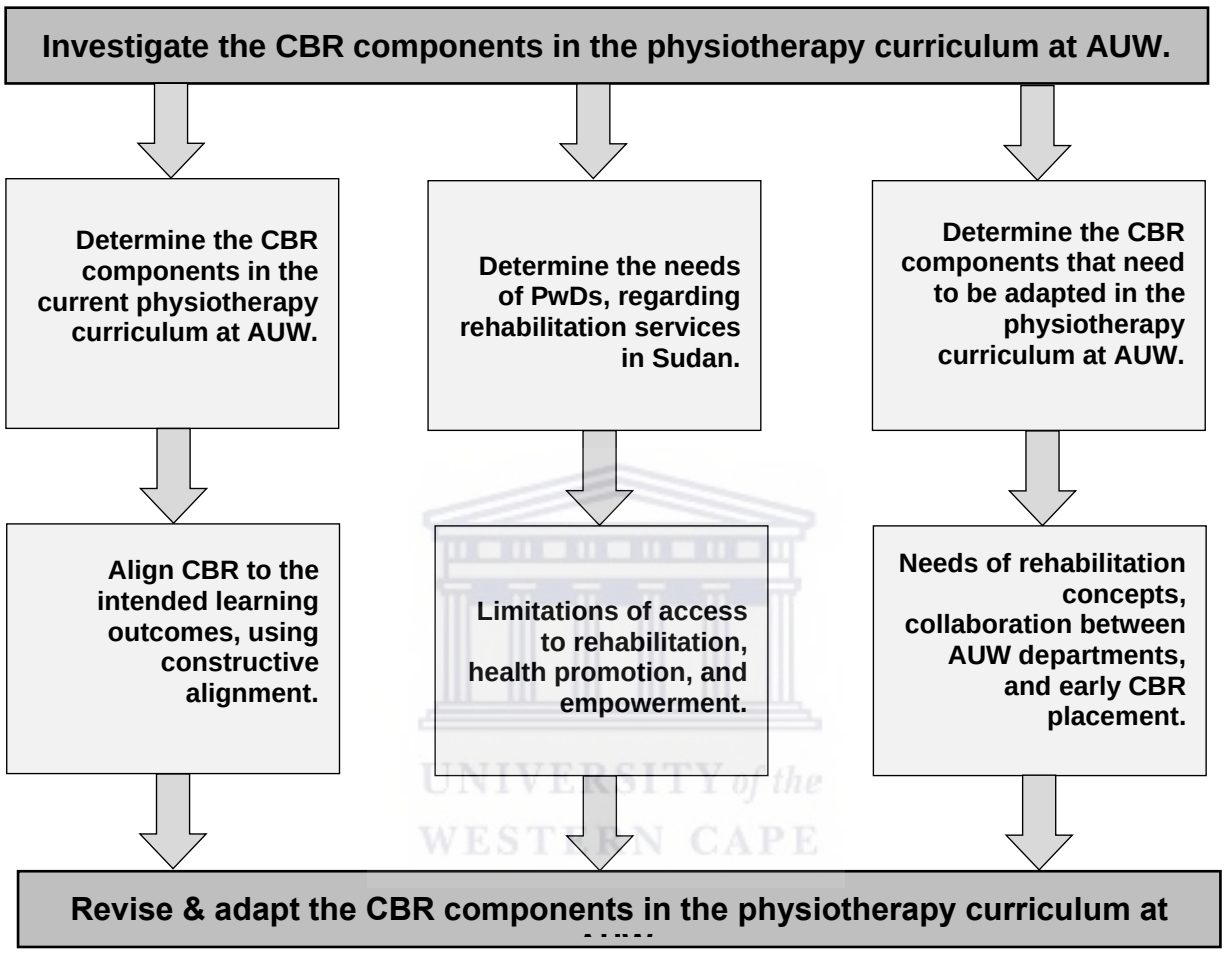

Figure 6.1: Summary of Phase 1: stages 1 & 2, and Phase 2: stage 1 of this research study

This current research study commenced by determining the components of CBR in the current physiotherapy curriculum at AUW, as shown in Figure 6.1. The alignment between the learning outcomes and other aspects of the curriculum was the most important fact, as recommended in Constructive Curriculum Alignment by Biggs (2014). Other aspects of the curriculum refer to course content, learning and teaching techniques, as well as assessment. Subsequently, the researcher continued to determine the needs of PwDs, regarding rehabilitation services in Sudan, as shown in Figure 6.1. The study findings revealed limitations experienced by PwDs, regarding access to rehabilitation, health promotion, and empowerment. The researcher, therefore, aimed to determine the CBR components that needed to be adapted in the

physiotherapy curriculum at AUW, as shown in Figure 6.1. The study findings revealed that certain rehabilitation concepts needed to be added in the CBR course content, collaboration was lacking between AUW departments, and early CBR placement needed to be implemented. Ultimately, the aim was to revise and adapt the CBR components of the physiotherapy curriculum at AUW, using the findings of this study, as indicated in Figure 6.1. New suggested components that were to be added into the CBR course included, learning outcomes, teaching and learning activities, assessment tasks, placement, and clinical aspects.

6.3. Methodology

6.3.1. Study design

The researcher employed a qualitative exploratory design, to discuss the changes that should be applied to the CBR components of the physiotherapy education curriculum at AUW, in order to improve the physiotherapy training, for better physiotherapy services. In this current study, the opinions of the participants, on the adapted content of the CBR course in physiotherapy education at AUW, were required. Therefore, the use of this design was to present the newly suggested components, concluded from the three previous chapters, to the participants in this study, in an atmosphere that was conductive to change (Humphrey-Murto *et al.*, 2017).

6.3.2. Population and Sampling

The population for this stage of the study was 20 individuals, who were connected to physiotherapy education at AUW. The purposive non-probability sampling technique was used in this stage. According to Etikan *et al.* (2016), in this type of sampling, the researcher selects the participants, based on his/her own judgment, which proved to be effective with the limited number of participants, due to the nature of the study (Etikan *et al.*, 2016). This current study was focused on a specific type of population, linked to AUW and the CBR curriculum; therefore, involving individuals linked to AUW, with CBR experience, would assist in achieving the study aim, which was to revise the adapted CBR components of the physiotherapy curriculum at AUW. The researcher contacted all the physiotherapy lecturers at the School of Health Sciences (SHS), who were involved with placing, supervising, and monitoring students in the community, for practical education in health science. In addition, the researcher contacted the physiotherapy staff at the NGOs, who were involved in clinical supervision, as one of their tasks. As an added

option, the researcher also contacted clinical supervisors, who had supervised AUW physiotherapy students at their placements, as well as lecturers from the SHS at AUW, who had taught different subjects to physiotherapy students. The final sample included fourteen (14) participants, who were staff members of AUW, engaged in CBE at SHS, as well as physiotherapists working at NGOs. Only the NGOs that had accommodated students for their course placements, were included in this study.

6.3.3. Data collection procedure

The data collection was conducted in the form of a workshop, which included a Power-point-presentation and feedback. The workshop methodology is aimed at fulfilling the participants' expectations of achieving a result, related to their own interests (Ørngreen & Levinsen, 2017). In this current study, the workshop involved a Power-point-presentation and an open, recorded discussion on the newly suggested items for the components of the CBR module in the physiotherapy curriculum at AUW. The participants were from SHS at AUW, and physiotherapists from NGOs; therefore the views obtained, would be from two different groups, which would add to the trustworthiness of the study findings (Rule, 2010). However, the biggest challenge of workshops, is the time required from the participants, whose schedules are loaded with education and rehabilitation tasks. Therefore, prior to the workshop, lengthy discussions and communication were conducted with the participants, to decide on the appropriate time, with the maximum number of participants.

In Table 6.1, the CBR course components for the physiotherapy curriculum at AUW are presented, with the newly added items, suggested by the participants. The items were added, according to the components, which included: the CBR course learning outcomes; course content; teaching and learning outcomes; assessment; and clinical aspects. During the workshop, the researcher introduced a Power-point-presentation to the participants. The presentation clarified each component and its corresponding items. Subsequently, a discussion ensued, after which the participants provided their feedback and views, regarding the new items.

Table 6.1: Items included to guide the presentation and discussion

Learning outcomes	Course content	Teaching and learning activities	Assessment	Clinical aspects
a) Understand the rehabilitation concepts, role, types, applications, and processes. b) Describe the principles and approaches of interdisciplinary team. c) Application of ergonomic principles. d) Describe and apply adult education.	i) Health. ii) Rehabilitation concepts. iii) CBR matrix. iv) CBR technology. v) Adult education approach. vi) Concepts of ergonomics.	1. Use of audio-visual aids. 2. Team teaching. 3. Open form discussion.	Reflection	Placement

6.3.4. Data collection

According to Ørngreen and Levinsen (2017), the main difficulty with conducting a workshop, is arranging a time that suits every participant. In this study, invitations were sent to the population of twenty subjects, three weeks prior to the date of the workshop, explaining the aim and objectives of the study, time, location, and ethical considerations. Fourteen (14) prospective participants responded, and confirmed their involvement. Subsequently, email and verbal communication continued with the participants to decide on the most convenient time and date. The day was selected after additional discussions with physiotherapy administrator, regarding the availability of the venue. The participants agreed that the workshop would commence at 1 pm on Wednesday, 2 August, 2017, in the meeting room of the physiotherapy department at AUW. The venue was equipped with an overhead projector, laptop, flipchart, and round table. Each participant was provided with papers, pins, and refreshments. The 2 research assistants helped in the facilitation of the workshop. The research assistants were physiotherapists from a different institution, who were briefed about this current research study's aim and objectives, as well as the aim of the workshop.

At the opening of the workshop, the researcher introduced the study, including the background of the study, aim, objectives, the previous stages and findings that had been achieved in this current study, what a workshop entails, as well as how to use it, to adapt

the CBR components in the physiotherapy curriculum at AUW. Subsequently, the participants took time to think about the new ideas, regarding the CBR components of the physiotherapy curriculum at AUW. The ideas were placed in the five component groups, according to the previous findings, namely, learning outcomes, course content, teaching and learning activities, assessment, and clinical aspects. The participants were informed of the existent components in the CBR course of the physiotherapy curriculum at AUW, as well as the components that were suggested to be added.

The workshop lasted three hours; one hour for the presentation, which was discharged by the researcher, and two hours for the discussion, facilitated by the two research assistants, together with the participants. All the stages of the workshop were audio-tape recorded by the researcher for data analysis. For each item to be added, the participants voted to reach consensus on whether they agreed, or disagreed (Table 6.2). The subsequent discussion was about whether the item should be added, or not.

Consensus was used in this stage of the study, because no attempt was made to change a behavior or opinion; therefore, the items had to be assessed, as seen (McMillan, King & Tully, 2016). In this stage of the study, the opinions of the participants, regarding the added items, needed to be described by descriptive method, as consensus. According to Humphrey-Murto *et al.* (2017), consensus has been applied in numerous healthcare settings, as well as education, as in this current study. In addition, consensus has been used in health education, to determine new components and revise curricula (Humphrey-Murto *et al.*, 2017). In this stage of the study, consensus was considered a high, structured face-to-face discussion; the term, *high*, implying that the participants were offered the opportunity to have their voices and opinions heard, as well as considered by other members in the discussion. The rate of consensus in this current study was 70%, which increases validity of the study, as the best consensus rate is considered between 70% and 80% (Curtis & Drennan, 2013).

6.3.5. Data analysis

The data analysis method used in this study was the deductive method. Themes did not emerge from the data, but instead, were pre-determined, and the questions were directed at the suggested added components to the CBR module, as shown in Table 6.1. The

researcher listened to the audio-tape recorded data several times, to be familiar with the data. The data analysis, therefore, commenced with the transcription of the entire discussion, as advised by Malterud (2012).

The data were transcribed by the researcher, as well as a transcription service, approached by the researcher. The transcriptions of the researcher and the transcription service were compared, when completed. No significant gaps, or differences, were found, except for a few cases, when the transcription service could not hear the participant's response, as many participants were talking, simultaneously. The researcher was able to transcribe those sections, after listening to them, several times over. The researcher carefully picked up incomplete sentences, half-finished thoughts, parts of words, odd phrases, and other characteristics of words, spoken in the group discussion. During the editing, every effort was focused on maintaining the character of the participants, even though, at times, they used poor grammar, or appeared to be confused. The transcript did not include gestures, behaviour responses, and non-verbal communication.

After the transcription was completed, the entire transcribed texts were read, thoroughly, several times, to obtain a comprehensive impression of the content and context, before initiating the coding process, to classify similar units. The relationships of the text units were condensed into sub-themes and sub-categories, based on word and phrase repetitions. The aim of the study made coding simpler, as the items included in the coding, were the same as in Table 6.1. Therefore, creating meaning units was to establish the participants' opinions of whether they should be included in the CBR course of the physiotherapy curriculum at AUW, as well as how to include them. Finally, a summary of the data analysis was concluded and presented, as revealed in the results sections of this chapter.

6.3.6. Trustworthiness

To ensure the credibility of the workshop findings, the participants' responses were aligned to the CBR module of the physiotherapy curriculum at AUW, as well as the finding of the FGD and in-depth interview. In addition, the individuals, who participated in the workshop, were experts in CBE and CBR.

To ensure confirmability of the workshop findings, the assistance of the study supervisors was sought, to interpret the data collected and transcribed from the audio-tape recordings. The content of the workshop presentation was agreed upon with the supervisors, based on the findings of the other stages in this current research. This was done to confirm the accuracy of the findings, and to ensure that the findings were supported by the data collected.

The researcher is a staff member in the physiotherapy department at AUW, which could have led to researcher bias, during data collection. To ensure a high level of reflexivity, participants from other departments and institutions, beside the physiotherapy, were included in this current study, which enabled the researcher to collect unbiased data from various participants. In addition, the researcher used the services of a research assistant, who was not employed at AUW.

6.4. Results

A total of fourteen (14) participants were involved in the workshop of this current study. Nine of the participants were employed at AUW, three were employed at NGOs offering CBR, and two were physiotherapy clinical practitioners, who had graduated from AUW. After the presentation, the participants were asked whether they agreed, or disagreed, to the need of including additional elements in the CBR components, namely, course content, learning outcomes, as well as the teaching and learning activities, of the physiotherapy curriculum at AUW (Table 6.2). Subsequently, an in-depth discussion continued, on why the items needed to be added, as well as how the suggested items should be added. In addition, the participants discussed the reasons for any disagreement on some of the items.

Table 6.2: Findings of the study

Course content	No. and % of participants who agreed - disagreed
a) Health.	(14/14) 100% - (0/14) 0%
b) Rehabilitation concepts.	(14/14) 100% - (0/14) 0%
c) CBR matrix.	(14/14) 100% - (0/14) 0%
d) CBR technology.	(14/14) 100% - (0/14) 0%

e) Adult education approach. F) Concepts of ergonomics.	(00/14) 0% - (14/14) 100% (14/14) 100% - (0/14) 0%
Learning outcomes	
a) Understand rehabilitation concepts, role, types, application, and process. b) Describe principles and approaches of interdisciplinary team. c) Application of ergonomic principles. d) Describe and apply adult education.	(14/14) 100% - (0/14) 0% (14/14) 100% - (0/14) 0% (14/14) 100% - (0/14) 0% (00/14) 0% - (14/14) 100%
Teaching and learning activities	
a) Use of audio-visual aids. b) Team teaching. c) Open form discussion.	(14/14) 100% - (0/14) 0% (14/14) 100% - (0/14) 0% (14/14) 100% - (0/14) 0%
Assessment	
Reflection.	(2/14) 14.2% - (12/14) 85.8%
Clinical aspects	
Placement in 4th year.	(10/14) 71.4% - (4/14) 28.6%

6.4.1. Course contents

In the course content, all the participants (100%) agreed to add *health*, *rehabilitation concepts*, *CBR matrix*, *CBR technology*, and *concepts of ergonomics*, as topics in the CBR course (see Table 6.2). Some participants suggested the following:

> *"I think it needs to include the concept of health, CBR matrix, and what are the structure of health system."*

> *"Include concept of health and structure of health system."*

These participants were obviously referring to the Sudanese health system and matrix. Subsequently, all the participants (100%) suggested including topics on the rehabilitation team and members' roles (Table 6.2). In addition, they suggested including subjects, such as, disability and rehabilitation in earlier years, prior to the CBR subjects and placement, as well as disability and primary healthcare. The following extracts refer:

> *"I want to suggest one credit hour or two credit hours for subject like disability, rehabilitation, and primary health because we are facing problem*

in the syllabus with students from the second they don't know what is disability."

"Yes, but we want from my point of view we want to see a little more about rehabilitation, about disability, about primary healthcare which need to be taught also in pediatric in neurology."

All the participants (100%) agreed on the need to add components containing CBR technology, such as, assistive devices (Table 6.2). They suggested that it be included in the CBR module of fourth year, even though assistive devices and wheelchairs are included in the Pediatric module of the physiotherapy curriculum at AUW.

"Students needs to have CBR technology in CBR and contains assistive devices."

"Can I say something? I do believe it is important that assistive devices be taught in CBR technology in CBR because students needs to have information about wheelchairs and technologies, how to use it as assistive devices."

In addition, they suggested including the concepts of ergonomics under the CBR technology, as per the following extracts:

"I mean ergonomics is going to be a topic that is important in CBR technology."

"Ergonomics can be a topic under the umbrella of CBR technology. I also agree to be under CBR technology."

However, all the participants (100%) disagreed to include the *adult education approach* in the CBR course content of the physiotherapy curriculum at AUW. As the term *adult education* was not well-known, it was a contentious aspect, which initiated disagreement on how the adult education approach should be included. Some of the participants viewed it as a wider approach, and not only for CBR learning. Others wondered what the *adult education approach* could add to CBR in Sudan, even though it was included in CBR modules in other countries. Consequently, the participants reached an agreement to

concentrate, instead, on teaching students techniques to work in team. The following extracts refer:

"But is adult education good for university learning or for the CBR itself"

"What is adult education going to add for a CBR?"

"Only from what I know I've seen that a CBR is, you can see like as how can you say, there are a lot of practices that I put together and if you read the guidelines they are quite abstract. That means that CBR here in Sudan is very different from CBR in South Africa or in other countries"

"Yes, and I think we have to revise the title to some extent that it make it clear that you didn't mean adult education as an adult education approach as general but you need something that team work spirit or organization work"

6.4.2. Learning outcomes

All the participants (100%) agreed that one of the learning outcomes of the CBR course could be that students are able to describe the principles and approaches of the inter-disciplinary team. In addition, they agreed that another learning outcome of the CBR course could be that students are able to apply ergonomic principles. However, all the participants (100%) disagreed that students should be able to describe and apply adult education. The following extracts refer:

"So it's a team work, organizing a team work rather than adult education"

"It's a kind of organizing a team work or doing a team work other or organizing the work that's adult education"

6.4.3. Teaching and learning activities

All the participants (100%) agreed on the use of audio-visual aids, team teaching, and open-form discussion as teaching and learning activities. In team teaching, the participants suggested using assistance of community members, namely, CBR workers, community leaders, and PwDs, into the class, to provide information related to the community, such as, how to enter the community, challenges, and the experience of PwDs. The following extracts refer:

"Yes, I do agree example inviting CBR worker teaching student's bout entering the community. It is important to invite CBR workers or a community leader to talk to them about these issues."

"Some people from the community as community leader maybe…"

"It can be the patient himself because from my understanding one of the team is the patient himself. He can come he can discuss his challenges with disability in the community so it's not difficult. It's not something that it will never be applicable so I guess we can go for this. It will break the routine of the normal way of teaching actually."

6.4.4. Assessment

There was disagreement (85.5%) regarding the addition of *reflection* to the assessment, because students in the CBR module were required to submit a report, instead of a *reflection*, as in other placements. The report also contained the students' experiences, similar to the reflection task. The following extracts refer:

"If you need a guideline why do you want to mark my reflection? It's my opinion, you're right it's my opinion. Are you going to give me a mark on my opinion?"

"Because inside the report they can include whatever they want so we have CBR report from community inside the report they can include what they want it an open and the idea is to write what they see, what they propose, what is positive, what is negative."

6.4.5. Clinical aspects

Regarding clinical aspects, most of the participants (71.4%) agreed that the placement for the CBR course in physiotherapy education at AUW could occur the fourth year of the physiotherapy course, because the CBR module was scheduled for the fourth year in the physiotherapy curriculum at AUW. The following extracts refer:

"Yes, I think why delayed to the fourth year because the CBR itself it not contain many subjects, orthopaedic, paediatrics, and sometimes we need to know the basics first."

"You need to understand what you are going to do. Yes, the whole package and then they will understand it because they will have all."

6.5. Discussion

A total of twenty participants were invited to participate in this stage of the study. However, those who attended were less, due to time constraints; therefore, only fourteen participants were involved in the workshop. Nine of participants were employed at AUW, three in NGOs offering CBR, and two physiotherapy clinical practitioners were former graduates of AUW.

6.5.1. Course content and learning outcomes

As indicated in Chapter 3 of this current study, adding components to the CBR course in the physiotherapy curriculum at AUW, was intended to achieve the learning outcomes of CBR in the physiotherapy education. To understand the concepts of rehabilitation, the topics on rehabilitation should include information about the types of rehabilitation, as well as the processes. Therefore, including additional topics on rehabilitation should address these issues and provide students with a better understanding of his/her role in community rehabilitation (Korner, 2010).

The findings of this current study revealed the need of CBR matrix in the course content, to achieve a better understanding of rehabilitation. In addition, the findings highlighted that topics on health should be included, as well. Health is one of the CBR matrix, and physiotherapy services is one of the health services offered. After the investigation of the Physiotherapy curriculum at AUW, it was revealed that no components of health, or the CBR matrix were included. However, the findings of this current this study revealed that there was a need to include these topics in the CBR module.

The CBR course in the physiotherapy education at AUW should include components on health promotion; therefore, it was agreed to include the CBR matrix, which contains a health component, as revealed in the findings of this current study. In addition, the CBR course in physiotherapy education at AUW should include topics and activities that equip physiotherapy students with the skills to develop, plan, and implement health promotion and prevention activities (WHO, 2011). One example could be increasing PwDs' awareness of CP and amputation. The activities could involve a health promotion campaign to educate PwDs on the causes and complications of amputation. Additionally,

the campaign could educate the community on how diabetes could lead to amputation in the Sudanese community (El Tayeb & Khalifa, 2013). Physiotherapy students could also plan activities that utilizes community resources, such as, media, and schools, which would encourage students to be aware that health promotion is not only limited to hospitals and clinics.

The findings of this current study also suggested that subjects like disability and rehabilitation, be included in the earlier years of the CBR course, to educate and prepare students better on topics regarding rehabilitation, the CBR matrix, and disability. However, it is unclear whether the collaboration activities between AUW and UWC influenced the participants' opinions. Disability and rehabilitation is a module offered in the second year of the physiotherapy curriculum at UWC, in which module, the CBR matrix and technology is explained. In this current study, the course components suggested are different, as it contains components related to rehabilitation, CBR matrix, and disability. According to O'Brien *et al.* (2014), topics on disability and rehabilitation could be addressed in the curricula of other health professionals' education, such as psychology, nursing, physiotherapy, occupational therapy, sociology, medicine, and public health. Therefore, having an earlier module on health and rehabilitation could help students to understand the rehabilitation concepts that would prepare them for later modules in the curriculum. This could encourage students to focus on the importance of access to rehabilitation for PwDs. Students, therefore, would understand why services are not accessible to PwDs, when they are placed in the community in the CBR course, and appreciate the need of CBR for PwDs, including personal and environmental challenges (Menezes *et al.*, 2016).

The findings of this current study revealed that topics like CBR technology should be included in the CBR components of physiotherapy education at AUW. According to WHO (2010), only 5-15% of PwDs in the low and middle income countries, who need assistive devices and technologies, have access to them. The limited availability of assistive devices and technologies restricts PwDs' participation in their community; for example, they cannot attend school or work, and the cycle of poverty continues (Harpur, 2012). For physiotherapy students at AUW, knowledge of assistive devices categories enhances the understanding of how each category could help PwDs, according to

disability types (WHO, 2010). Assistive devices is located under the health component of the CBR matrix, because it is important for PwDs to access assistive devices, in order to participate in the community (Mittler, 2015), for example, to access education and employment. The Convention on the Rights of Persons with Disabilities requires that States promote the availability of appropriate devices, and mobility aids, as well as provide accessible information about these devices (Mittler, 2015; Harpur, 2012; WHO, 2011). In addition, The Standard Rules on the Equalization of Opportunities for Persons with Disabilities also encourage States to support the development, production, distribution and servicing of assistive devices and equipment, as well as the dissemination of knowledge about them.

The need to include CBR technology in the CBR course of the physiotherapy curriculum at AUW, emerged from the findings of this current study, and is discussed in this chapter. Previously, information regarding the CBR matrix and assistive devices was not included in the physiotherapy course at AUW. However, the findings revealed that many PwDs in Khartoum State were using assistive devices; therefore, the importance of including the CBR matrix, which includes assistive devices, in the physiotherapy course, was confirmed. Physiotherapy students should be equipped with adequate knowledge and skills to work with PwDs and their families, to determine their need of assistive devices, facilitate access to assistive devices, and ensure maintenance, repair and replacement, when necessary. The CBR course in the physiotherapy curriculum at AUW, should include relevant topics and activities, during the module, for example, activities in the community to promote and increase awareness of assistive devices in the community.

The findings of this current study also revealed the need to add the application of ergonomics as a learning outcome, which would require that topics regarding ergonomics be included in the CBR course content of physiotherapy education at AUW. Previous studies presented ergonomics as a way of including PwDs in the social environment, as well as at work (Guimarães *et al.*, 2012). Therefore, the rehabilitation of PwDs in CBR should include ergonomic principles, and should be added to the CBR course in physiotherapy education at AUW. However, ergonomics has no bearing on the rehabilitation of PwDs, even though it fulfils the role of increasing the social and work participation of PwDs (De Guimaras, 2015). Therefore, ergonomics helps PwDs to

achieve the CBR matrix, in general, for example, having an accessible work environment for PwDs, would enable the individual to work, produce, and be employed to his/her maximum capability, which empowers the individual and supports his/her livelihood standard. The findings of this current study did not reveal that ergonomics was included in the other components of physiotherapy education at AUW, such as in occupational therapy. Occupational therapy is offered in the final year of the physiotherapy curriculum at AUW; therefore, including ergonomics in the CBR module could be the appropriate location, so that students could observe the relationship between ergonomics and CBR.

Relating CBR technology and ergonomics is possible, as both terms facilitate the PwDs' participation in their community. Physiotherapy students need to be knowledgeable about the use of both terms in CBR. Ergonomics could be used to assist PwDs with environmental challenges, namely, difficulties in daily activities such as using public transportation, or at home. The use of assistive devices, as CBR technology, helps with mobility; however, with no prepared environment, it is restricted. Physiotherapists could fulfil the role providing guidance on increasing the community's awareness about the needs of CBR technologies and ergonomics. Studies reveal that PwDs and caregivers receive limited guidance on ergonomics from health care professions (Moreira *et al.*, 2018). This lack of information could restrict PwDs and their caregivers from having positive results in CBR, because they simply did not benefit from tools and technologies. Physiotherapy students at AUW receive basic background information on physiotherapy subjects, such as, kinesiology and biomechanics; therefore, combining this knowledge with ergonomics and CBR technologies in the CBR course, could facilitate the students' reflection on how to use it in the community with PwDs. The findings of a study conducted by Moreira *et al.* (2018) revealed that PwDs and their caregivers, who received ergonomics technology and advice, could benefit more in their environment, than those who received the usual CBR services. The benefits were mainly in mobility, with less restriction, which enabled the PwDs to participate in their daily activities. The usual CBR services in the study of Moreira *et al.* (2018) were focused on, mainly, general information and training on how to use assistive devices. In addition, the findings of that study revealed the importance of information and adjustments, related to the home environment and transportation.

6.5.2. Teaching and learning activities

The participants in this current study agreed on using team-teaching as one of the teaching activities. The teaching process involves coordinated teaching by a team of teachers, working together at any institution (Olsen & Bialocerkowski, 2014; Körner, 2010). The aim would be to use this coordinated process to include activities that cover the CBR content and learning outcomes of CBR, which could assist in understanding the concepts of rehabilitation as a learning outcome of the CBR components in physiotherapy education at AUW. This process, therefore, could be achieved by including other health professionals in rehabilitation services, to teach physiotherapy students (Olsen & Bialocerkowski, 2014). In addition, PwDs could participate to share their experiences.

Körner (2010) concurs that team-teaching would assist physiotherapy students to understand their role in the rehabilitation context, as it allows interaction between teachers and students. In the CBR components of physiotherapy education at AUW, various topics related to rehabilitation services in the community, should be addressed, which requires that the teaching activities to be planned accordingly. For example, community workers could contribute by sharing their experiences regarding what the community needs, and plan to promote the rehabilitation process, for PwDs to participate in activities in their community.

The findings of this stage of the study also recommended that PwDs participate in CBR classes in the physiotherapy department at AUW, to share their experiences. According to the researcher's experience, the Department of Physiotherapy at AUW previously involved patients in clinical examinations, once a year in the final year, when students performed authentic assessments on real patients. The findings of this stage of the study suggested a similar exercise, as a teaching and learning activity. The patients benefitted financially, when participating in the clinical examinations; however, the benefits for the patients, could be related to empowerment, as the patient holds the experience and could describe the life of a PwD. The PwD could explain how s/he manages disability, as well as what is required to change his/her life, which is aligned with the meaning of empowerment in CBR.

However, when PwDs visit the Physiotherapy Department there are issues that need to be addressed, such as accessibility, time, and transportation. The Physiotherapy Department at AUW is located on the first and second floors. There are only stairs to access the department, which is viewed as an access limitation for PwDs. Regarding transportation, AUW vehicles are available to the department to transport PwDs, as done during the clinical examinations, while time could be adjusted through communication, also as was done during the clinical examinations.

The participants in this current study agreed on using open discussion as a learning and teaching activity in the CBR curriculum of physiotherapy education at AUW. Literature explains several forms of open discussion, such as a large group, a small group, and on an individual basis. Open discussion involves stimulating individual skills to obtain knowledge for students, clinical educators, and other professionals (Rowe *et al.,* 2013). One challenge of this form of discussion, is the large number of students enrolled. At AUW, the number of students per class is more, or less, 30 students (Haugland *et al.,* 2014). Therefore, two options are suggested to organize useful forms of discussion. Firstly, the students should be divided into small groups. There is no specific strategy that governs how students should work in small groups, but activities and tasks in small groups could be organized for the course intended learning outcomes. For example, if the intended learning outcome of the CBR components in physiotherapy education at AUW, is to acquire knowledge about PHC, the discussion could be on sharing knowledge and experience about PHC. Secondly, ICT could be used to organize the discussion among students and lecturers. Studies reveal the benefits of ICT in teaching and learning skills to gain knowledge (Rowe *et al.,* 2013: Woreta & Kebede, 2013). However, the differences in technology use and access, highlight the challenges (Vissers *et al.,* 2018). At AUW, the students' general ICT experience is low; however, they also prefer an increase in the use of ICT (Vissers *et al.,* 2018). Therefore, more attention to designing the ICT learning environment in physiotherapy education at AUW, would be helpful in the future.

The use of audio-visual aids in physiotherapy was observed to enhance effective learning activities and clinical reasoning (Hurst, 2016). The participants in this current study agreed on the use audio-visual aids in the CBR components of physiotherapy education

at AUW. When using audio-visual aids, it is very important to gain and maintain the students' attention, or else they may merely watch and relax without interest (Wilson & Greig, 2017). The Physiotherapy Department at AUW should investigate a strategy of using audio-visual aids that ensures the maximum benefit, and gains the intended learning outcomes of the CBR curriculum. The use of rich, quality materials is one of the strategies recommended (Wilson & Greig, 2017). In the case of this current study, using materials related to the intended learning outcomes of the CBR components of physiotherapy education at AUW, is very important. Lecturers could design guidelines on which audio-visual aids to use, as well as how, based on the intended learning outcomes.

6.5.3. Reflection as an assessment tool

Reflection is part of the placement assessment in physiotherapy education at AUW. In the CBR course of the physiotherapy curriculum at AUW, students are required to submit a report at end of their placement, which serves the same outcomes of reflection, depending on how the report is designed. The findings of this current study revealed that the report includes the experiences of the students, while on placement. The student is required to reflect on what was learned and experienced in the placement. In addition, the students disclose any challenges in the placement, as well as how those challenges were handled. The report should be designed according to education development and evaluation, as recommended in several methods, such as the Gibbs Reflective Cycle (Rust, 2002).

Firstly, the students describe the experience, by considering all the details regarding their placement, and the outcomes, implying data from the experience already generated. *Secondly,* the students consider their impressions regarding the situation; what they think happened, as well as why it happened, from their point of view. This is very useful in assessing what the students regarded as inappropriate, or what they needed to do differently, at the evaluation stage. *Thirdly,* the students evaluate what transpired, and analyze why it transpired, as well as what functioned positively, or negatively. This referred to the data that were generated, logically, towards the result of the condition, including students' actions, or other circumstances. *Fourthly*, the students consider why the results culminated in a certain manner. They consider the consequences that led to a

particular result, and strive to formulate logical explanations to the relationships between circumstances. *Fifthly*, the students reach a conclusion on what should be done, to produce a different result, using the findings of the analysis. At this stage, the students consider why they did not select a better way of proceeding, as well as what the challenges were. Missing facts that were required in the situation, would be screened meticulously, to solve it in the new plane for the next stage. *Sixthly*, students plan how to react to the situation, by listing features that need to be performing better, to gain an improved result. This final stage paves the way to improved learning and performance.

This stages are also referred to as adult education, using PBL and critical thinking (Mattar, 2018). In this current study, the students were required to produce a report that included student experience and opinion regarding positive and negative experiences, as well as their proposals. This report could assist, to some extent, in the achievement of the benefits of reflection, implying that it could include the above-mentioned stages of the Gibbs Reflective Cycle.

6.5.4. Clinical placement

Regarding the clinical aspects, a consensus on having the CBR placement in the fourth year of the physiotherapy programme at AUW was reached. Mpofu and Imalingat (2006) concurs that, at some universities, placements commence in the fourth year of physiotherapy education. However, McMahon *et al.* (2016) highlight evidence, which suggests that earlier commencement of placements is beneficial for learning. Therefore, the issue of when to include CBR placement in physiotherapy education at AUW, needed to be investigated in this current study.

In Chapter five of this current study, the issue of placement was discussed, as the participants were of the opinion that the fourth year was too late to commence placements in the CBR course. There was conflict between the participants' views; however, consensus was reached, eventually, to include the placement in the fourth year of the physiotherapy curriculum at AUW. However, McMahon *et al.* (2016) highlight the need of introducing community visits before the placements, to prepare students for what they are will see and do in the community. This could be planned during the CBR course in

physiotherapy education at AUW. Consequently, early community visits could be included in physiotherapy education at AUW.

6.6. Summary of the chapter

In this chapter, the researcher aimed to revise and adapt the CBR course in the physiotherapy curriculum at AUW. The components to be adapted in the CBR course of the physiotherapy curriculum at AUW, were discussed among AUW staff and clinical supervisors. Including early community visits in physiotherapy education at AUW were recommended, to prepare students for what they will experience in the placements (McMahon *et al.*, 2016). Regarding the content of the CBR components in physiotherapy education at AUW, there was a need to include additional components/elements of components in the physiotherapy curriculum, to provide students with important information about CBR, such as the CBR matrix.

Regarding teaching and learning activities in the CBR components of physiotherapy education at AUW, more attention on designing an ICT learning environment for physiotherapy education at AUW, could assist in obtaining the maximum benefit of using ICT. Using members from the community in CBR classes was also recommended. Regarding assessments, the findings of this current study did not reveal that reflection was used as an assessment tool in the placements of the CBR module of physiotherapy education at AUW, as it was in other placements. However, students were required to submit a report, which could fulfil the same task of reflection. This CBR report that the students submit, instead of reflection as an assessment tool in the physiotherapy curriculum at AUW, requires more investigation. Additionally, the findings of this stage revealed that the placements for the CBR course in physiotherapy education at AUW, could continue to be programmed in the fourth year of study, as it used to be. However, this does not negate the recommendation of early community visits, to prepare students to what they will experience in the community, during their placements and career.

CHAPTER SEVEN

CONCLUSION AND RECOMMENDATIONS

7.1. Introduction

This chapter comprises an introduction revealing the connection between the research aim, questions, and objectives. Subsequently, the chapter includes a summary of the research findings. Finally, the conclusion of the study, based on each objective of the research, is presented, as well as recommendations related to the research outcomes, the Physiotherapy Department at AUW, and clinical practice.

In this study, the researcher aimed to investigate the CBR components in the Physiotherapy Curriculum at AUW, to answer the following question: what are the components of CBR that should be included in the physiotherapy curriculum at AUW. In order to address the research question, an investigation of CBR components in the physiotherapy curriculum at AUW was conducted in four different stages, aligned with the research objectives of this current study. The objectives were:

1. To determine the components of Community Based Rehabilitation (CBR) present in the current physiotherapy curriculum in Ahfad University for Women (AUW).
2. To determine the needs of People with Disability (PwD) regarding rehabilitation services in Sudan.
3. To determine the CBR components that needs to be adapted in the physiotherapy curriculum at AUW.
4. To revise the adapted CBR components in physiotherapy education at AUW.

7.2. Summary of the research findings

The summary of the research findings are summarized in the following sections, according to the objectives of the study.

7.2.1. Objective one: To determine the components of CBR present in the current physiotherapy curriculum in AUW

The findings related to this objective were discussed in the third chapter of this current study. Data were collected using content analysis of the CBR module in the physiotherapy curriculum at AUW. The components of the CBR module in the physiotherapy curriculum at AUW were captured on data capture sheets (Appendix 1), analysed, and compared to CBR courses in the physiotherapy curricula at four other universities. The research findings revealed both, similarities and differences in the CBR courses, including: content; intended learning outcomes; learning and teaching activities; and assessment tasks of the module.

The findings of this current study revealed that the CBR course in physiotherapy education at AUW, needed to include components related to multi- and inter-disciplinary approaches. Adult education and ergonomics principles were not found in the intended learning outcomes, and content of the CBR course in physiotherapy education at AUW. The use of community visits, as a learning activity were introduced only during the placements in the fourth year of physiotherapy education at AUW. However, literature revealed the need of initiating community visit in the earlier years of physiotherapy education, in order to prepare students for placements (MacMahon *et al.*, 2016). Finally, the findings revealed teaching and learning techniques that had been used in the CBR module in physiotherapy education at AUW. These techniques included, lectures, tutorials, and group work, as indicated in Table 7.1.

7.2.2. Objective two: To determine the needs of People with Disability (PwD) regarding rehabilitation services in Sudan

Objective two was discussed in the fourth chapter of this current study, and included a questionnaire survey to explore the needs of PwDs, regarding rehabilitation services in Khartoum State, Sudan. The methodology used in the study, findings and discussion, and challenges that restricted PwD's participation in their community were included.

The findings of this current study revealed that PwDs experienced limitations regarding accessibility and quality of the rehabilitation services. These challenges involved multi-sectoral factors, including socio-demographical and physiological factors, which resulted in restrictions to participation, and quality of life. Therefore, social inclusion emerged as

a barrier for PwDs in the community. In addition, the findings revealed that other community sources of health promotion, such as media, schools, and clinics, were not used to the maximum, as health promotions were mainly offered by hospitals.

This part of the research study included the revision of the CBR module, to determine how CBR could address the challenges of PwDs, regarding rehabilitation services. In order to address the identified challenges, the findings revealed a significant relationship ($P<0.05$) between information on assistive devices with maintenance of assistive device, and benefits from assistive devices, respectively. Therefore, PwDs with information on how to maintain and use their assistive devices, are more likely find the use of their assistive devices, easier and advantageous, compare with those who received no information on how to maintain and use their assistive devices. In addition, the findings revealed that the CBR matrix could meet the needs of PwDs regarding rehabilitation services in Khartoum State, such as, in livelihood and health components. Health components include, assistive devices, which are commonly used by PwD in Khartoum State. Livelihood components include, employment to reduce financial challenges that restrict PwDs in accessing rehabilitation services in Khartoum State.

7.2.3. Objective three: To determine the CBR components that need to be adapted in the physiotherapy curriculum at AUW

In the fifth chapter, the researcher presents the FGD with physiotherapy students and an in-depth interview with a CBR expert. In addition, the physiotherapy students and CBR expert were encouraged to discuss the need of additional CBR components/elements to components in physiotherapy education at AUW. The findings of this current study revealed that there were several advantages to applying CBR concepts in the community. The students were able to observe what is transpiring in their community, and could think critically about what needed to be added to the CBR components in the physiotherapy curriculum at AUW. Consequently, the findings revealed that the course content, design, duration, and the reflection as one of the assessment tools, had to be modified. However, the findings also revealed a need for further investigation of other components in the physiotherapy curriculum, to determine where health, or the CBR matrix should be located. The need of early student placements in the community emerged in the form of clinical placement, or community visits within the CBR components of the physiotherapy curriculum at AUW.

7.2.4. Objective four: To revise and adapt CBR components in physiotherapy education at AUW

In the previous chapter, the researcher conducted a workshop to revise and adapt the components of the CBR course in the AUW physiotherapy curriculum. Participants from AUW and physiotherapy education in Sudan discussed and voted on including the new components, as well as the manner in which they should be implemented. A consensus was reached on the additional components, which would provide students with important information on CBR, namely, the CBR matrix, as well as the importance of the physiotherapist's role in each CBR matrix component. The findings revealed that it was possible to include a module on disability and rehabilitation, in the earlier years of the course, for students to gain earlier erudition, before starting the CBR module. O'Brien *et al.* (2014) concur with this recommendation. The findings also revealed that concepts of ergonomics should be adapted under CBR technology, in the CBR course. However, the findings revealed that describing and applying adult education could not be one of the learning outcomes of the CBR course, but rather an outcome for the whole curriculum.

The findings further suggested including other health professionals in rehabilitation services, as well as the community, to teach physiotherapy students, as per the team-teaching recommendation by Olsen and Bialocerkowski (2014). Based on the findings of the workshop, it was agreed not to include *reflection* as a tool of assessment for the CBR placements, although it was already used in other placements. After their CBR placements, physiotherapy students are required to submit a report, which was used for assessments, instead. It was considered that the report fulfilled the same task as *reflection* would. Ultimately, based on the findings, it was agreed that placements for the CBR course in physiotherapy education at AUW would remain in the fourth year of study, as before. However, early community visits, to prepare students for what they would experience in the community, during their placement and career, was agreed on.

7.3. Conclusion of the findings

The additional components/elements of the CBR module in the physiotherapy curriculum at AUW are listed according to course content, intended learning outcomes, learning and teaching activities, assessment tasks, and clinical practice, as displayed in Table 7.1.

Table 7.1: Components of CBR

Course content	Original components	Added components
	Primary health care/community health: Definition, principles and strategies of PHC**.**	Health & disability.
	Organization of PHC in Sudan (also with a review of the topics of the Health Services Management).	Rehabilitation concepts.
	History of CBR	
	CBR Definition, Concept and Role.	CBR matrix.
	WHO & CBR	
	Convention on Right of Persons with Disabilities.	CBR technology.
	CBR multi-system approach.	Concepts of ergonomics.
	Involvement & participation of PwD and their families.	
	Importance of the integration with the local network of services and association for supporting PwD.	
Intended learning outcomes		
	Know and define the principles, strategies and elements of PHC.	Understand rehabilitation concepts, role, types, application, and process.
	Appreciate the concept of CBR as a choice for Community responsibility to the disabled people.	Describe principles and approaches of interdisciplinary.
	Prepare the students with strategies for rehabilitation, equalization of opportunity, poverty reduction and social inclusion of people with disabilities.	Application of ergonomic principles.
	How to collaborate to ensure the benefits of the Convention on Rights of Persons with Disabilities reach the majority.	
Teaching and learning activities		
	Lectures	Early field visits.
	Tutorials	Use of audio-visual aids.
	Group work	Team teaching.
		Open form discussion.
Assessments tasks		
	Continuous assessment/ report	
	Final examination	
Clinical practice		
	Placement in the 4th year	

7.4. Recommendations

In this section, recommendations related to research, Physiotherapy Department at AUW, and clinical practice are discussed, as follows:

7.4.1. Research

The findings of this current study revealed that IPE needs to be used in CBE in the physiotherapy curriculum at AUW, to strength the role of the rehabilitation team of CBR in Sudanese community (Körner, 2010). However, more research is needed at AUW, to investigate the process and application of IPE.

The findings revealed that environmental and social restrictions, such as finance and transportation, are challenging PwD's access to rehabilitation services. Therefore, more studies are needed to investigate the restrictions experienced by PwDs, regarding participation in their community, including personal and environmental facts, to determine how CBR could intervene in the community sources, to reduce these restrictions.

It is important to CBR education in physiotherapy education, to prepare students to use community resources for CBR. The findings revealed that the use of community sources in health promotion was not maximized, and was mainly based on information offered in hospitals. This needs to be investigated, to determine why community sources, such as media, clinics, and schools are not fulfilling a greater health promotional role in Khartoum state. In addition, more research on how to maximize the role of those sources is required, in order to strengthen CBR for PwDs in Khartoum State.

The findings also revealed a lack of student knowledge for the concepts of disability and rehabilitation, was recommended to be inculcated throughout the physiotherapy curriculum at AUW (O'Brien *et al*, 2014). Therefore, further investigation of other components in the physiotherapy curriculum is needed, including components of health, disability, rehabilitation, and the CBR matrix.

7.4.2. Physiotherapy Department at AUW

The Physiotherapy Department at AUW could benefit from studies related to the physiotherapy curriculum. This could be conducted in in several forms, such as, encouraging undergraduate students to choose relevant topics as their research projects, in their curriculum requirement. The department could also encourage staff to choose relevant topics, when they study towards higher education degrees and conduct research activities. There are significant positive effects to using ICT in higher education (Woreta, Kebede & Zegeye, 2013).

The findings revealed the importance of the rehabilitation professionals in CBR. More attention on the designing of an ICT learning environment in physiotherapy education at AUW, could help in the future. The Physiotherapy Department at AUW could plan to maximize the use of ICT tools available at AUW, such as internet access, in order to decrease the challenge of having different professionals in IPE. In addition, it enables physiotherapy students to share national and international experience (Vissers *et al.*, 2018).

7.4.3. Clinical practice

The findings of this current study revealed that CBR placements commence in the fourth year of physiotherapy studies. However, research suggests that early community visits prepare students for what they could expect in future placements (McMahon *et al.*, 2016). Therefore, early community visits should be included in the CBR course of the physiotherapy curriculum at AUW.

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APPENDICES

Appendix 1: Data capture sheet

Similarities.	Similarities in two or more.	Differences.
Learning outcomes.		
Main content.		
Learning activities.		
Assessment.		

Appendix 2: Questionnaire for PwDs

Dear participant/

The goal of this research project is to explore the needs of physical disable people for Community Based Rehabilitation. The survey is anonymous.

Rehabilitation center:

- Organismo di Volontariato per la Cooperazione Internazionale **(**OVCI)_
- National Authority for Prosthesis and Orthosis (NAPO)_
- Usratuna Sudanese Association for Disable Children (USADC)_
- Khartoum Cheshire Home (KCH)_
- Al Amal Rehabilitation City_

Please answer the following questions:

Section 1: Demographic Information:

1- Gender:
- Male_
- Female_

2- How old are you?
- Less than 1 year_
- 1 to 10 years_
- 11 to 20 years
- More than 20 years_

3- Marital status:
- Single__
- Married___
- Divorced__
- Widow__

4- Residence:
- Khartoum__
- Omdurman__
- Khartoum north__
- Out of Khartoum state__

5- Education level:
- Illiterate_
- Elementary_
- Secondary_

- Higher education_

6- Occupation:

- Student__
- Employed__
- Self employed__
- No occupation__

7- Monthly income:

- Less than 500SG_
- 500SG to 1000SG_
- 1000 to 2000SG_
- More than 2000SG_

Section 2: Participation restrictions:

Do you have any difficulty doing the following?

8- Shopping (getting goods and services).
   - Yes
   - No

9- Preparing meals (cooking).
   - Yes
   - No

10- doing housework (washing/cleaning)
   - yes
   - no

11- taking care of personal objects (mending/ repairing)
   - yes
   - no

12- taking care of others
   - yes
   - no

13- taking part in clubs/organisations (community life)
   - yes
   - no

14- taking part in recreation/leisure (sports/play/crafts/hobbies/arts/culture)
   - yes
   - no

15- taking part in political life and citizenship
   - yes
   - no

Section 3: Type of disability:

16- What type of physical disability are needing services for? You can choose more than one.

- Acquired Brain Injury_
- Muscular Dystrophy_
- Amputation_
- Cerebral Palsy_
- Parkinson's Disease_
- Other, specify_____

17- What is the cause behind the disability?

- Congenital_
- Delivery_
- Injury_
- I do not know_

18- For how long did you have the disability?

- Since birth_
- Less than 10 years ago_
- More than 10 years ago_
- I do not know_

19- How far did the disability affect your daily life activity?

- Affect so much_
- Affect a little_
- Do not affect at all_

20 Do other members of the family have disability?

- Yes_
- No_

21 If yes what type?

- Acquired Brain Injury_
- Muscular Dystrophy_
- Amputation_
- Cerebral Palsy_
- Parkinson's Disease_
- Other, specify_____

Section 4: Assistive devices:

22 -Do you use assistive device? If no go to section 5.

- Yes_
- No_

23- What type of assisting device do you use?

- Walking aid_
- Prosthesis_
- Orthosis_
- Wheelchair_
- Other, specify…….

24- Does your device help you as intended

- Not at all
- Slightly
- Moderately
- Very much

25- How much difficulty do you still have even if you use the assistive device?

- Very much
- Moderate
- Slight
- No difficulty

· Considering everything, how much has your use of assistive devices improved your quality of life?

- Worse
- No change
- Slightly better
- Much better

27- Were you given any information or help on how to use your device(s)?

- Yes_
- No_

28- Do you maintains or repairs your assistive device(s)?

- Yes_

- No_

29- If yes, by whom?
    a. Self.
    b. Government.
    c. NGO.
    d. Family.
    e. I don't know.
    f. Other, specify…….

Section 5: Rehabilitation services:

30- Which services, if any, are you *aware* of and have ever *needed and received*?
- Physiotherapy
- Occupational Therapy
- Psychotherapy
- Others

31- What type of physiotherapy services do you get at the center?
- Gait training_
- Exercises_
- Electrotherapy_
- Hydrotherapy_

32- How many sessions did you receive?
- Less than 10 sessions_
- 11 to 20 sessions
- More than 20 sessions_
- I do not know_.

33- Are the rehabilitation exercises effective?
- Yes
- No

34- How do you grade the health care attitude towards you?
- Excellent_
- Very good_
- Good_
- Bad_
- Very bad_

35- Are you satisfied with the provided services at the center?

- Very satisfied_
- Satisfied_
- Not satisfied_

36- Do you have any barriers that restrict your access to the health services?

- Yes_
- No_

37- If yes, what are they?

- Transportation_
- Center policy_
- Financial_
- Personal_

38- Do you get any rehabilitation services at home?

- Yes_
- No_

39- If yes by whom?

- Physiotherapist_
- Field workers_
- Other family members_

40- What improvements in the services would you expect?

- Improvement regarding the facilities_
- Improvement regarding the staff_
- Improvement regarding the center policy_
- Improvement regarding the therapy program_

41- Do you get any Community Based/ societal support?

- Yes_
- No_

42- If yes what type?

- Financial support_
- Educational Support_
- Transportation support_
- Medical support_

43- Did you have any counselling services before?

- Yes_
- No_

44- If yes, what type?

- Physiatrist_

- Psychologist_
- Social worker_
- School counselor_
- Others_

45- Do you get health information?

- Yes
- No

46- If yes, where do you get it?

- Media
- Schools
- Clinics
- Hospital
- Counselling
- Others

THANK YOU

Appendix 3: Focus Group Questions for students/staff

1. Let's do a quick round of introductions. Can each of you tell the group about yourself, work, and about your involvement in CBR?
2. First, we'd like to hear your thinking about CBR course for physiotherapy students.
   Prob: Do you think it is useful and why?
   What are the challenges in the course?
   How could the course be improved?
3. Tell us your opinion regarding the CBR course content.
   Prob: What are the important topics to be covered?
4. Tell us your opinion regarding the CBR course learning outcomes.
   Prob: What should be the course objectives?
   What are the common challenges achieving the objectives?
   How it can be managed?
5. What is your opinion regarding the CBR course learning activities?
   Prob: Activities needs to be used (ex. Lectures, tutorial, group work, field visits……etc.
   How activities can be used?
   What are the challenges using these activities?
   How it can be treated?
6. What about the teaching style?
   Prob: Training and practice, (at school and in the field/community).
   What are the challenges and how to deal with it?
7. What is your opinion about lecturers/supervisors interests?
   Prob: Is there are any challenges?
   And how it can be treated?
8. What do you think about the course length?
   Prob: Length of the lectures, placement, assessment…..etc.
   Is the time for each is enough?
   If not, how it can be sorted?
9. Tell us your opinion regarding the CBR course assessment.
   Prob: What are the assessment tools can be used (ex. Continues assessment, final exam……..etc)?

How those tools can be used?

10. What is your opinion about student's interests and reflection regarding the CBR course?
    Prob: How to make students interested in the course?
    Do you have any tool to evaluate this?
    Is there is any challenge?
    How you handed the challenge?
11. To which extend do you find the community interested and helpful regarding CBR course?
    Prob: Having collaboration with governmental and nongovernmental organizations. Having student's accessibility to the community.
    -What are the challenges and how it can be treated?
12. What are your suggestions for the physiotherapy department in AUW for the CBR course to make it easier for students to integrate later as professionals into community life and for working with those who needs CBR?
    Probe: This can be student orientation, testing, accessibility to services, assistance with accessing financial aid, or anything else you can think of.
13. Is there anything else we haven't discussed yet that you think is important for CBR course in AUW to know about as we consider tailoring programs to students?

Thank you so much for your time!

Appendix 4: Key Informant Interview guide

- Can you tell about yourself, work, and about your involvement in CBR.

- From your experience what do you know about CBR?

- How is the CBR services offered in your community?

- What are the main challenges facing PwD in your community?

- From your experience how far you found the students are prepared to grasp the concepts of CBR?

- What do you think that physiotherapy education needs to improve the rehabilitation service?

Appendix 5: Participant information sheet

INFORMATION SHEET

Project Title: Evaluating The Feasibility Of The Expansion Of Community Based Rehabilitation Into The Physiotherapy Curriculum In Ahfad University For Women, Sudan.

This is a research project being conducted by Hassan Abdelnour at the University of the Western Cape. We are inviting you to participate in this research project because you are involved in the community rehabilitation field. The purpose of this research project is to investigate Community Based Rehabilitation integration in the physiotherapy curriculum in Ahfad University for Women.

What will I be asked to do if I agree to participate?

You will be asked to share your opinion and knowledge about physiotherapy and Community Based Rehabilitation.

Would my participation in this study be kept confidential?

We will do our best to keep your personal information confidential. To help protect your confidentiality. The data will be kept in locked filing cabinets and storage areas, using identification codes only on data forms, and using password-protected computer files and will be destroyed immediately after the submission of the thesis. The surveys are anonymous and will not contain information that may personally identify you. If we write a report or article about this research project, your identity will be protected to the maximum extent possible.

What are the risks of this research?

There are no known risks associated with participating in this research project.

What are the benefits of this research?

This research is not designed to help you personally, but the results may help the investigator learn more about community based rehabilitation in physiotherapy education. We hope that, in the future, other people might benefit from this study through improved understanding of rehabilitation services.

Do I have to be in this research and may I stop participating at any time?

Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify.

Is any assistance available if I am negatively affected by participating in this study?

In case you are negatively affected by participating in this study you will receive proper counselling and referral for care.

What if I have questions?

This research is being conducted by Hassan Abdelnour at the University of the Western Cape. If you have any questions about the research study itself, please contact Physiotherapy Department at University of the Western Cape, telephone number: 00-27-959-2542, and (if appropriate) e-mail address: mwarner@uwc.ac.za

Should you have any questions regarding this study and your rights as a research participant or if you wish to report any problems you have experienced related to the study, please contact:

Head of Department:

Dean of the Faculty of Community and Health Sciences:

University of the Western Cape

Private Bag X17

Bellville 7535

This research has been approved by the University of the Western Cape's Senate Research Committee and Ethics Committee.

Project Title: Evaluating The Feasibility Of The Expansion Of Community Based Rehabilitation Into The Physiotherapy Curriculum In Ahfad University For Women, Sudan.

Before participating in this study the aim and objectives of the study been explained to me. In additional, all my rights been explained to me. Therefore, I do agree to participate in this study.

Date:……

Participant name.....

Participant signature.....

Appendix 6: Written consent ARC

بسم الله الرحمن الرحيم

التاريخ : 2014/7/19

السيد / مدير مدينة الامل الطبيه

جبل اولياء

انا حسن مبارك عبدالنور طالب دكتوراة في مجال العلاج الطبيعي بجامعة ويسترن كيب في جنوب افريقيا واعمل بجامعة الاحفاد في كلية العلاج الطبيعي .

الرجاء التكرم بالسماح لي بجمع بعض الاستبيانات من مدينتكم العامره وذلك لمساعدتي في بحثي المتعلق بأحتياجات ذوي الإعاقة الحركيه.

ولكم مني جزيل الشكر والتقدير

حسن مبارك عبدالنور

جامعة الاحفاد

تلفون : 0902183005

Appendix 7: Written consent OVCI

la Nostra Famiglia
Volunteer Organization for International Co-operation
المنظمة الطوعية للتعاون الدولي – اسرتنا

Omdurman, 16/6/2014

To whom may concern,

I undersign Marco Ferrante, in the quality of OVCI Resident Representative, do declare that today 16/06/2014 Mr. Hassan Abdelnour has applied to OVCI the permission to conduct his study survey as a part of his PhD study under the title "Evaluating The Feasibility Of The Expansion Of Community Based Rehabilitation Into The Physiotherapy Curriculum In Ahfad University For Women, Sudan" in our organization. Therefore, we do not have any objection that Mr. Hassan Abdelnour collecting data from our organization.

Sincerily,

Marco Ferrante
OVCI Resident Representative

OVCI la Nostra Famiglia
Sudan head office: P.O. Box 40 - Omdurman; tel. / fax +249 (87) 566965 mobile +249 (0) 924068164 – [redacted]
Main Office: 22057 Pontn Lambro (Como) - Italy tel. +39 031625111

Appendix 8: Ethical clearance UWC

UNIVERSITY of the
WESTERN CAPE

OFFICE OF THE DEAN
DEPARTMENT OF RESEARCH DEVELOPMENT

7 November 2013

To Whom It May Concern

I hereby certify that the Senate Research Committee of the University of the Western Cape approved the methodology and ethics of the following research project by:
Mr H Abdelnour (Physiotherapy)

Research Project:	Evaluating the feasibility of the expansion of community based rehabilitation into the physiotherapy curriculum in Ahfad University for Women, Sudan.
Registration no:	13/5/16

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

The Committee must be informed of any serious adverse event and/or termination of the study.

Ms Patricia Josias
Research Ethics Committee Officer
University of the Western Cape

Private Bag X17, Bellville 7535, South Africa
T: +27 21 959 2988/2948 F: +27 21 959 3170
E: pjosias@uwc.ac.za
www.uwc.ac.za

Appendix 9: Written consent USADC

بسم الله الرحمن الرحيم

Usratuna Sudanes Association For Disabled Children

Vocational Training center

USADC_VTC

هيئة أسرتنا السودانية للأطفال المعوقين

مركز التأهيل المهني

النمرة:ج.أ.س.أ.م/م.ت.م/ 1009

التاريخ 4 / 7/ 2014 م

السيد / د/ حسن مبارك حسن

السلام عليكم ورحمة الله وبركاته

الموضوع :- طلب جمع الاستبيان

بالإشارة للموضوع أعلاه ورداً علي خطابكم بتاريخ 2014/7/4 نود أن نحيطكم علماً بانه لامانع لدينا من جمع الاستبيان من مركزنا للمساعده فى البحث .

ولكم جزيل الشكر

أ/عبير هلالى

المدير التنفيذى

أمدرمان – شارع العرضة – شرق جامعة الأحفاد للبنات

Tel::87461255 Fax:87461254

Appendix 10: Written consent NAPO

بسم الله الرحمن الرحيم

التاريخ :2014/8/14

السيد / مدير الهيئه القومية للاطراف الصناعية

المحترم

انا حسن مبارك عبدالنور طالب دكتوراة في مجال العلاج الطبيعي بجامعة ويسترن كيب في جنوب افريقيا واعمل بجامعة الاحفاد في كلية العلاج الطبيعي .

الرجاء التكرم بالسماح لي بجمع بعض الاستبيانات من مدينتكم العامره وذلك لمساعدتي في بحثي المتعلق بأحتياجات ذوي الإعاقة الحركيه.

ولكم مني جزيل الشكر والتقدير

حسن مبارك عبدالنور

جامعة الاحفاد

تلفون : 0902183005

Appendix 11: Written consent KCH

بسم الله الرحمن الرحيم

التاريخ : 2014/8/14

السيد / مدير دار ششر للاطفال المعاقين.

المحترم

انا حسن مبارك عبدالنور طالب دكتوراة في مجال العلاج الطبيعي بجامعة ويسترن كيب في جنوب افريقيا واعمل بجامعة الاحفاد في كلية العلاج الطبيعي .

الرجاء التكرم بالسماح لي بجمع بعض الاستبيانات من مدينتكم العامره وذلك لمساعدتي في بحثي المتعلق بأحتياجات ذوي الإعاقة الحركيه.

ولكم مني جزيل الشكر والتقدير

حسن مبارك عبدالنور

جامعة الاحفاد

تلفون : 0902183005

لا مانع لدينا من اي مساعدة
مع أمنياتنا بالتوفيق

Appendix 12: Written consent AUW

بسم الله الرحمن الرحيم

جامعة الأحفاد للبنات

Ahfad University For Women

8\6\2014

ETHICAL CLEARANCE CERTIFICATE

This is to certify that, the PhD proposal entitled "Evaluating the Feasibility of the Expansion of Community Based Rehabilitation into the Physiotherapy Curriculum in Ahfad University for Women, Sudan" has been approved by The Ahfad University Research and Ethical Review Committee.

The candidate Mr. Hassan Abdelnour is registered for PhD at University of Western Cape, South Africa.

Prof. Mutamad Ahmed Amin
Chairman, Research and Ethical Review Committee

Telephone / Fax (+249-187) 553363 - 579111
Arda Street P.O Box: 167 Omdurman-Sudan
Email: ahfad@sudanmail.net
www.ahfad.org
تلفون/ فاكس ٥٥٣٣٦٣ - ٥٧٩١١١ (١٨٧) (+٢٤٩)
شارع العرضة، ص.ب ١٦٧ أمدرمان - السودان

Appendix 13: Consent form

CONSENT FORM

Title of Research Project: Evaluating The Feasibility Of The Expansion Of Community Based Rehabilitation Into The Physiotherapy Curriculum In Ahfad University For Women, Sudan.

The study has been described to me in language that I understand and I freely and voluntarily agree to participate. My questions about the study have been answered. I understand that my identity will not be disclosed and that I may withdraw from the study without giving a reason at any time and this will not negatively affect me in any way.

Participant's name……..

Participant's signature…….

Witness……..

Date……

Should you have any questions regarding this study or wish to report any problems you have experienced related to the study, please contact the study coordinator:

Study Coordinator's Name: Prof. A Rhoda
University of the Western Cape
Private Bag X17, Belville 7535
Telephone: (021)959-2546
Fax: (021)959-1217
Email: arhoda@uwc.ac.za

Appendix 14: Editorial certificate

Idea Corporation t/a
AQUARIAN PUBLICATIONS

26 November 2018

To whom it may concern

Dear Sir/Madam

RE: Editorial Certificate

This letter serves to prove that the thesis listed below was language edited for proper English, grammar, punctuation, spelling, as well as overall layout and style by myself, publisher/proprietor of Aquarian Publications, a native English speaking editor.

Thesis title

EVALUATING THE FEASIBILITY OF THE EXPANSION OF COMMUNITY BASED REHABILITATION INTO THE PHYSIOTHERAPY CURRICULUM IN AHFAD UNIVERSITY FOR WOMEN, SUDAN

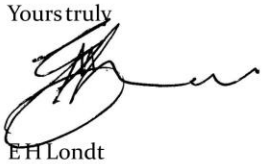
Author

Hassan M. Abdelnour

The research content, or the author's intentions, were not altered in any way during the editing process, and the author has the authority to accept or reject my suggestions and changes.

Should you have any questions or concerns about this edited document, I can be contacted at the listed telephone and fax numbers or e-mail addresses.

Yours truly



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P O Box 00000
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TELEPHONE
021 788 1577

FAX
021 788 1577

MOBILE
076 152 3853

E-MAIL
eddi.aquarian@gmail.com
eddi.londt@gmail.com

WEBSITE
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Turnitin Originality Report

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From EVALUATING THE FEASIBILITY OF THE EXPANSION OF COMMUNITY BASED REHABILITATION INTO THE PHYSIOTHERAPY CURRICULUM IN AHFAD UNIVERSITY FOR WOMEN, SUDAN (Thesis submission)

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