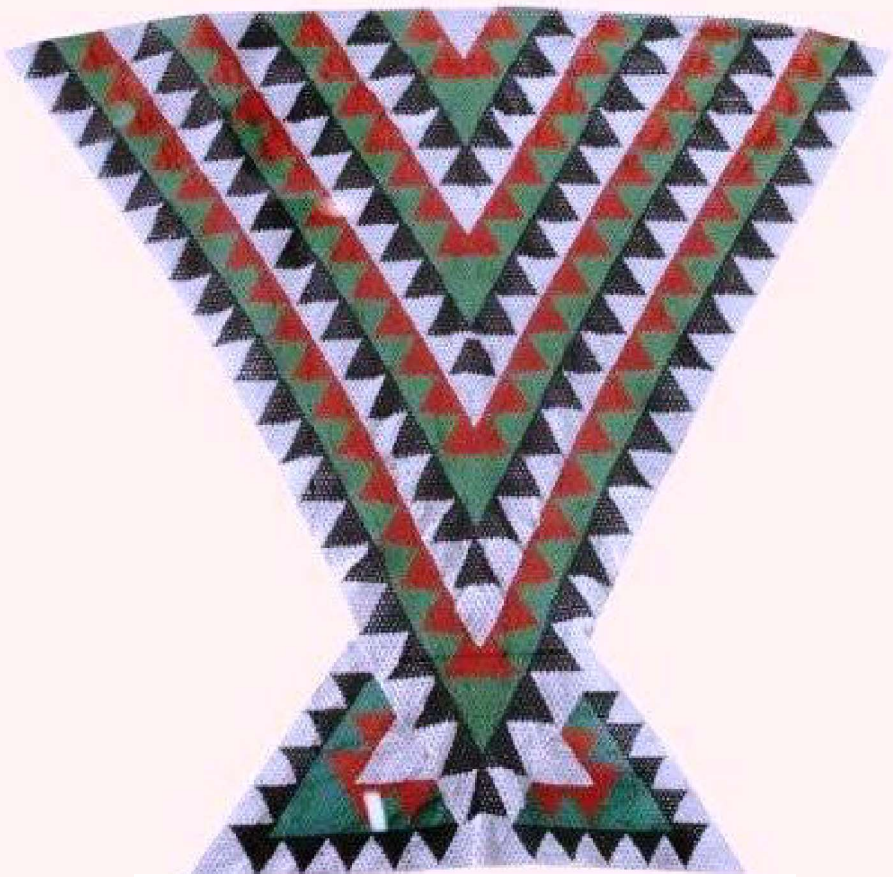
INKANYISO

The Journal of Humanities and Social Sciences



Volume 10(1) 2018

Inkanyiso

The Journal of Humanities and Social Science
ISSN 2077-2815
Volume 10 Number 1 2018

Publisher

Rosslyn Press, Academic Publishing and Editing:

Specialist English editing and final layout of academic theses, etc.

Pretoria, South Africa

Managing editor: Dr Ian Raper

Publishing editor: Mrs E van Dyk

rosslyni@lantic.net; www.rosslynpublishers.com

Inkanyiso

Journal of Humanities and Social Science
ISSN 2077-2815
Volume 10 Number 1, 2018

Contents

EDITORIAL

Dear Inkanyiso readers,

It is a pleasure to present *Inkanyiso* Volume 10(1) 2018 containing nine articles covering psychology, philosophy, education, information studies and indigenous knowledge.

The first article, 'Development of Ubuntu HeartMath Workshop for social coherence and spirit at work' by Steve Edwards, Emeritus professor at the University of Zululand, reports on the development of an Ubuntu type HeartMath Workshop for facilitating social coherence and spirit at work. The study provides evidence regarding the efficacy of the workshops in improving psychophysiological coherence, social coherence and work spirit. The second article, by Norman Rudhumbu from Bindura University of Science Education, Zimbambwe and Sreedevi Iyer from Botho University, Botswana, is 'The mediating role of assessments in the development of problem-solving skills in university students'. The study found that assessment strategies that include practical examinations, projects, portfolios, quizzes, short tests, in-class assessments (ICAs) and written examinations can be used to develop problem-solving skills in students, whereas oral presentations do not develop problem-solving skills. It is anticipated that the study outcome will play a significant role in conscientising university lecturers on the types of assessments which can be used for the development of problem-solving skills in their students. Research data management is increasingly considered by academic and research institutions for the proper preservation of data for access and use for research development. In the third article, by Emily Nge'no from Moi University, Kenya and Stephen Mutula from the University of KwaZulu-Natal, South Africa, titled 'Research data management (RDM) in Agricultural Research Institutes: A literature review', the two authors review literature in the domain with a view to sharing knowledge and providing understanding of the core issues of RDM such as: legal, policy and regulations in RDM; data curation; knowledge, skill and training required of RDM; ICT infrastructure for RDM; and collaborative partnerships influencing RDM. The authors acknowledge that RDM has been widely embraced in developed countries especially in agricultural research institutes, whereas Africa is making strides in grasping RDM to improve access, reuse and share research data. Overall, the findings revealed that RDM has been poorly managed in developing countries; the authors recommend the establishment of a legislative and policy framework for RDM; capacity building programs and plans, incentivizing of researchers, and providing a sound technical infrastructure. The fourth article focuses on a delicate subject, namely happiness, from a philosophical viewpoint. Edward Uzoma Ezedike from the University of Port Harcourt, Nigeria, in 'Happiness as an end: A critique of Aristotle's rational eudaemonism' examines Aristotle's concept of happiness as encapsulated in his *Nicomachean Ethics*. Aristotle argues that happiness is the supreme practical good because it is perfect, final, self-sufficing and complete in itself. The paper maintains that happiness is an elusive concept and, being 'transient, ephemeral and illusory,' cannot be seen as an end in physical absolute terms; when viewed from the standpoint of Plato's metaphysical dualism the author considers Aristotle's pronouncement on how to attain happiness to be inadequate. Another article on philosophy, 'A philosophical analysis of character education as panacea to Nigeria's leadership crises,' is by Okorie Ndukaku from Obafemi Awolowo University, Nigeria. Okorie argues that education without character is counter-productive and blames leadership crises in Nigeria for moral decadence in the country. The author advocates for moral education, right from elementary school level, with special emphasis on 'character education,' because both leadership and morality have implications for the relationship between humans in a society. The sixth paper focuses on clinical informatics. Kehinde Owolabi from Federal University of Agriculture, Nigeria and Neil Evans from the University of Zululand, South Africa, report in 'Clinical Informatics tools for healthcare quality improvement: A lit-

erature review' on recent research on clinical informatics focusing on types, benefits and challenges across the globe. Based on the reviewed literature, the two authors suggest that the article has the potential to inform policy makers, improve practice and contribute to research in the area of social informatics. Research on indigenous knowledge is growing. The seventh article reports on 'Ethnobotanical study of medicinal plants in southwestern Nigeria and traditional healers' perception of indigenous knowledge digitization'. Oluremi Abiolu from Federal University of Technology, Nigeria, has researched and identified plants, diseases they are used to treat, and has explored indigenous healers' perceptions of digitisation of their medical knowledge. They suggest that undergraduate university level education can be contributory to the preservation of medicinal plants.

The eighth paper focuses on library and information studies and is titled 'Exploring the usage of social media in public libraries in Mangaung Metropolitan Municipality, South Africa'. Molaodi Margaret Matobako from the University of South Africa and Williams Nwagwu from CODESRIA, Senegal, note that social media is one of the innovations which expands the option of web-based technologies to meet the needs of library users without access cost, and many public libraries in South Africa have embraced this technology. The study provides evidence of social media applications in the libraries for conventional and web-based services, but blames a lack of training activities, restrictive Wi-Fi access and poor services for access problems. The study has implications for social media research, development and usage in public libraries.

Animal rights is perhaps given more attention in developed countries than in other parts of the world. In the final article, 'How our rights affect their rights: Rethinking animal rights in Africa,' Victor Olanipekun from Obafemi Awolowo University, Nigeria, argues that animal rights protection has been given insufficient attention in Africa and blames socio-economic and political challenges confronting African countries, that also lead to human rights violations, for the neglect of animal rights. Olanipekun concludes that 'if human rights are taken seriously in Africa, animal rights will be taken seriously'.

Enjoy the reading
Dennis N. Ocholla, Editor-in-Chief, *Inkanyiso*, JHSS
www.inkanyiso.uzulu.ac.za

Inkanyiso

Journal of Humanities and Social Science
ISSN 2077-2815
Volume 10 Number 1, 2018

Contents

Development of Ubuntu HeartMath Workshop for social coherence and spirit at work

Steve Edwards[1]
Department of Psychology, University of Zululand, South Africa
sdedward@telkomsa.net

Abstract

This study reports on the development of an Ubuntu type HeartMath Workshop for the purpose of facilitating social coherence and spirit at work. The study employed a pre- and post-test, mixed methods, within subjects, outcome evaluative design. Data were collected in three workshops with a total sample of 10 women and 7 men, with mean age 38.23, and range 24 to 58 years. Pretesting and post-testing consisted of psychophysiological coherence, social coherence and spirit at work measures. The Ubuntu HeartMath Workshop procedure included HeartMath heart focused breathing and cultivating positive Ubuntu feelings, followed by instruction and group discussion of ways in which Ubuntu could promote social coherence with special reference to work spirit. Afterwards participants provided written experiential and evaluative descriptions of the workshops. Significant and meaningful quantitative and qualitative findings provided consistent evidence as to the efficacy of the workshops in improving psychophysiological coherence, social coherence and work spirit. Implications for the development and evaluation of further research with other participant samples in other contexts are discussed.

Keywords: Ubuntu, HeartMath, social coherence, spirit at work

1. Introduction

The broad theoretical framework in which the present study is located includes critical, theoretical considerations on Psychology in Africa, African Psychology, Afrocentric Psychology and Ubuntu psychology (Idemudia 2015; Makhubela 2016; Ratele 2017; Wilson, & Williams 2013). In its focus on Ubuntu this study is philosophically grounded in the work of Ngubane, (1977), Asante (1990, 2014) and Myers (1993). The original African notion of Ubuntu has become international. Some contemporary implications were conveyed by the Comparative and International Education Society (CIES) at its conference held in Washington DC under the theme "Ubuntu: imagining a humanist education globally." Selected papers from this conference subsequently appeared in the Special Issue of the United Nations Educational, Scientific and Cultural Organization (UNESCO) scholarly journal *International Review of Education*, Volume 62 Number 1 (Sefotho 2018). In South Africa, following the advent of democracy in 1994, the government, civil society and the private sector placed great faith in the idea of Ubuntu to build social cohesion. However Desai (2015) has also argued that while notions like social cohesion and Ubuntu have assumed increasing importance in nation building, high levels of poverty, inequality and mounting social protests have tended to dilute the original vision and mission and render any authentic implementation ineffective. It is within this contemporary context that Mkabela (2015) has explicated Ubuntu as a foundation for an Afrocentric psychology and research method and that Edwards (2016) has described Ubuntu and HeartMath as

1. Steve Edwards PhD, DEd, DTE is an emeritus professor and research fellow in the Department of Psychology, which he headed for many years, at the University of Zululand, South Africa. He is a clinical, educational and sport psychologist. This paper is revised from a keynote address he delivered at the 9th UNIZULU HSS Conference 2018.

complementary, integral healing approaches for promoting empathy, and coherent, social and moral consciousness.

The HeartMath system was created by Doc Childre to develop heart focused intelligence, health and wellbeing. Working with a small group of professionals, who represented a wide spectrum of scientific disciplines, experience and expertise, Childre established a non-profit research and educational organization, the HeartMath Institute, in Boulder Creek, California in 1991 (Childre & Martin 2000). Rigorous interdisciplinary heart focused research indicated patterns of profound coherence, harmony, interconnectedness and consistency, typically including a global order where the whole is greater than the sum of the parts (McCraty 2017). Major findings related to heart communication of electromagnetic, neurochemical, biophysical and hormonal information (McCraty, Atkinson, Tomasino & Bradley 2009). Also pioneered were a system of practical, heart based tools and techniques for people of all ages to use in the moment to relieve stress and promote health, creativity, intuitive insight and zoned performance, as well as biofeedback technology to facilitate heart rate variability (HRV) coherence feedback training (Childre, Martin, Rozman & McCraty 2016). Rigorous research has revealed that psychophysiological, social and global coherence may be optimized through coherent communication, sustained positive emotions and an intentional heart focus. This is readily initiated through a meditative 10-second cardio-respiratory rhythm (Edwards 2016). In that the scientific, evidence based efficacy of HeartMath methods on psychophysiological and personal coherence is now well-established, the main current research emphasis is social coherence.

Among many other connotations, Ubuntu refers to human social relationships, as idiomatically portrayed in the isiZulu saying *umuntu umuntu ngabantu*, literally a person is a person through others, in a fundamentally social world, as also tersely expressed in the German term “mitwelt”. It is in this existential, human, social, relational, “with world” or “we world” that human relationships are forged, begin, flourish or flounder, and end. Indigenous Zulu people have long recognized the fundamental importance of living a socially coherent, integrated life, where all dimensions of existence are harmoniously aligned (Edwards 2016). A typical cosmology, still found in many rural Zulu communities, is of an undivided universe, where plants, animals, humans, ancestors, earth, sky and the entire universe all co-exist in a varying state of balance between order and disorder, harmony and chaos (Ngubane 1977). To prevent disorder and chaos, there is the expectation that people must continually work at renewing harmony and social coherence *(nokubumbana komphakathi).* This work (*umsebenzi*) has many dimensions, including ancestral consciousness and socially coherent relationships characterized by dignity and respect (*Ubuntu*). In view of Csikszentmihalyi’s (1980) insights on phenomenological intentionality or directedness of consciousness, with specific focus on attention as psychic energy that determines what will or will not appear in human consciousness, it is entirely appropriate that the French word for consciousness. i.e. *conscience*, and the Nguni word *isazela,* both imply a moral connotation to consciousness

The isiZulu term for work (*umsebenzi*) implies a labor of love as in a cultural, spiritual ceremony or sacrifice. As work is also a main life context in which social coherence can occur, the research question arose as to whether Ubuntu HeartMath Workshops would facilitate psychophysiological coherence, social coherence and spirit at work. In view of the cultural and empirical evidence as to the value and effectiveness of Ubuntu and HeartMath, as independent variables, it was hypothesized that there would be improvements in associated dependent variables, involving psychophysiological and psychometric instruments, and that this improvement would be qualitatively endorsed by participants’ perceptions and experiences.

The primary purpose of this study was the development of an Ubuntu type HeartMath Workshop for facilitating social coherence and spirit at work.

2. Method

This exploratory research consisted of an integrated, mixed methods, within subjects, pre- and post-test, outcome evaluative design (Fetters, Curry & Creswell 2013). Data were collected in three workshops with purposive samples of University of Zululand, Educational Psychology masters students and staff. The student workshops comprised 5 and 7 participants respectively and the staff workshop 5 participants. The total sample consisted of 10 women and 7 men, with mean age 38.23, and range 24 to 58 years. Procedure consisted of pretesting on three measures, namely psychophysiological coherence, social coherence and spirit at work. The Ubuntu HeartMath Workshop package involved social coherence instruction, which included: Broodryk's (2006) table of personality values, life skills and application outcomes; HeartMath heart focused breathing, cultivating positive Ubuntu feelings, and general group discussion of ways in which Ubuntu could promote social coherence with special reference to work spirit. After post-testing on the three above-mentioned measures, participants provided written experiential and evaluative descriptions of the workshop.

Appropriate ethical clearance was obtained from the University of Zululand and respective psychometric test developers. All participants were informed of the nature of the research and provided written consent with regard to the use of the information for publication purposes. Participants were guaranteed nominal confidentiality and advised of their right to withdraw from the research at any stage.

The HeartMath tool, emWavePro, served as a general Heart Rate Variability (HRV) assessment instrument for psychophysiological coherence. This instrument was complemented by specific psychometric measures of social coherence and spirit at work. These instruments are described in more detail as follows:

HRV derived psychophysiological coherence was measured with one-minute recordings on the HeartMath biofeedback tool emWavePro. In this case, for pragmatic and time purposes, as each participant has to be tested individually, one-minute recordings of high coherence were chosen for pre-test and posttest purposes. Psychophysiological coherence is characterized by a heart rhythm pattern of elevated amplitude in low frequency heart rate variability of around 0.1 Hz, accompanied by positive emotions, indicating harmony between sympathetic and parasympathetic divisions of the autonomic nervous system. It is experienced as a state of relaxed alertness, which sportspersons describe as "being in the zone" (Childre, *et al*. 2016). The Quick Coherence technique, which was used in this study, involves such heart focused breathing while cultivating a sincere positive emotion from the heart area of the chest. It has been scientifically researched and developed, works immediately and is exceptionally useful as an in-the-moment meditation technique to facilitate physiological coherence, improve consciousness and develop concentration. As an immediate antidote to the evolutionary, emotional, default mode network expressed in the form of fight, flight and freeze reactions, a conscious practice of heart focused breathing slows the system down and facilitates identification and focus on a particular positive emotion and/or experience, in this case social coherence and work spirit.

The Sense of Coherence measure consisted of an adapted and shortened nine-item version of Antonovsky's (1987) scale, with a Cronbach alpha reliability coefficient of .79. Antonovsky's (1987) original scale has three subscales, which measure the degree to which persons perceive their world as manageable, meaningful and predictable. The shortened version used in the present study has been shown to demonstrate high internal reliability and concurrent validity when assessed against Antonovsky's original 29-item measure (Klepp, Mastekaasa, Sorensen, and Sandanger & Kleiner 2007). Participants' reported their feelings in relation to items such as, "Do you have the feeling that you don't really care about what goes on around you?" on a nine, seven point Likert-type scale anchored by the terms "very often" and "very

seldom". The adaptation simply consisted in changing the personal pronouns in the scale from the singular "I" to the plural "we" form.

The Spirit at Work Scale (SAWS) refers to an 18-item measure assessing the experience of spirituality at work, which developed from factor analyses of a 102-item scale with a sample of 333 participants. Analyses reveal high internal consistency for both the total scale (= .93), indicating a short, psychometrically sound, and easy to administer measure that holds much promise for use in research and practice (Kinjerski, & Skrypnek 2006a, 2006b).

The small non-representative sample with repeated measures indicated means and Wilcoxon Z non-parametric testing. The conventional probability level of $p < 0.05$ was set for significant statistical comparisons. Braun and Clarke's (2006) thematic analysis, chosen to analyse participants' experiential descriptions, consisted of the following six phases (1) familiarising with the data, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, (6) producing the report.

3. Results

3.1 Quantitative findings

Quantitative findings are presented in Table 1 in the form of measures' mean pre-test and post-test scores, standard deviations (SD's) and Wilcoxon statistics.

Table 1 Measures' mean pre-test post-test scores, standard deviations (SD's) and Wilcoxon statistics

Measure	**Pre-test**	**SD**	**Post-test**	**SD**	**Wilcoxon Z**	**Probability**
Psychophysiological Coherence	29.0	32.97	77.85	24.71	2.97	.003
Social Coherence	40.06	7.32	45.06	7.17	2.73	.006
Spirit at Work	80.59	12.82	87.95	13.05	3.52	.000

Quantitative findings should be treated with caution owing to the relatively small number of participants. However, as is apparent in Table 1, there were clear trends in the form of mean score increases from pre-test to post-test in psychophysiological coherence, social coherence and spirit at work perceptions. Wilcoxon testing for physiological coherence yielded statistics of $Z = 2.97$, $p = .003$; for social coherence $Z = 2.73$, $p = .006$ and $Z = 3.52$, $p = .000$ for spirit at work respectively.

3.2. Qualitative findings

Five central, overlapping, themes emerged from thematic analysis of the written experiential descriptions. Themes were respectively coded as consciousness transformations, psychophysiological coherence, Ubuntu meanings, social coherence facilitation and spirit at work facilitation. These themes and examples from the seventeen participants follow, with students coded A to L, and staff coded M to Q respectively, all used in their original sequence adopted for audit trail purposes.

Consciousness transformations were experienced through awareness, sensations, perceptions, emotion and cognition as conveyed in such terms as heartbeat, breathing, feeling, experiencing, mindfulness, and enhanced connectedness.

The heart breathing exercise brought on calmness and centeredness. Slowing the heartbeat pushed away all other thoughts (A). It brought calmness in my body. I was able to accept myself as I am. (B). It was enriching and I feel empowered with the Ubuntu breathing techniques (C). There was a sense of positive emotional state (D). I felt a calm sense of calmness in my shoulders, and then I felt happiness (E). I have been reminded to learn more about the powers and abilities of thoughts, mind and social coherence (J). It was enlightening to learn that I can be in control of my feelings (H). It was an amazing experience learning how to connect with yourself and others (K). Being able to connect and feel a sense of calmness and respect for yourself makes the world seem "perfect" (K). It meant being aware of your consciousness, to be in control of things and let yourself grow positively (L). It was mind-opening. I now know that I can control my experiences in life. I know the benefits of staying positive in life (Q).

Psychophysiological coherence experiences were appraised for their practical intervention skills, for example in managing feeling, upgrading personal and therapeutic skills.

The workshop flowed. I enjoyed the practical components, which added useful skills for intervention. (E). Practical coherence was eye-opening to say the least, amazing work indeed (G). Coherence can also be within a person, it does not only apply to the relationship with other people (H). I experienced coherence with colleagues during a support group facilitation (F). It allows people to get in connection with themselves. (F). It upgraded my skills for handling therapy with my clients and alerting me on what to take note of (I). It is a powerful tool (J). Being able to switch emotions and have control over your feelings and thoughts is just amazing (K). I learnt the therapeutic strategy of focusing power of the heart to reconnect with society (K). I learnt to control and manage my feelings from negative feelings to positive feelings (L). It was informative in that human beings are spiritual and technology is attempting to establish the link between human beings and their spiritual world (O).

Ubuntu meanings were experienced personally, emotionally, interpersonally, communally, socially, nationally, and spiritually, as conveyed in such terms as: enlightening, sharing, caring, non-judgemental, tolerant, compassion, emotional intelligence, culture, Spirit of Ubuntu, indigenous healing.

The workshop was enlightening and brought back thoughts of Ubuntu and what it means to me personally (A). The Spirit of Ubuntu can expand and togetherness can be truly felt by all individuals (A). Ubuntu means being able to have emotional intelligence, to be non-judgemental and tolerant to other human beings (B). By practising Ubuntu one becomes open-minded, one learns tolerance, one is more sympathetic and compassionate (B). The workshop was enriching and I feel empowered with the Ubuntu breathing techniques (C). Emotional stability can be achieved through Ubuntu, the culture of sharing and caring for others (D). The Spirit of Ubuntu can be developed and improved by mindfulness of body, heart and breath (E). I exercised Ubuntu in helping those with problems of mild to moderate depression (F). It definitely made me appreciate Ubuntu and to establish a stronger sense of coherence with my colleagues. The goodness of the heart is important (F). It helped by showing that there are other means that people believe in and helping them to solve their problem consulting indigenous healers, *izinyanga, izangoma etc* (I). Participating in "*woza umoya*" with a group created a sense of peace and harmony, the concept of Ubuntu, of being one and working together as a group (K).

Social coherence facilitation occurs through personal and social interconnectedness, togetherness, group belonging, trust, acceptance, support, empowerment and collaboration.

I think if we can begin to work together we can live happily (B).This workshop will be valuable in community projects, cultural celebrations which gather us all in shared values, belief and morals, at general meetings where we air our views. This could involve local government, to pass on to provincial and national government. It will be valuable in forums to fight social ills and any community meetings in general (C). Social coherence also includes supporting and

educating each other, empowering oneself so one can empower others, understanding oneself and others (C). It is when we connect with ourselves that we can truly connect with others. Our mindfulness can also be socially modelled to others (E). The workshop also demonstrated the motto “together we can do more” when it emphasised social coherence (G). Sharing and learning from each other helps by understanding the situation from different perspectives (K). Social coherence can bring peace and promote mutual relations in the family and at work (L).

Spirit at work facilitation occurs through enhanced spirituality, collaboration, harmony, cultural understanding, work ethic and related principles.

I am able to work with others peacefully. I think if we can begin to work together we can live happily (B). The workshop was very meaningful as it assisted me to gain understanding of how different religions and cultural practices can be important to some individuals (F). It emphasized the importance of working coherently in harmony as a group and the benefits of doing so (F). The workshop was amazing really, finally finding academic work that touches on the different spiritual routes (G). Spiritually the heart, the soul are all central to who we are, who we aspire to be as human beings and as therapists who happen to belong to a social group (G). It was about connecting positively with life and wisdom. Respecting other people’s beliefs, culture and values (J). It’s about harmony, spirit of togetherness, one love, one heart (J). It takes you to a higher spiritual level with your Creator (K). It was so informative and one learnt and benefitted a lot. (M). An amazing day, enlightening and inspiring (N). For me the concept of justice is central to everything and has connections with the other values and principles, like freedom, social justice, peace and harmony; all these will breed goodness. What theoretical and methodological approaches should inform us? How could each achieve all this? (P).

4. Discussion

Integrative, quantitative and qualitative findings provided comprehensive, consistent evidence as to the efficacy of the workshops in improving psychophysiological coherence, social coherence and work spirit. Befitting psychologists whose work concerns the welfare of others, underlying the general theme of consciousness transformations, findings reveal a specific, interconnecting, social consciousness theme of the reflexive, participant-observer, intentionally witnessing the self, others and the contextual, socially coherent world. This is likely associated with the additional, heart breath awareness facilitated by the Quick Coherence technique elevating consciousness to what is conventionally described as a higher vibrational level typical of meditation (Childre, *et al*. 2016). HeartMath HRV studies attribute this to improved autonomic balance as well as a general shift towards the higher frequency of the parasympathetic nervous system as stimulated by increased vagal activity (McCraty 2017). Porges’ (1994) polyvagal theory associates such activity with those social nurturing activities that have ensured evolution and survival of humanity. If workshops function to enhance social consciousness, they will greatly benefit humanity.

Human history reveals that being human inevitably implies an ongoing, endemic struggle between survival and destruction, creativity, work and destructiveness, coherence and incoherence, suffering and compassion, flourishing and floundering. Nowhere are these truisms more apparent than in human social relationships, graphically portrayed in the German term “mitwelt”. It is in this existential, human, social, relational, “with world or “we world” that human relationships are forged, begin, flourish or flounder, and end. Here the unavoidable “givens” of life are most starkly apparent. Richo (2005) has described five such givens as: everything changes and ends, things do not always go according to plan, life is not always fair, pain is a part of life, and people are not loving and loyal all the time. Richo (2005) opines that these givens also bring humanity’s greatest gifts, such as joy and compassion. This study points towards social coherence as a fundamental way humans can comfortably negotiate such givens.

The development of Ubuntu HeartMath approaches to promoting psychophysiological and social coherence, and related dimensions such as team spirit, is still in early stages. Clearly more suitable, standardized, collective measures of psychophysiological and social coherence need to be developed. A bioenergetics communication system has been found in highly coherent group contexts. Social coherence studies have provided evidence that people trained in achieving high states of heart coherence can facilitate coherence in other people (McCraty 2017). Further, improved, technology is currently being developed and tested for assessment, accurate measurement and facilitation of social coherence, as well as synchronized activity amongst group members that typically only occurs in high functioning and effective teamwork contexts. Personal communication with the HeartMath Research Director, Rollin McCraty, indicates that a social coherence app should be publicly available some time in 2018.

Present study findings have implications for the development and evaluation of further research by other researchers with other participant samples in other contexts. Two follow-up Ubuntu HeartMath workshops as presented by the author and piloted in the UK have yielded similar trends, although not as quantitatively significant, indicating a great need for improved social coherence promotion and related strategies. However, it was also apparent that although participant groups from local UK university and private practice settings were aware of the theory and practice of Ubuntu, their approach seemed more individual and less communal in orientation, which was understandable in that most participants had not grown up with the full holistic meaning of this ethos in its depth, breadth and height dimensions. In international contexts, this may mean that the concept and its everyday practice will need to be broken down and promoted in smaller meaning units, as, for example, in Broodryk's (2006) comprehensive table of Ubuntu personality values, life skills and application outcomes. This table formed a relatively minor part of the instructional package for the African workshops.

Table 2: Ubuntu life skills

Ubuntu personality values	**Ubuntu life skills**	**The outcomes of application**
Togetherness	facilitating togetherness	improved teamwork, family atmosphere, moral support
Brotherhood	implementing brotherhood	experienced unity, *simunye* (we are one), solidarity, commitment
Equality	support equality	practised non-discrimination, acceptance by all
Sharing	endorsing sharing	created different responsibilities, happiness and sorrow-participation
Sympathy	expressing sympathy	applied listening, problem analysis, consolation
Empathy	practising empathy	established open-mindedness, understanding
Compassion	honouring compassion	valued peace, cohesion, warmth
Respect	maintaining respect	structured order, discipline, dignity
Tolerance	allowing tolerance	self-controlled calmness, coolness, forgiveness
Humanness	saluting humanness	lived softness, bliss-ness, helpfulness

Harmony	propagating harmony	resulted steadiness, non-chaos, clarity of vision
Redistribution	redistributing wealth (and knowledge)	obtained sustainability, cooperation, capacity, empowerment
Obedience	applying obedience	justified relationship, convention, custom, values, norms
Happiness	living happiness	enjoyed spontaneity, long life, friendliness
Wisdom	loving wisdom	executed resolution, decision, evaluation, happiness

One principle behind further development of social coherence strategies, in general, is that these will, in all probability, have to be tailored to suit the particular participant group or community. An alternative strategy long used in community psychology research and action is to optimize existing resources, skill and strategies. For example, Ebersohn (2012) has worked on optimizing and promoting an African collective strategy she describes as 'flock' to 'fight and flight,' in a "honeycomb of resilience where supply of relationships meets demand for support". It is instructive that Nelson Mandela used rugby as an existing resource to build the South African nation following the demise of apartheid and development of South Africa's new democracy. In discussing spiral dynamics, Butters (2015) notes that Don Beck made more than sixty trips to South Africa over this transitional period and is credited with supporting Nelson Mandela in changing South African collective consciousness – bringing about a peaceful end to apartheid when much of the nation's population was bent on revenge against its former oppressors. As seen in the movie *Invictus* (2009), Mandela devised the strategy of using a rugby game to transcend racial and class identification and unify the country. Here Butters (2015, p. 70) described the real value of this strategy as highlighting and bringing into focus a value system that was already there.

A further Educational Psychology department staff workshop on the theme of ways in which Ubuntu might promote social coherence, which took place after the first masters student workshop, yielded the following summary findings.

"Interpretations of Ubuntu are broad, but converge around the goodness of the human heart, kindness of the human spirit, selflessness of humankind and togetherness in spirit, mind, and soul. For one participant, Ubuntu epitomizes ideal humanity in the form of love, compassion, caring, consideration and genuineness. In the South African context, critical thought was expressed or implied by all participants, with regard to behavior lacking in Ubuntu, which included war, violence, crime, genocide, racism, jealousy, destructive competition, vengeance, retaliation, retribution and egocentric selfishness. The common experiential theme was that Ubuntu guaranteed an infinity of social promotion resources, that much has been achieved, much was possible, and much still needed to be done to promote social coherence. This theme was unpacked further as follows**:** throughout known history, Ubuntu has promoted and continues to promote social coherence in many ways and at many levels, conceptually, philosophically, psychologically, humanly, personally, inter-personally, socially, communally, spiritually, legally, politically, economically, and at various levels, locally, internationally and globally. For another participant, this implied greater openheartedness to promote social coherence and combat violent crimes. If instilled at a very young age it can promote health, respect, trustworthiness, harmony and peace for future generations. Participants also emphasized various ways in which Ubuntu might promote social coherence, such as mentoring, helping people to share their stories, identify with one another and realise their mutual need through monitoring actions towards the spirit of reciprocal

living in constant communication with others and nature; through meaning, inter-human and environmental relationships and through neighborly caring and sharing" (Hlongwane, *et al.* 2018**).**

Finally, the many limitations of the present study need to be acknowledged. These include its small-scale exploratory nature and lack of a control group. Phenomena such as the placebo, Hawthorne effect and general relationship as well as expectancy variables will have featured. Certainly, from a critical and reflexive perspective, the study will have been influenced by the authors' knowledge, experience and relationships with staff. Further research is needed to generalise and/or transfer findings in different contexts with other researchers, participant samples and methods. Randomised controlled studies are recommended to control for experimenter effects, including enhanced expectancies of participants, who were fully motivated and informed as to Ubuntu and HeartMath social coherence findings. Such randomised controlled studies are also specifically needed for any causal inferences to be postulated with regard to quantitative data as well as various other considerations that usually operate in such applied developmental research.

Conclusion

An Ubuntu HeartMath integrative approach empathizes morals, virtues, values and principles, of order beyond chaos, of balance between polarities, of finding the golden mean and achieving harmony amongst distinguishable but inseparable relations such as body, mind, soul, individuals and collectives. Recognizing the dynamic reality of endemic, conflicting energies and forces in the universe, the Nguni practice of *ukulungisa* involves harmonizing human, environmental and ancestral relationships. In this sense, harmony becomes an original and fundamental value of excellence, inclusive of beauty and truth, similar to what was celebrated in ancient Greece as *arête.* Although the development of Ubuntu HeartMath approaches to promoting social coherence and work spirit is still in its infancy, promising findings are that such workshops do have potential for raising awareness of the great need for contemporary humanity to develop greater social consciousness, moral actions and ethical behavior. Underlying phenomenological principles of intentionality of consciousness and sustained attention are needed. If this is directed towards Ubuntu in a coherent heartfelt way, as in awareness, dignity, respect, valuing of and focus on coherent communication and beneficial human relationships, it seems reasonable to predict that these will probably continue to be associated with generally improved social consciousness and behavior.

Acknowledgements

This work is based on research supported by the University of Zululand and the South African National Research Foundation (NRF). Any opinion, finding and conclusion or recommendation expressed in this material is that of the author(s) and the NRF does not accept any liability in regard thereto.

References

Antonovsky, A. 1987. *Unravelling the mystery of health.* San Fransisco, CA: Jossey Bass.

Asante, M. K. 1990. *Kemet, Afrocentricity and knowledge.* Trenton, NJ: Africa World Press.

Asante, M.K. 2014. *Afrocentricity: toward a new understanding of african thought in the world.* In M.K Asante, Y Mijke & J Yin. The Global Intercultural Communication Reader (2nd Edition, Pp. 1-110). New York, NY: Routledge.

Braun, V., & Clarke, V. 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101.

Broodryk, J. 2006. *Ubuntu African life coping skills: theory and practice, in recreating linkages between theory and praxis in educational leadership*. The Commonwealth Council for Educational Administration and Management (CCEAM) conference, SouthAfrica.*http:// www.topkinisis.com/conference/CCEAM/wib/index/outline/PDF/ BROODRYK%20Johann.pdf*. Accessed 27-04-2015.

Butters, A.M. 2015. A Brief History of Spiral Dynamics. *Approaching Religion*, 5 (2), 67-78.

Childre, D. L., Martin, H., Rozman, D., & McCraty, R. 2016. *Heart intelligence. Connecting with the intuitive guidance of the heart*. HeartMath, CA: Waterfront Press.

Csikszentmihalyi, M. 1990. *Flow. The psychology of optimal experience.* New York, NY: HarperCollins.

Desai, A. 2015. An Exploratory Critique of the Notion of Social Cohesion in contemporary South Africa. *Psychology in Society*, 49, 99 – 113.

Ebersohn, L. 2012. Adding “flock” to “fight” and “flight”. A honeycomb of resilience where supply of relationships meets demand for support. *Journal of Psychology in Africa*, 22(1), 29-42.

Edwards, S.D. 2016. HeartMath and Ubuntu integral healing approaches for social coherence and physical activity. *African Journal for Physical Activity and Health Sciences (AJPHES),* 22(1), 49-64.

Edwards, S.D., Makunga, N. V., Ngcobo, H. S. B. & Dhlomo, R. M. 2004. Ubuntu: A cultural method of mental health promotion. *International Journal of Mental Health Promotion, 6*(4), 17-22.

Fetters, M. D., Curry, L. A., & Creswell, J. W. 2017. Achieving integration in mixed methods designs - principles and practices. *Health Service Research Journal*, *48*(6), 2134-2156.

Hlongwane, M.M, Govender, S., Makhubu S.S., Makhonza LO, Kent, D., Ochiogu S.N. Gumede, G. V., Nzima, D.R., & Edwards, S.D. 2018. African centered investigation into ways in which Ubuntu can promote social coherence. *Indilinga. African Journal for Indigenous Knowledge Systems.* In press.

Idumedia, E.S. 2015. Psychology in Africa or African Psychology? Discourse on paradigm shift in psychotherapy and psychological practice in Africa. *World Journal of Psychotherapy*, 1(8), 2-7.

Kinjerski, & Skrypnek, 2006a. *Measuring the intangible: Development of the Spirit at Work Scale.* Paper presented at the Sixty-fifth Annual Meeting of the Academy of Management, Atlanta, Georgia.

Kinjerski, V. & Skrypnek, B.J. 2006b. A human ecological model of spirit at work. *Journal of Management, Spirituality &* Religion, 3(3), 232-239.

Klepp, O. M., Mastekaasa, A., Sorensen, T., Sandanger, I. & Kleiner, R. 2007. Structure analysis of Antonovsky’s sense of coherence from an epidemiological mental health survey with a brief nine–item sense of coherence scale. *International Journal of Methods in Psychiatric Research,* 61(1), 11-22.

Makhubela, M. 2016. From Psychology in Africa to African Psychology: Going nowhere slowly. *Psychology in Society,* 52, 1-18. *Http://Dx.Doi.Org/10.17159/2309-8708/2016/N52a1.*

McCraty, R, 2017. New frontiers in heart rate variability and social coherence research: techniques, technologies, and implications for improving group dynamics and outcomes. *Frontiers in Public Health,* 5, 1–13.

Mkabela, Q. N. 2015. Ubuntu as a foundation for researching African Indigenous Psychology. *Indilinga. African Journal of Indigenous Knowledge Systems*. 14, 284-291.

Myers, L.J. 1993. *Understanding an Afrocentric World View: Introduction to an optimal psychology*. Dubuque, IL: Kendal Hunt.

Ngubane, H. 1977. *Body and mind in Zulu medicine.* London, England: Academic Press.

Porges, S.W. 1994. Orienting in a defensive world. Mammalian modifications of our evolutionary heritage. A polyvagal theory. *Psychophysiology,* 32, 301-318.

Ratele, K. 2017. Frequently asked questions about African Psychology. *South African Journal of Psychology*, 47(3), 273–279.

Richo, D. 2005. *The five things we cannot change and the happiness we find in embracing them*. Boston, MA: Shambhala.

Sefotho, M.M, 2018. *Philosophy in education and research.* African Perspectives. Pretoria, RSA: Van Schaik,

Wilson, D. & Williams, V. 2013. Ubuntu: Development and framework of a specific model of positive mental health. *Psychology Journal,* 10(2), 80-100.

The mediating role of assessments in the development of problem-solving skills in university students

Norman Rudhumbu[1]
Faculty of Science Education, Bindura University of Science Education, Zimbambwe
nrudhumbu@buse.ac.zw; nrudhumbu@gmail.com

Sreedevi Iyer[2]
Faculty of Computing, Botho University, Botswana
sreedevi.iyer@bothouniversity.ac.bw

Abstract

The purpose of the study was to examine the mediating role of assessments in the development of problem-solving skills in university students at a selected university in Botswana. The study was specifically an attempt at identifying assessment strategies and question types that promote the development of problem-solving skills in university students. As part of the study, challenges which are faced by lecturers that militate against the development of assessments for the development of problem-solving skills in students were identified. The study used samples of 438 students and 108 lecturers selected using a stratified random sampling procedure to collect data about the role of assessments in the development of problem-solving skills in university students. A structured questionnaire that used a 5-point Likert scale was used for data collection. Collected data was analysed using SPSS version 24. Results of the study showed that assessment strategies that include practical examinations, projects, portfolios, quizzes, short tests, in-class assessments (ICAs) and written examinations can be used to develop problem-solving skills in students, while oral presentations do not develop problem-solving skills in students. It was also found that assessment type questions that include essays, case studies, short answer and assertion/reasoning questions could be used to develop problem-solving skills in students, while assessment question types such as multiple choice, fill-in the blanks, matching and true or false do not lead to the development of problem-solving skills in university students. Results of this study will play a significant role in conscientising university lecturers on the types of assessments which can be used for the development of problem-solving skills in university students.

Keywords: assessments, problem-solving, students, development, assessment strategy, question type, university

Introduction

Assessments are an important part of higher education quality assurance as they determine the extent to which learning is taking place. They not only act as a measure of academic standards, but also play an inevitable role in molding student behavior and their future (Higher Education Academy, 2012). Assessments can motivate students to study (Quality Assurance Agency for Higher Education (QAA), 2012; Stassen & Doherthy 2001). Assessments are a continuous process throughout higher education and make the higher education sectors' expectations

1. Norman Rudhumbu PhD is an associate professor and Acting Dean of the Faculty of Science Education at Bindura University of Science Education, Zimbabwe.
2. Srideevi Iyer PhD is a lecturer in the Faculty of Computing, Botho University, Botswana.

explicit to the learners. Assessments are structured with the aim of setting high standards of quality in learning. They represent a constructive process which involves collecting assessment evidence for every learner and comparing their achievements against set expectations. From a higher education view point, the outcomes of quality assessments are not only restricted to student success, but also to creating a "shared academic culture", which can in turn lead to improvement of quality in higher education (QAA 2012).

Research shows that problem-solving skills equip students to encounter and solve problems in their professional and personal lives. In his study on the development of problem-solving skills in university students, MacDonald (2014) found that problem-solving skills help students to be confident, creative and effectively manage change, while Mills and Kim (2017) also found that students with a high degree of problem-solving skills are able to solve complex and sometimes complex challenges they face in their everyday lives. Graduates with such abilities are proven "skilled thinkers" and "innovators" who can be a worthy addition to the global economy. Consequently, national and international bodies are urging universities to produce graduates who have the knowledge and skills to solve problems in varied contexts. Research shows that this skill also finds expression in employability, since employers now look for varied problem-solving skills such as creativity, innovation, practicality, independence, team playing, among others in university graduates (Crebert *et al*. 2011; Darling-Hammond *et al*. 2013). This study therefore focuses on assessments and their role in the development of problem-solving skills in university students.

Universities the world over use different types of assessments when seeking to establish the learning progress of their students. Such assessments include practical examinations, projects, portfolios, quizzes, short tests, in-class assessments (ICAs), written examinations, essays, case studies, short answer and assertion/reasoning questions. Despite having a multiplicity of these assessments types, there is no study known to the researcher that has been conducted, in the context of Botswana, to establish which of these assessment types can be used to develop problem-solving skills in students. This study therefore is an attempt to fill the research gap on the role of assessments in the development of problem-solving skills in university students as well as on the challenges lecturers face when developing such assessments.

Research questions

1. What are the views of students and lecturers towards the role of assessments in the development of problem-solving skills in university students?
2. Which assessment strategies and question types can be used in universities to develop problem-solving skills in university students?
3. What factors related to assessment act as challenges to the designing and implementation of assessments for the development of problem-solving skills in university students?

Literature review and theory

This study aimed at establishing assessment strategies that can be used to develop problem-solving skills in university students, hence it is informed by the dynamic assessment theory whose focus is on problem-solving abilities through assessments. The dynamic assessment (DA) theory is defined as an "active teaching process", which continually assesses a student's perception, learning, thinking and problem-solving skills (Rahbardar, Abbasi & Talaei 2014). Among some of the objectives of the DA theory are (i) assess student's grasping capacity, (ii) assess the amount of teacher time investment to make the student understand concepts, (iii) identify any cognitive functions that are deficit in students, and (iv) identify "special factors" (impulsivity, planning behavior) that are not related to intelligence that lead to student failure to develop critical thinking and problem-solving skills. This theory helps lecturers understand

cognitive problems of students which act as barriers to the development of problem-solving skills in students (Rahbardar, Abbasi & Talaei 2014; Birjandi, Estaji & Deyhim 2013). The DA theory is viewed as a framework that integrates teaching and learning to understand learners' cognitive abilities, and appropriate actions to facilitate effective learning process (Birjandi, Estaji & Deyhim 2013; Lantolf & Poehner 2010; Lantolf & Poehner 2010; Malmeer & Zoghi 2014). DA also suggests that some learners can achieve learning outcomes at a faster rate than others, and hence learners' pace of learning is very crucial to their success. It is also noteworthy that a student's performance on one assessment is not enough to generalize the abilities and skills developed by the student. Mediation should be appropriately utilized to assist students from failure (Lantolf & Poehner 2010; Ozgur and Kantar 2012). In the next section, the paper focuses on the concept of assessment, and the nature of assessments that can be used for developing problem-solving skills in university students.

2.1 The concept of assessment

According to McCulloch (2007), the term "assessment" is derived from the Latin word *ad sedere*, which refers to the procedure that is used to assess/measure student learning. Assessments provide insight into (i) the concepts that students consider as important, (ii) time spent by students for academic purposes, and (iii) the perspectives of students about themselves (McCulloch 2007). An important definition of assessments is suggested by The Quality Assurance Agency for Higher Education (QAAHE) (2012) which avers that assessment is the process that "appraises" students' knowledge, content understanding, abilities and skills that are required to pursue their future careers. Assessments therefore form a very crucial part of higher education not only for students, but also for teachers and the society. Assessments provide students with feedback, help them to identify their strengths and weaknesses, and encourage them to successfully complete the programmes (McCulloch 2007; Fletcher *et al*. 2011; Spiller 2012; QAAHE 2012; Sotardi and Brogt 2016).

2.2 Challenges in designing assessments for developing problem-solving skills

Assessments that appropriately test the learning outcomes and also promote the development of problem-solving skills in students are not easy to design. Some of the major challenges faced by many higher education institutions in this regard are (i) uncertainty on what to measure, (ii) lack of commitment showcased by institutional leadership, (iii) lack of commitment from faculty, and (iv) difficulty in identifying valid and reliable assessment instruments (Nunley, Bers & Manning 2011). Apart from the general issues stated above, there are more serious and overlapping concerns for higher education institutions in terms of designing and implementing assessments that develop problem-solving skills in students. Some of these diverse challenges in executing effective assessments are identified by Nunley, Bers and Manning (2011), explained as follows:

i. higher education institutions have multiple missions – students enter higher education with varied expectations like acquiring a degree or transfer, understanding the content, and/or obtaining the programme credentials. These varied expectations from the students necessitate different approaches to assessing student learning;

ii. student characteristics – students in higher education possess varied characteristics such as pre-college level reading and writing skills, not adhering to the right path of developmental courses like math, irregular attendance, difficult economic and family conditions, dropping out of college, etc … that make assessments difficult to design and execute if each of these students' needs are to be satisfied;

iii. scarcity of qualified staff – Faculty members who are qualified and skilled enough to design assessments that effectively assess learning outcomes are limited in most of the higher education institutions;

iv. limited funds – many higher education institutions do not have enough funds to cover assessment development costs to provide appropriate stipends to the faculty involved in the process;

v. time constraints - in many cases faculty members in higher education institutions are not provided adequate time to effectively develop assessments;

vi. less engagement from faculty members as a result of a wide range of barriers that result in low faculty interest to carry out assessments and which according to Emil (2011: 49) include: (a) time constraints due to teaching work load, (b) lack of skills and knowledge to conduct effective assessments, (c) faculty lacks support and encouragement from administration departments, (d) part-time faculty members may not undergo training on assessments, and (e) limited use of technology to support effective assessment development;

vii. adjunct faculty's involvements in assessment – Such faculty members often conduct evening lessons and are not available during the discussions about assessments, and it might become difficult to reach the outcome of discussion with clarity to them; and

viii. higher education institution's policies and practices regarding assessments – lack of interest and involvement from higher authorities within and outside the institutions can create low motivation in faculty members, thus affecting their willingness to create and execute effective assessments.

To construct and conduct good assessments at University, Sotardi and Brogt (2016) suggest that knowledge resources are very important. Knowledge resources are the knowledge the student will gain through the module content and educational experience during the course of study. These include discipline specific skills (also known as transferable skills) which are competent in nature such as self-management skills (like critical thinking and problem-solving), content specific information and knowledge, and task specific skills (Sotardi and Brogt 2016). These skills can be a deciding factor with regards to the nature of student results.

2.3 Types of assessment methods

According to SQA (2015), choosing appropriate assessment methods is crucial to student learning, and requires professional expertise and knowledge in terms of module content and important skills students should develop. Some of the commonly used assessment methods that enhance problem-solving skills are assignments, case studies, professional discussions, projects, simulations, work-integrated learning, and work-based learning (Derrell 2015; SQA 2015).

Once an assessment method has been chosen, the next step in setting a good assessment is to understand the different types of questioning techniques available. The choice of questioning techniques will depend on the benefits and challenges of each of the types of questions. According to SQA (2015), the questioning types that enhance the development of problem-solving skills are assertion/reasoning, essays and short answers. Other types of questions such as true/false, matching, grid, multiple choice, restricted response and structured questions are shown as not being capable of developing problem-solving skills in students (SQA, 2015).

From the above discussions it is evident that assessment criteria and scheme must be considered as very crucial elements of any assessment. This is because assessment criteria define the knowledge, skills, and other qualities that need to be assessed. Ulster University (2016) posits that assessment criteria should also provide clarity on the standards of achievement for every grade or mark. Marking schemes, on the other hand, provide clarity on the strategies to award marks for every element of performance. The Quality Assurance Agency for Higher Education (QAA) (2012) provides two important measures to be considered when choosing assessment methods: (i) Mixing assessment methods is very effective to not only

provide students with varied assessment experiences, but also to null-out the biases involved in one assessment method, and (ii) use of more and more formative assessments to help students effectively satisfy the learning outcome.

It is interesting to note that O'Neill (2011) suggests providing an opportunity for students to choose assessment methods. In his book he argues that this will make them competent in decision-making on how and what they learn. This paradigm is known as an “inclusive approach to assessment” as it allows the students to choose assessment questions, criteria, topics, etc. at module level (SQA 2015).

2.4 Problem-solving skills

According to Hains-Wesson (2015), problem-solving skills relate to a student’s ability to critically analyze and solve both real and ill-defined problems. These skills can be defined as the abilities to (i) understand the problem, (ii) use appropriate tactics or methods to solve the problem, (iii) monitor the methods and reflect on the observations, (iv) prioritize accuracy to speed, (v) risk and cope with ambiguity, etc. (Kim and Choi 2014). Laterell (2013) argues that problem-solving skills represent the ability to solve an unfamiliar problem with no particular constraints. For instance, it does not consider whether the method of solving is known to the solver.

Higher Education should not only educate students on the content, but also inculcate some of the soft skills that will prepare the young graduates to (i) perform jobs of tomorrow, (ii) work with technologies that are always emerging, (iii) live, think and learn in a way they are not yet familiar with (Griffin 2015; Hains-Wesson 2015; Tremblay, Lalancette & Roseveare 2012). Research shows that problem-solving skills represent the most important characteristic of a young graduate in the employment market. This is because most of the employees in the work place are confronted by a variety of problems related to work that need thinking before acting. This has eventually led to the parents and employers suggesting that higher education institutions develop problem-solving skills in graduates (Organization for Economic Co-operation and Development (OECD) 2014; Griffin 2015).

Problem solving skills not only lead to the mastery of content, but also go beyond, to make students (i) motivated, (ii) obtain a deep understanding of the content, (iii) learn independently and collaboratively, (iv) obtain higher-order cognitive skills, and (v) develop other skills such as critical analysis and communication (Fry, Ketteridge and Marshall 2009; Antonenko, Jahanzad and Greenwood 2014). Results of a study by OECD (2014) show that, among all students in OECD countries, only 5% are able to solve problems, and that too, only if problems are straightforward and familiar.

2.5 Designing assessments that develop problem-solving in students

Shabani, Khatib and Ebadi (2010) argue that traditional assessments only evaluate fully matured abilities and leave out those abilities, such as problem-solving skills, which are in the developmental phase. Therefore, refocusing traditional methods of assessment like examinations, research essays, projects or laboratory reports, is required to align them with real-world problems will help to develop problem-solving skills in students (Crebert *et al*. 2011). Moreover, there are assessment methods that can assess if the students are indeed able to solve real-world problems, and these include case studies, group discussions, work-integrated learning and work-based learning. Heins-Wesson’s assessment rubric for problem-solving skills articulates six steps which include (i) identification of the problem, (ii) defining the problem, (iii) examining the solutions, (iv) acting on a plan, (v) analyzing the consequences, and (vi) testing the outcome (Hains-Wesson 2015).

Swartz and McGuinness (2014) propose two approaches for assessing critical thinking and problem-solving abilities, namely the psychometric and curriculum approach. Psychometric or testing approach perceives critical thinking as a characteristic of students and promotes single testing of skills. This approach relies on multiple choice questions. On the other hand, the

curriculum approach views thinking as an ability that develops during a specific learning context, and hence argues that assessment of thinking and development of problem-solving skills will depend on the quality of students' work.

3. Methodology

The study employed a post-positivism paradigm that used a quantitative approach. Post-positivism argues that knowledge is conjectural and that absolute truth can never be found (Creswell 2015). As a result, this paradigm works on the belief that evidence established in research is always imperfect and fallible and hence is open to continuous improvement. A descriptive design that used a survey was also used in the study.

Population and sampling

The study population or target population refers to the group of people or objects that are affected by the research findings (Hanlon and Larget 2011). This study aimed at finding out whether university assessments develop problem-solving skills in students. As a result, the target populations for this study were the two categories of respondents, namely university students who take part in the assessments and lecturers who are responsible for setting, executing and marking the assessments at the four selected universities.

A study sample refers to the group of people selected from the population for data collection purposes especially where the population of the study is large (Hanlon and Larget 2011; Meng 2013). We used stratified random sampling strategy to select 108 lecturers and 438 students from 132 lecturers and 1615 students respectively to participate in the study. Stratified random sampling technique is a method of partitioning the population into regions or strata, so that a sample is drawn from each stratum using simple random sampling (Meng 2013). The total of these samples from the different strata gives the study sample. The 4 selected universities had four faculties with different numbers of departments, and each department consisted of different numbers of lecturers and students. This sampling technique enabled us to select lecturers and students proportionately.

Data collection instruments are defined as fact-finding instruments used for collecting data (Zohrabi 2013). This research used structured questionnaires for data collection from lecturers and students. Structured questionnaires consist mostly of close-ended questions and have pre-coded answers, and are best used for comparing the responses of many people (Mathers, Fox and Hunn 2009). This method is most commonly used for quantitative research that involves computations using numbers. Structured questionnaires are helpful to reach a large group of people quickly, and are relatively easier to create. Moreover, it is easy to address embarrassing, confidential areas. However, the format of such questionnaires makes it difficult for the researcher to explore complex issues and/or opinions. It relies a lot on the respondents' understanding of the questions, and hence requires the researcher to frame questions in such a way that both the questionnaire constructer and the reader perceive them in the same way. The response rate is also generally low with this method, and this may worsen if the questionnaires are distributed through a postal system (Harris and Brown 2010).

This research used structured questionnaires to gather data for understanding the perceptions of lecturers and students. Structured questionnaires were especially beneficial here since the target group was large and the respondents were likely to provide unbiased, correct opinions in an anonymous structured questionnaire. Before administration, the questionnaires were tested for internal consistency reliability and content validity. With regard to internal consistency reliability, Cronbach's alpha index was found to be 0.83, hence the instrument was found to be reliable enough for the study. With regard to content validity, the questionnaire was subjected to expert opinion and contributions from the experts were incorporated into the questionnaire before administration. With regard to lecturers, 108 questionnaires were distributed and 87 were returned, making a return rate of 80%. With regard to students, 438

questionnaires were distributed and 375 were returned, making a return rate of 85.6%. The 80% and 85.6% return rates were considered adequate since according to Nulty (2008), depending on the robustness of the study, 50 to 60% of response rate is adequate in on-paper surveys.

This research, as explained above, assumed a quantitative approach and the collected quantitative was analysed using SPSS version 24. As part of analysis using SPSS, statistical tools that include tables and graphs were used.

4. Presentation and analysis of results

This section deals with the presentation and analysis of data collected from both lecturers and students about the role of assessments in developing the problem-solving skills of university students. The section begins by analysing biographic factors of both students and lecturers then goes on to analyse data related to the perception of students and lecturers on the mediating role of assessments in the development of problem-solving skills in university students. For ease of analysis, the following key was used in some of the sections below: SDA – Strongly Disagree, DA – Disagree, N – Neutral, A – Agree, and SA – Strongly agree.

4.1 Analysis of demographic data

Demographic data of respondents was analysed in order to gain an understanding of the profiles of all the respondents. These profiles are important in helping decipher why the respondents or some of them held perceptions about assessments and the development of problem-solving skills the way they did.

Table 1: Demographic data of students

Item	**Categories**	**Response %**
Gender	Male	39
	Female	61
Age (years)	< 20	2
	20 – 24	82
	25 – 29	13
	– 34	2
	> 34	1
Level of study	7	48.2
	8	51.8
Qualification studies	Degree	95%
	Diploma	5%

Results in Table 1 show that there are more female students (61%) than male students (39%) at second year level in the university. This shows that, in terms of gender, the university may be admitting more female students than male students into its programmes. It is also shown in Table 1 that most of the students (84%) at the university are less than 25 years old while very few (3%) are aged 30 years and above. This may mean that most of the students at the university are still very young adults. It is further shown in Table 1 that of the second-year students who participated in the study, most are in the second semester (51.8%) while the remaining ones (48.2%) are in the first semester of their second year. Results of the study in Table 1 also show that most of the students (95%) are doing degree-level qualifications while very few (5%) are doing diploma qualifications. This may indicate that the university mostly admits students into its degree programmes rather than into diploma programmes.

Table 2: Demographic factors of lecturers		
Item	**Category**	**Response %**
Gender	Male	70
	Female	30
Age (years)	25 – 29	12
	30 – 34	21
	35 – 39	27
	40 – 44	16
	45 – 49	11
	50^{+}	13
Years of experience	0 - 4	16
	5 - 9	39
	10 - 14	17
	15 - 19	15
	20^{+}	13
Educational level	Professional Diploma, e.g. (CIMA)	7
	Bachelor's degree	8
	Master's degree	77
	PhD	8
Levels taught	7 (Year 2 semester 1)	48
	8 (Years 2 semester 2)	52

Table 2 shows that most of the lecturers at the university (70%) are male while female lecturers only constitute 30% of the total lecturer population teaching second year students. The above shows a lack of gender balance in the teaching staff at the university. Such an imbalance may have an influence on the overall perceptions of lecturers on the role of assessments in developing problem-solving skills in university students as views of many male lecturers may overshadow those of the few female lecturers.

Results in Table 2 also show that the age of most of the lecturers at the university (60%) is below 40 years while fewer lecturers (40%) are 40 years old and above. This may indicate that the university has a relatively young staff complement. It is further shown in Table 2 that most of the lecturers (55%) who teach second year students have less than 10 years of teaching experience while 45% of the lecturers have 10 years and more years of experience. This may mean that lecturers teaching second year students are still relatively new to the profession and still have a lot to learn about lecturing. It is shown in Table 2 that most of the lecturers (77%) teaching second year students possess masters degrees as their highest educational qualifications while only 8% of the lecturers are PhD holders and the rest (15%) are either bachelors or diploma holders. These statistics show that lecturers teaching second year students are relatively well qualified. Table 2 shows that most of the lecturers (52%) teaching second year students teach level 8 students while 48% of the lecturers teach level 7 students. This could be because, as shown in Table 1, the university has more level 8 students than level 7.

4.2 Challenges affecting the ability of lecturers to develop assessments that enhance problem-solving skills in students

This section discusses challenges faced by lecturers when designing assessments that develop problem-solving skills in students. Data from this section was viewed as important in generating an understanding of the complexity or otherwise of challenges university lecturers face and why they may or may not be able to effectively design assessments that develop problem-solving skills in students.

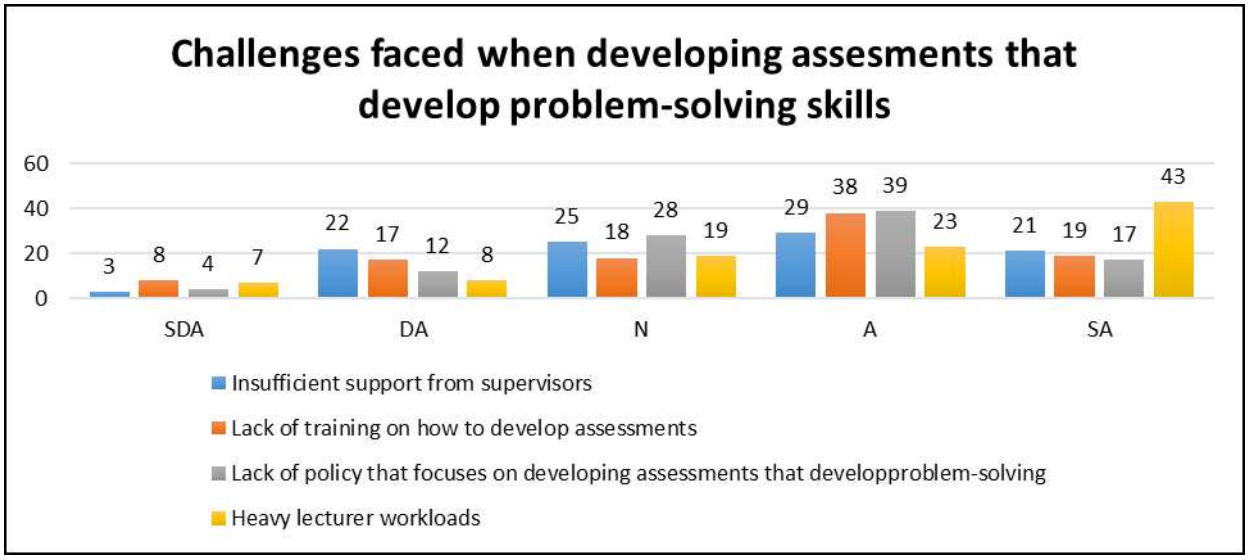


Figure 1: Challenges faced when developing problem-solving enhancing assessments

Figure 1 shows that lecturers face a number of challenges that affect their ability to develop assessments that develop problem solving skills in students. The main challenge lecturers face is heavy workloads (66%) followed by a lack of training on the development of assessments that develop problem-solving skills (57%), lack of policy in the institution that focuses lecturers' attention towards developing assessments that lead to the development of problem-solving skills in students (56%) and inadequate support from supervisors (50%). The issue of heavy workloads particularly is viewed as the greatest hurdle to the effectiveness of using assessments to develop problem-solving skills in students as teachers find no time to plan, design and effectively implement these assessments. Another main challenge in the university is lack of training on how to design assessments that are capable of developing problem-solving skills in students. Without training it means the lecturers do not have the knowledge and skills to handle issues to do with such assessments. The end result will then be students being subjected to assessments that mostly ask them to recall information instead of critical thinking and problem-solving.

4.3 Views of students on whether assessment strategies used by lecturers develop problem-solving skills in students

This section discusses perceptions of students towards whether assessment strategies their lecturers use help in developing problem-solving skills in students. This data was viewed as important in helping readers make judgements about how students view some or all of the assessments they participate in.

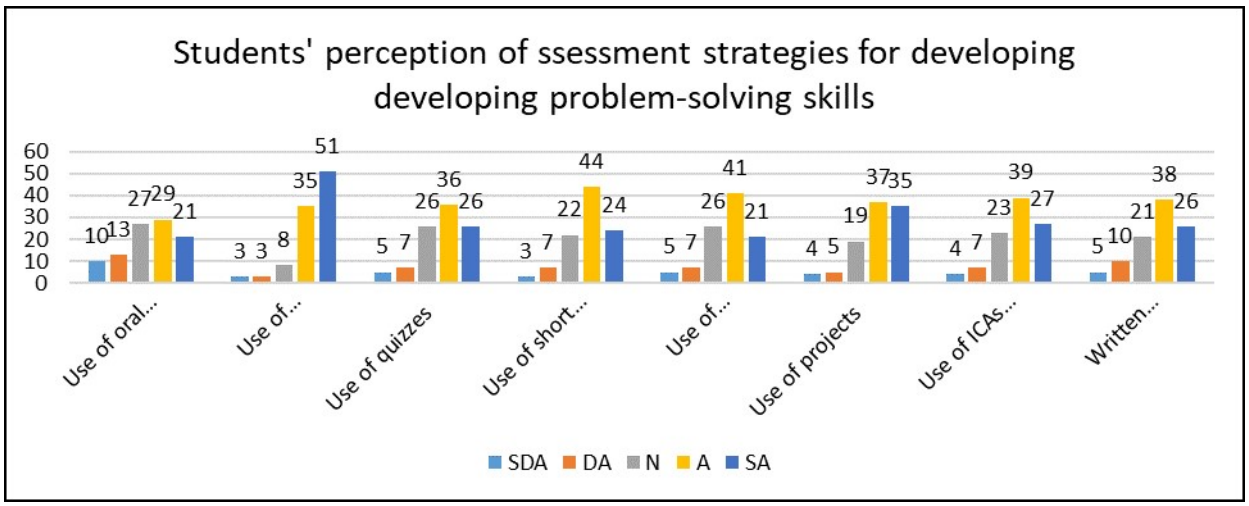


Figure 2: Students' perception of assessment strategies for developing problem-solving skills

Figure 2 shows that there was a general agreement among students that written examinations (64%), ICAs (66%), projects (71%), portfolios (62%), short tests (68%), and practical examinations (86%) are assessment strategies that can be used to develop problem-solving skills in students. Use of oral examinations (49%) was however not viewed as being capable of developing problem-solving skills in students. From the above it can be observed that practical examinations are the most accepted assessment procedure for developing problem solving skills in students.

4.4 Perception of lecturers on assessment strategies for developing problem-solving skills

This section presents an analysis of perceptions of lecturers on whether they feel assessment strategies they use help in developing problem-solving skills in students. A 5-point Likert scale from SDA to SA was used to collect data on lecturers about their views on assessment strategies and the development of problem solving-skills by students.

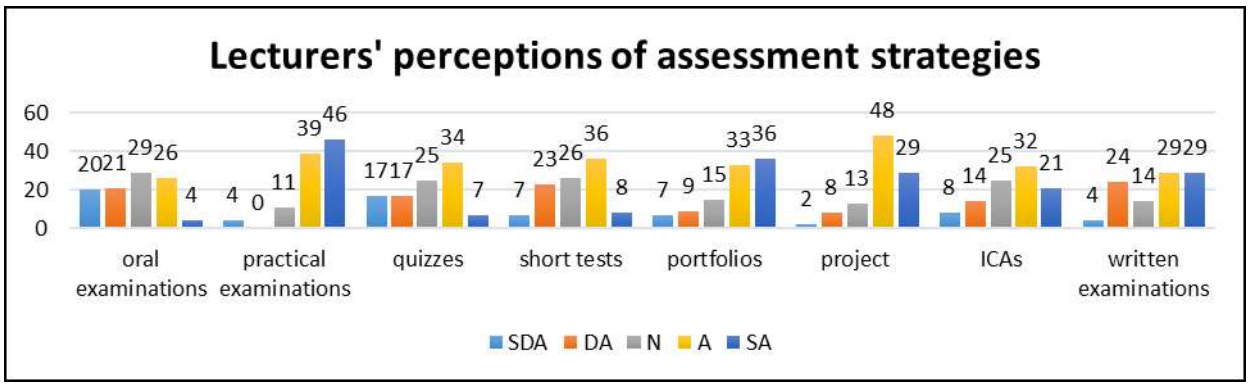


Figure 3: Lecturers' perception of assessment strategies for developing problem-solving skills

Results in Figure 3 show that lecturers believed that the following assessment strategies: practical examinations (85%), projects (77%), written examinations (58%), portfolios (69%) and ICAs (53%) can be used for developing problem-solving skills in students. At the same time, lecturers do not believe that oral examinations (30%), quizzes (41%), and short tests (44%) can be used to develop problem-solving skills in students.

4.5 Students' perceptions of assessment question types for developing problem-solving skills

This section analyses views of students on whether specific assessment question types help in developing problem-solving skills in students. A 5-point Likert scale from SDA to SA was used to

collect data on how students viewed the different assessment types that lecturers administer on them. This data was viewed as important in gauging whether students believed that the assessments they take part in were in developing problem-solving skills in students.

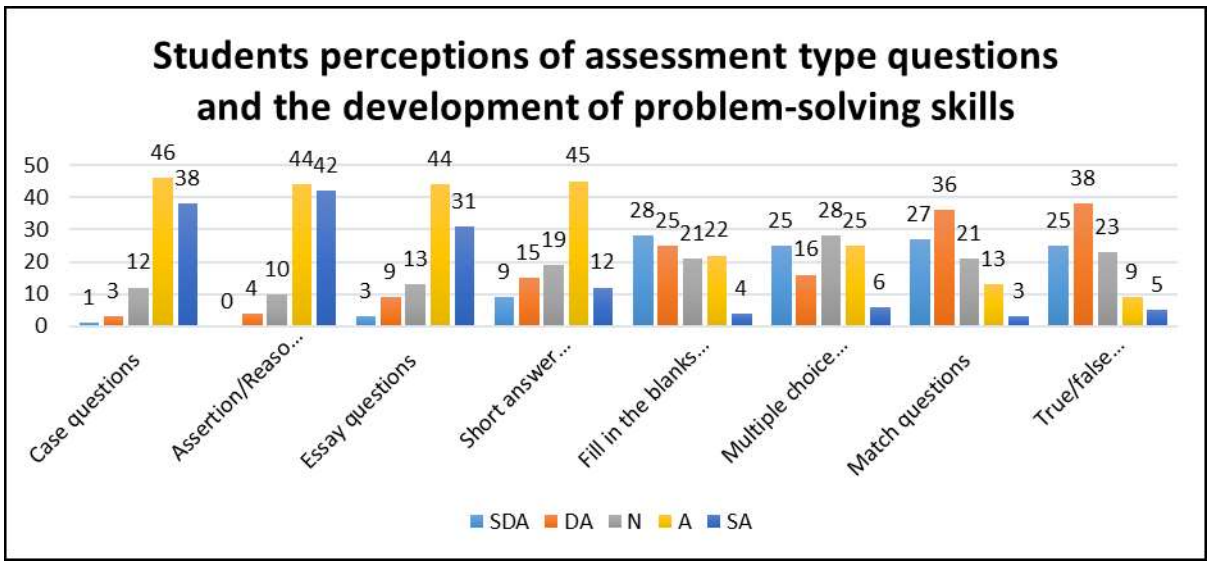


Figure 4: Students' perception of assessment type questions

Results in Figure 4 show that students believe that assessment type questions that include short answers (68%), essays (67%), assertion/reasoning (73%), and case studies (67%) can be used to develop problem-solving skills in university students. Students also believe that assessment type questions that include fill-in the blanks (47%), multiple choice (45%), match questions (35%), and true and false questions (39%) cannot be used to develop problem-solving skills in students.

4.6 Lecturers' perception of assessment type questions which develop problem-solving skills

This section analyses the views of lecturers on whether the different assessment question types they use develop problem-solving skills in students. A questionnaire that employed a 5-point Likert scale from SDA to SA was used to collect data from lecturers. This data was viewed as important in helped readers gain an understanding of how lecturers viewed and understood the importance of assessment types they set and administered in terms of the development of problem-solving skills in students.

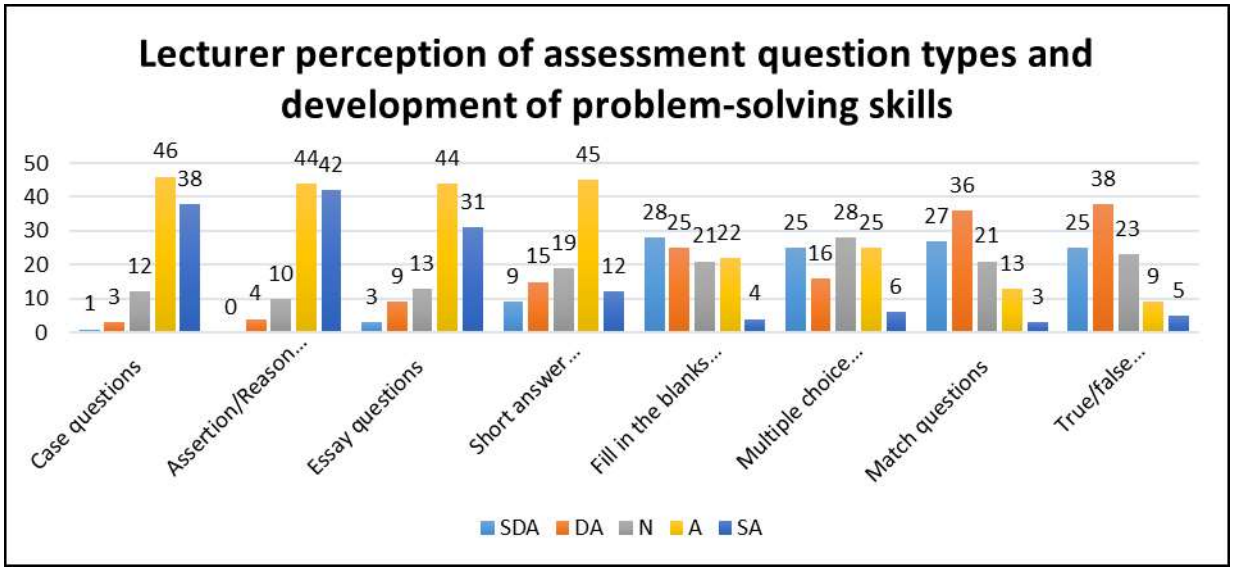


Figure 5: Lecturer perception of assessment question vis-à-vis problem solving skills

It is shown in Figure 5 that most lecturers believed that the following assessment question types can contribute to the development of problem-solving skills in students: case questions (84%), assertion/reasoning (86%), essay (75%), and short answer (57%). It also emerged from the study that lecturers believed that the following assessment question types: fill-in the blanks (26%), multiple choice (31%), matching (16%) and true and false (14%) do not contribute to the development of problem-solving skills in students.

5. Discussion of findings

Results of the study showed that assessments play a significant role in developing problem-solving skills of students. It was further shown in the study that it is not just any type of assessment that can develop problem-solving skills in students but certain types. Such assessments should present students with real-world situations or problems as well as assess and equip them to make appropriate decisions to solve such problems (Astin *et al*. 2016). According to Crebert *et al*. (2011), assessments that develop problem-solving skills in students should be designed based on problem scenarios, group works, work-based problems, committee or enquiry report, a research bid or realistic brief, a case analysis, or a conference paper. Shabani, Khatib and Ebadi (2010) argue that traditional assessment that include true and false, multiple choice, fill-in the gap, and short answer questions fail to evaluate fully matured student abilities as they leave out those abilities which require critical thinking and problem solving. Extant literature shows that assessments that develop problem solving skills do not only develop content knowledge, but go beyond to make students (i) motivated, (ii) obtain a deep understanding of the content, (iii) learn independently and collaboratively, (iv) obtain higher-order cognitive skills, (v) as well as develop other skills such as critical analysis and communication (Fry, Ketteridge and Marshall 2009; Antonenko, Jahanzad and Greenwood 2014). The above therefore according to SQA (2015) means that choosing appropriate assessment method is crucial to student learning processes and the development of problem-solving skills, and requires professional expertise and knowledge in terms of module content and important skills students should develop.

It emerged in the study that assessment types that include studies written examinations, ICAs, projects, portfolios, short tests, and practical examinations are critical for the development of problem solving skills in students (McCulloch 2007; Ulster University 2016; Sotardi and Brogt 2016). These assessments help develop students' cognitive skills of analysis, synthesis and evaluation, all of which are critical problem-solving skills (SQA 2015). Such assessments help the assessor measure not only the extent of a student's mastery of the content but also the ability to apply that content in novel situations. It was also shown in the study that the following assessment question types: cases, essays, assertion/reasoning, and short answer questions can be used for developing problem-solving skills in students while fill-in the blanks, multiple choice, matching and true and false questions do not promote the development of problem-solving skills in students. These findings confirm results of earlier studies that showed that projects, fieldwork, laboratory work, portfolios, reflective logs, group work/projects, presentations, essays, reports, critical reviews, articles, cases, reaction papers, objective/short answer/practical questions, dissertation, production of a video, magazine, newsletter, exhibition, play, etc. which are all forms of coursework assessment (McCulloch 2007; Ulster University 2016), help develop problem-solving skills in students. Case studies particularly can be utilized to develop problem-solving and decision-making skills as well as improve time management skills (Hains-Wesson 2015; Surgenor 2010).

The study further showed that using assessments to develop problem-solving skills in students comes with a number of challenges. First, such assessments are time-consuming both in terms of preparation and grading (SQA 2015; Surgenor 2010; Hains-Wesson 2015). Other challenges affecting the ability of lecturers and teachers to use assessments that develop

problem-solving skills in students include high workloads, lack of policy guidelines that provide guidance and direction on how to design and implement these types of assessments, lack of training on how assessments develop problem-solving skills as well as lack of supervisory support (Emil 2011; Nunley, Bers and Manning 2011).

Conclusion

Based on the results of the study, it is concluded that some assessment strategies can be used to develop problem-solving skills of students at university level. Such assessments strategies that promote the development of problem-solving skills in students include practical examinations, projects, portfolios, short tests, written examinations, and ICAs, while oral examinations or presentations do not promote the development of problem-solving skills. Further, there are some assessment type questions that can be used to develop problem-solving skills in students; these include case, essay, short answer and assertion/reasoning questions while assessment question types that include multiple choice, fill-in the blanks, matching, and true and false do not promote the development of problem-solving skills in students. In addition, attempts to develop and implement assessments that develop problem-solving skills in students at the university are affected by a number of challenges, particularly a lack of training on how to develop such assessments as well as a lack of lecturer support from immediate and top management.

Results of the current study show that a university needs to address some critical issues to ensure that lecturers are able and willing to design assessment that develop problem-solving skills in students. The first issue to be considered ensuring that all lecturers involved in the running of assessments receive training on how to effectively design assessments. Such knowledge will not only provide the lecturers with both the knowledge and skills required to effectively design the assessments but will motivate them to want to do so. Secondly, rationalizing workloads of staff is very important at the university as high workloads seem to be demoralizing to staff by taking away time for them to plan and design effective assessments. Third, some form of framework is needed at the university to act as a guideline on how assessments that develop problem-solving skills in students can be designed and executed. This study provides an important contribution to the body of knowledge on the development of assessments that develop problem-solving skills in students. Industry is now looking for graduates with problem-solving abilities and hence it is incumbent upon universities to capacitate their lecturers with the ability to develop assessments that provide students with these much needed skills.

References

Antonenko, P., Jahanzad, F. and Greenwood, C. 2014*. Research and Teaching: Fostering Collaborative Problem Solving and 21st Century Skills Using the DEEPER Scaffolding Framework.* Journal of College Science Teaching, [online] Vol 43, Issue 9, pp.79-88.

Astin, A., Banta, T., Cross, K., El-Khawas, E., Ewell, P., Hutchings, P., Marchese, T., McClenney, K., Mentkowski, M., Miller, M., Moran, E. and Wright, B. 2016. *9 Principles of Good Practice for Assessing Student Learning.* Available: *http://www.asbmb.org/uploadedfiles/education/teachingstrategies/workshop/assessmentall.pdf*, ASBMB-RCN Workshop: Assessment of Students' Reasoning with Core Concepts and Visualizations in Biochemistry. Washington DC. [Accessed 13 May 2018].

Birjandi, P., Estaji, M. and Deyhim, T. 2013. The Impact of Dynamic Assessment on Reading

Comprehension and Metacognitive Awareness of Reading Strategy Use in Iranian High School Learners*. Iranian Journal of Language Testing,* Vol 3, Issue 2, 12-19.

Crebert, G., Patrick, C., Cragnolini, V., Smith, C., Worsfold, K. and Webb, F. 2011. *Problem Solving Skills Toolkit. 2nd ed.* Brisbane: Griffith Institute for Higher Education (GIHE).

Creswell, J.W. 2015. *Educational research: Planning, conducting, and evaluating quantitative and qualitative research, 5*th *ed*. Boston, MA: Pearson.

Darling-Hammond, L., Herman, J., Pellegrino, J., Abedi, J., Aber, L., Baker, E., Bennett, R., Gordon, E., Haertel, E., Hakuta, K., Ho, A., Linn, R., Pearson, D., Popham, J., Resnick, L., Schoenfeld, A., Shavelson, R., Shepard, L., Shulman, L. and Steele, C. 2013. *Criteria for High-Quality Assessment.* Stanford: Stanford Center for Opportunity Policy in Education.

Derrell, T. 2015. *5 Common Types of Educational Assessment*.Viewed on 19th January, 2019 from *https://www.aiuniv.edu/blog/2015/july/educational-assessment.*

Emil, S. 2011. *Assessment for Improvement in Higher Education: Faculty Perception of and Participation in Program Assessment*. Dissertations and Theses. Viewed on 7th May , 2018 from *https://pdxscholar.library.pdx.edu/open_access_etds/605.*

Fletcher, R., Meyer, L., Anderson, H., Johnston, P. and Rees, M. 2011. *Faculty and Students Conceptions of Assessment in Higher Education.* Higher Education, Vol 64, Issue 1, pp.119-133.

Fry, H., Ketteridge, S. and Marshall, S. 2009. *A Handbook for Teaching and Learning in Higher Education*. 3rd ed. New York: Routledge.

Hains-Wesson, R. 2015. *Development of the problem solving teaching resource.* Problem Solving. Viewed on 3rd December, 2016 from *http://teachassist.deakin.edu.au/wp-content/uploads/2015/06/GLO5-problem-solving.pdf*

Hanlon, B. and Larget, B. 2011. Samples and Populations. Case Studies. Madison: Department of Statistics, University of Wisconsin—Madison. Viewed on 1st October, 2016 from *http:// www.stat.wisc.edu/~st571-1/03-samples-4.pdf .*

Harris, L. and Brown, G. 2010. Mixing interview and questionnaire methods: Practical problems in aligning data. *Practical Assessment Research and Evaluation*, Vol15, Issue 1, 2-10.

Higher Education Academy. 2012. A Marked Improvement - Transforming assessment in higher Education,Viewed on 9th November, 2016 from https://www.heacademy.ac.uk/system/files/a_marked_improvement.pdf.

Kim, K. and Choi, J. 2014. The Relationship between Problem Solving Ability, Professional Self Concept, and Critical Thinking Disposition of Nursing Students*. International Journal of Bio-Science and Bio-Technology*, Vol 6, Issue 5, 131-142.

Lantolf, J. and Poehner, M. 2010. Dynamic assessment in the classroom: Vygotskian praxis for second language development. *Language Teaching Research*, Vol 15, Issue1, pp.11-33.

MacDonald, G. 2014. *Teaching and assessing problem solving skills – PISA recommendations*. Viewed 12th October, 2018 from *http://www.oecd.org/pisa/keyfindings/pisa-2012-results-volume-v.htm.*

Malmeer, E. and Zoghi, M. 2014. Dynamic Assessment of Grammar with Different Age Groups. *Theory and Practice in Language Studies*, Vol 4, Issue 8, pp12-17.

Mathers, N., Fox, N. and Hunn, A. 2009. *Surveys and Questionnaires. The NIHR Research Design Service for Yorkshire & the Humber. Nottingham: National Institute for Health Research.Viewed on 6th October , 2016 from* https://www.rds-yh.nihr.ac.uk/wp-content/uploads/2013/05/12_Surveys_and_Questionnaires_Revision_2009.pdf [Accessed 6 October 2016].

McCulloch, M. 2007. *An Introduction to Assessment. Learning and Teaching Centre.* Glasgow: University of Glasgow.

Meng, X. 2013. *Scalable Simple Random Sampling and Stratified Sampling*. In: 30th International Conference on Machine Learning. Georgia: JMLR: W&CP. Viewed on 5th October, 2016 from *http://www.jmlr.org/proceedings/papers/v28/meng13a.pdf*

Mills, K. & Kim, H. 2017. *Teaching problem solving: Let students get 'stuck' and 'unstuck'.* Viewed on 25th October, 2018 from *https://www.brookings.edu/blog/education-plus-development/2017/10/31/teaching-problem-solving-let-students-get-stuck-and-unstuck/.*

Nunley, C., Bers, T. and Manning, T. 2011. *Learning Outcomes Assessment in Community* Colleges. National Institute for Learning Outcomes Assessment. Champaign: *National Institute for Learning Outcomes Assessment (NILOA).* Viewed on 4th December, 2016 from *http://www.learningoutcomesassessment.org/documents/CommunityCollege.pdf*

O'Neill, G. 2011*. A Practitioner's Guide to Choice of Assessment Methods Within a Module.* 1st ed. Dublin: UCD Teaching and Learning.

Organization for Economic Co-operation And Development (OECD), 2014. *PISA 2012 Results:Creative Problem Solving: Students' Skills in Tackling Real-Life Problems.* 1st ed. [online]: PISA, OECD Publishing.Viewed on 4th December , 2016 from *https:// www.oecd.org/pisa/keyfindings/PISA-2012-results-volume-V.pdf*

Ozgur, B. and Kantar, M. 2012. *Dynamic Assessment (DA) & Zone of Proximal Development (ZPD)*. Viewed on 17th September, 2018 from *www.ealta.eu.org/events/.../ BurcuMurat_EALTA_SIG_ Ankara2012.*

Rahbardar, H., Abbasi, M. and Talaei, A. 2014. *Dynamic Assessment (DA) and Evaluation of Problem-solving Skills in Childeren.* International Journal of Pediatrics. Viewed on 6th December, 2016 from *http://ijp.mums.ac.ir.*

Scottish Qualifications Authority, 2015. Guide to Assessment. Glasgow: SQA.

Shabani, K., Khatib, M. and Ebadi, S. 2010. Vygotsky's Zone of Proximal Development: Instructional Implications and Teachers' Professional Development. *English Language Teaching*, Vol 3, Issue 4, 34-41.

Sotardi, V. and Brogt, E. 2016. *Common student problems with assessment during the transition to university: Support staff perspectives, insights, and recommendations.* 1st ed. Wellington: Ako Aotearoa National Centre for Tertiary Education.

Spiller, D. 2012. *Principles of Assessment. Teaching Development*. Hamilton: The University of Waikato.

Stassen, M. and Doherthy, K. 2001. *Program-Based Review and Assessment - Tools and Techniques for Program Improvement.* Amherst: University of Massachusetts.

Surgenor, P. 2010. *Teaching Toolkit: Summative and Formative Assessment. University College Dublin Teaching and Learning Resources*. Dublin: University College Dublin. Viewed on 1st December, 2016 from *http://www.ucd.ie/t4cms/UCDTLT0029.pdf*

Swartz, R. and McGuinness, C. 2014. *Developing and assessing thinking skills. Literature Review and Evaluation Framework*. Boston & Northern Ireland: The International Baccalaurate Organization.

The Quality Assurance Agency for Higher Education (QAA), 2012. *Understanding assessment: its role in safeguarding academic standards and quality in higher education. 2nd ed.* Gloucester: The Quality Assurance Agency of Higher Education.

Tremblay, K., Lalancette, D. and Roseveare, D. 2012. *Feasibility Study Report Volume 1 – Design and Implementation. Assessment of higher education learning outcomes.* OECD. Viewed on 4th December, 2016 from *http://www.oecd.org/education/skills-beyond-school/AHELOFSReportVolume1.pdf*

Ulster University, 2016. *Assessment Handbook. Assessment Handbook*. Coleraine: Ulster University.

Zohrabi, M. 2013. *Mixed Method Research: Instruments, Validity, Reliability and Reporting Findings. Theory and Practice in Language Studies.* Viewed on 3rd October, 2016 from *http://www.academypublication.com/issues/past/tpls/vol03/02/06.pdf.*

Research Data Management (RDM) in agricultural research institutes: a literature review

Emily Ng'eno[1]
Moi University, Kenya
ngenoemily28@gmail.com

and
Stephen Mutula[2]
University of KwaZulu-Natal
mutulas@ukzn.ac.za

Abstract

This article presents a survey of literature on Research Data Management (RDM) with focus on agricultural research institutes. This is to help the understanding of core issues in RDM such as legal, policy and regulations; skills set and infrastructure in order to strategically position the agricultural sector in the knowledge economy and also help in reducing duplication of effort, promoting innovation, minimizing loss or destruction of research data sets and that ensuring compliance with funders' requirements. The author argues that while RDM has been widely embraced in developed countries Africa is lacking behind. The literature reviewed in this article seem to suggest that legal, policy and regulatory framework in agricultural research sectors are either nonexistent or outdated. This is exacerbated by inadequate technical infrastructure, human resources capacity, and paucity of national or international partnerships. As a result, research data sets within agricultural institutes are poorly managed. The establishment of a legislative and policy framework for RDM; capacity building programs, and improvement of technical infrastructure are highly recommended.

Keywords: Research Data Management, data curation, research data, agricultural research institutes, Kenya

1. Introduction

The purpose of this literature review is to examine Research Data Management (RDM) with a view to understanding legal, policy and regulations in RDM. Research data are valuable resources that need to be properly managed by research institutes to contribute to technology innovation and transfer in the agricultural sector. Besides research data being intricate and complex, they are irreplaceable, expensive and time-consuming to replicate. In addition, the research institutes must exercise diligence and ensure data accuracy and precision in the collection, description, preservation, access, reuse and sharing of research data (Fellous-Sigrist 2015; University of California, Los Angeles n.d). The Government of Canada (2016) maintains that the ability to preserve, access, reuse and build upon research data is critical to the advancement of science and scholarship. In addition, research data is instrumental in supporting innovative solutions to economic and social challenges, and holds tremendous potential for productivity, competitiveness, and quality of life. Therefore, there is a need for research institutes to engage in RDM cannot be underestimated. Ray (2014) defines Research Data Management

1. Emily Ng'eno PhD is a lecturer in the Department of Library, Records Management and Information Studies, Moi University , Kenya. She graduated with a PhD from the University of KwaZulu-Natal in 2018.
2. Stephen Mutula PhD is Professor of Information Studies and Dean of Humanities, University of KwaZulu-Natal, South Africa .He supervised Emily's PhD.

(RDM) as the collection, organization, validation, and preservation of data for analysis, discovery, sharing, reuse, and transformation. Fundamentally, RDM consists of different activities and processes associated with data creation, storage, security, preservation, retrieval, reuse and sharing taking into account technical capabilities, ethical considerations, legal issues, human resource capability and government frameworks.

The literature reviewed in this article on RDM is informed by Community Capability Model Framework (CCM Framework) and Data Curation Centre (DCC) Lifecycle Model (Ng'eno 2018:22). Community Capability Model (CCM) Framework was developed by the United Kingdom Office for Library and Information Networking (UKOLN), University of Bath and Microsoft Research to assist research funders, institutions and researchers in growing the capability of their communities to perform data-intensive research (Lyon, Ball, Duke & Day 2012). It focuses on eight capability factors that include collaboration, skills and training, openness, technical infrastructure, common practices, economic and business, legal and ethical, and academic issues representing human, technical and environmental issues. Key variables in CCM framework relevant to this literature review on RDM include: openness, skill and training, technical infrastructure, legal and policy issues, and collaborative partnerships.

The DCC Lifecycle Model on the other hand promotes a lifecycle approach to the management of digital materials to enable their successful curation and preservation from their initial conceptualization to either disposal or selection for re-use and long-term preservation (Higgins 2008). According to Data Curation Centre (DCC) Lifecycle Model, data curation includes the data capture, appraisal, description, preservation, access, re-use and transformation of research data. Higgins (2008) emphasizes that Data Curation Centre (DCC) Lifecycle Model advocates for maintenance of authenticity, reliability, integrity and usability of digital material which in return ensures quality of RDM. The review is underpinned by the CCM Framework and DCC Lifecycle Model because the former addresses the community/institutional capabilities which incorporate skill and training, technical infrastructure, legal and policy issues, collaborative partnerships and openness which contribute a lot to RDM practices and the later equally prescribes the activities to be done in RDM such as data curation involving capture, appraisal, preservation, access and re-use. These activities are the core functionalities in RDM.

Therefore, it can be noted that RDM it is imperative in agricultural research institutes for the reason that if research data is managed well, it will promote access, sharing and reuse.

2. Research Data Management (RDM)

The availability of huge amounts of new data, often referred to as a data deluge, impacts the method in which research is carried out for societal benefit. RDM brings benefits to researchers and research institutes in many ways (Lewis 2010; and Dora and Kumar 2015) such as:

- ***i.*** Ability to share research data, minimizing the need to repeat work in the field or laboratory;
- ***ii.*** Research data gathered at considerable cost is not lost or inadvertently destroyed;
- ***iii.*** Retrieval, comparison, and co-analysis of data from multiple sources can lead to powerful insights;
- ***iv.*** New research themes can emerge from re-analysis of existing data or comparisons with new data;
- ***v.*** Long-term preservation of data provides for validation check of the data and this enhances the credibility and transparency of the research data used;
- ***vi.*** By opening research data sets for the public, there is visibility of the host institution and its researchers;
- ***vii.*** Research funders are increasingly requiring researchers to deposit their research data for proper curation, full utilization, preservation, and reuse (Heidorn 2011; Ingram 2016; Lyon, Patel, and Takeda 2014).

Furthermore, Ray (2014) explains that the sharing of research data increases the return on large investments, advances human knowledge, promotes economic development and reduces costly data duplication. Open access has emerged as one way of sharing research data to promote the advancement of knowledge and technology transfer. Organization for Economic Co-operation and Development (OECD) (2007) points out that the principles and guidelines of open access include openness, flexibility, transparency and legal conformity, protection of intellectual property, formal responsibility, professionalism, interoperability, quality, security, efficiency, accountability; and sustainability. RDM has become even more widely endorsed in agricultural research institutes and increasingly supported by the mandates of research funders who are keen to see the greatest possible returns on investments both in terms of quality of research output and the reuse of research data.

2.1 Legal, policy and regulations in RDM

In essence, RDM legal, policy and regulation framework should respond to a number of RDM drivers such as: storage, security, preservation, quality, compliance, sharing, and jurisdiction in order to enhance management, sharing and reuse of research output (Pinfield, Cox and Smith, 2014; Higman and Pinfield 2015).

Smith (2014) in a study on data governance argues that legal environment surrounding research data lags behind hindering the ability to develop best practices for data management, sharing and use. Moreover, RDM legal environment includes laws, regulations, and policies associated with data, as well as strategies for data quality control and management in the context of agricultural research institutes. In this respect, RDM legal framework ensures that data can be trusted through facilitation of RDM governance by adoption of appropriate technical standards, practices and architecture that will necessitate management, sharing and reuse of research data. A study by Fitzgerald, Pappalardo and Austin (2008) on RDM legal and policy guide advances the view that RDM legal framework should be comprehensive, coherent and precise. In addition, Karick (2014) points out that RDM framework should clearly state ownership and rights associated with research data in order to minimize disputes and provide accountability for research data.

Policy and regulations affecting RDM must be developed to address data curation, quality and security as well as ethical requirements, human resource capacity, technical infrastructure and collaborative partnerships at every stage of RDM. This should result in the development and operationalisation of an effective and efficient collection, appraisal, preservation, access, reuse and sharing of research data (Cox and Pinfield 2014). An RDM study conducted through an online survey of 145 research funders, national bodies and agricultural research institutes by Mossink, Bijsterbosch, and Nortier (2013) focusing on Support Infrastructure Models for RDM (SIM4RDM), underscored the fact that a number of agricultural research institutes with RDM policy is growing, however there is a need for institutional policies on RDM to have the following elements:

a) Responsibilities and roles;
b) Access and reuse of data;
c) Long term preservation/curation;
d) Security;
e) Open accessibility and availability of data;
f) Protection of legitimate subjects of research data (embracing informed consent, anonymity and confidentially).
g) Provision of mechanisms for storage, back up, registration;
h) Training, support, advice;
i) Copyright and intellectual property issues (copyright, patents, trademarks and design rights);

j) Embargo period for open accessibility;
k) Methods used to share guidelines/restrictions on data;
l) Destruction of records;
m) Removal or transport of data;
n) Preferred Licenses for data.

Similarly, the study concluded that there is a need for policies and guidelines to govern ownership of data created within research institutes and also raise awareness amongst researchers regarding important research data and related aspects as this was a problematic area (Mossink, Bijsterbosch, and Nortier 2013). In addition to the elements listed by Mossink, Bijsterbosch, and Nortier (2013) on what the policy should entail, Smith (2014) posits that RDM policy and regulation framework should address issues such as copyright, data licensing, data security, data privacy, and mind-set (researchers to accept the idea of their data being made available for reuse). Therefore, policy development is a cross-institutional process and by initiating the conversation about RDM policy, it should be an all-inclusive with the goal to facilitate effective and efficient management, sharing and reuse of research output (Erway 2013).

3.2 Data curation

Data curation as one of the key aspects of RDM involving research data capture, appraisal, description, preservation, access, reuse and transformation. Data curation is the active and on-going management of data throughout its lifecycle of interest and usefulness to research to enable data discovery and retrieval, maintain quality, add value and provide for reuse over time (Palmer, Cragin, Heidorn, and Smith 2007). Whyte and Allard (2014) acknowledged the challenges in data curation with regard to lack of legal framework, standards or procedures to reference and define mandatory guidelines when curating data.

3.2.1 Data capture

Australian National Data Service (n.d) defines data capture as the process of collecting data which will be processed and used later to fulfill certain purposes. Research data with good metadata attached at the point of capture can expedite data sharing, publishing and citation. Metadata capture is of great value simply because the more information there is about data, the greater the value of the data whether automatic or manual. Consequently, Australian National Data Service (n.d) buttress that data capture tools should:

a) Provide processes of organizing and structuring data files;
b) Have data validation components to ensure that captured data meet required types and ranges;
c) Enable open and flexible formats where good conversion tools exist; and
d) Allow data to be moved to its destination efficiently and with high quality.

Higgins (2012) advances the view that relationships developed between the researcher and the information professional is very crucial in planning research data capture, since the former is concerned with capturing data, while the latter is concern with receiving and ensuring data capture.

3.2.2 Data appraisal

Appraisal and selection is the process of evaluating research data in order to decide which to retain over the long term, which to retain for the meantime and which to discard (Higgins 2012; International Standards Organisation (ISO) 2001). Appraisal and selection policy need to ensure consistent, transparent and accountable decision making. Whyte and Wilson (2010) state that appraisal and selection policy must fit legal requirements, for example, relating to privacy and intellectual property rights, Public Records Acts, national data policies and codes of conducts adopted by the host institution or agricultural research institutes or funders. Niu (2014) and Eaker (2016) came up with a framework that synthesized traditional archival appraisal methodologies

and elements identified from existing appraisal policies with an intention to serve as high-level guidance for individual institutions to create their local appraisal/selection policies for research data. Niu (2014) and Eaker (2016) appraisal/selection criteria include:

a) Mission alignment: whether the resource supports the mission and falls within the scope of the collection policy of a preserver or the institution;

b) Value of digital resources: can either be primary or secondary value as Tibbo (2003); Schellenberg (1956); and UK National Archives (2012) point out; that primary values include administrative, fiscal, and legal value while secondary values includes evidential and information values.

c) Cost: It could be costs in acquiring, housing, preserving, and processing the collection to make it accessible also assess whether value of the data exceeds costs;

d) Feasibility: Feasibility of preservation is often determined by the technical capacity which include metadata and documentation, file formats and protection mechanisms such as password, digital signatures or encryption (National Archives and Records Administration (NARA) 2007).

Whyte and Wilson (2010) observed that in agricultural research institutes, research data librarian and archivist should assume the role and responsibility of setting appraisal/selection criteria and appraisal policy in consultation with stakeholders, especially researchers and local data managers in order to know how data would be assessed and how they would increase their enduring impact.

3.2.3 Data description

Research data description is the documentation that accompanies the research data which makes it discoverable and usable over time thus metadata standards exist to provide standardized descriptions, for example, Dublin Core, and computer software (The University of Western Australia 2016). Proper description and documentation of research data allows users to understand and track important details, in addition to describing research data using metadata facilitates, searching and retrieval in data repositories. Regarding the contents of metadata in describing research data, Cornell University Library (n.d) gives an example of the content of metadata such as contact information, geographic locations, units of measure, abbreviations or codes used in the dataset, instrument and protocol information, survey tool details and much more. Such detailed metadata content facilitates data curation which results in quality RDM. Data description is imperative in agricultural research institutes in terms of fully describing research data for easy accessibility, searching as well as retrieval and preservation.

3.2.4 Data preservation

Data preservation means securing permanent access to the original research data from the finished research project and general characteristics of data preservation is data accessibility to others for verification or for sharing or collaboration within the scientific community (Kruse and Thestrup 2014). Subsequently, it is imperative that long-term preservation and protection of sensitive data are vital characteristics of data preservation actions in agricultural research institutes. Furthermore, policies and requirements regarding where to deposit research data and the retention period should be clearly stipulated as well as address the gap between short-term access and long-term preservation with reference to the type of research data (RECODE Project Consortium 2014). Activities that support the preservation process should be planned to include administrative procedures required before undertaking preservation activities and the technical requirements of preservation.

A survey carried out by Mossink, Bijsterbosch and Nortier (2013) on Support Infrastructure Models for RDM (SIM4RDM) in Europe revealed that institutional repositories were also deployed to store finished datasets, for example, the Netherlands, the UK and Finland have well-

established data archived for storage. Research data preservation is an ongoing process that should be planned throughout its lifecycle to include the following activities: validation, assigning preservation metadata, assigning representation information and ensuring acceptable data structures (Data Curation Centre 2004). These preservation actions should ensure that research data remain authentic and reliable while maintaining their integrity.

3.2.4.1 Data repository

Data repositories are another strategy that could facilitate preservation of research data to ensure that researchers, scholars and other stakeholders can be assured of availability, accessibility, preservation and dissemination of content (Decman and Vintar 2013; and Yiotis 2008). An effective data repository is usually achieved through the collaborative works of librarians, information technologists, archivists, policymakers and research institute administration. On their part, research funders and publishers require agricultural research institutes to deposit research data in certified and credited repositories, in an effort to secure the reusability and long-term preservation of research data. RECODE Project Consortium (2014) agrees that obtaining accreditation or certification to appropriate standards is a way for ensuring both the quality of data repositories and of the quality assurance process.

Good data repositories are goldmines for agricultural research institutes because they bring in the benefits of open access as well as enhance sharing and reuse of research data. On the contrary, Parker (2012) points out that there are complexities around clarity of ownership, description and preservation formats of research data in data repositories which results in some discontentment among researchers. In this regard, Amorim et al. (2015); Bush (2009); and Fary and Owen (2013) state that if a clear and articulated RDM policy is in place, then issues of ownership, storage, formatting, description, networks, and software will clearly be spelled out to allow fluent RDM. Agricultural research institutes need to invest aggressively in data repositories in consultation and in collaboration with the government, agricultural research institutes and RDM stakeholders in order to change the landscape of scholarly communication across agricultural research institutes.

3.2.5 Data access

Open access refers to the practice of making peer-reviewed scholarly research and literature freely available online to anyone interested in reading it (European Commission 2016; and OECD 2007, 2004). It is imperative that open access movement (Berlin Declaration 2003; European Commission 2016; Higman and Pinfied 2015) have advocated for research data to be carefully preserved and made widely available through open access to enhance sharing, use and reuse. The Scholarly Publishing and Academic Resources Coalition (n.d) lists three key requirements for open access; first- availability, second- access and third- redistribution and reuse. In contrast, RECODE Project Consortium (2014) found out that most agricultural research institutes in the European Union focus on open access to publications rather than research data and therefore there is need to develop policies that allow the openness of research data but safeguarding the intellectual property rights, ownership while meeting the funders requirements. There are also institutional and community benefits provided by open data (Macdonald and Martinez-uribe 2010; Ball 2012; and NSF 2011) which include:

a) Visibility in terms of increased citation and usage, and greater public engagement;
b) Make new discoveries through faster impact, wider collaboration and increased interdisciplinary conversation; and
c) Comply with funder mandates.

In sum, open access is a means to advance knowledge, increase the benefits and return of investment in research and to foster innovation. Open access to research data from public funding should be easy, user-friendly and preferable internet based (Thanos 2010), but this will only be possible if policy, legal and technological dimensions are addressed, for instance,

technology must render physical and semantic barriers irrelevant, while policies and laws must address and supplant outdated legal jurisdictional boundaries.

3.2.6 Data use and reuse

The use of data collected in addressing emerging issues or being reused to find out whether a research establishes same conclusions or re-analyses of existing data to come up with powerful insights is imperative to RDM and agricultural research institutes (Lewis 2010; and Heidorn 2011). Improvement in technology, tools and communications have made research data easier to use and reuse. Since research data is data-rich, researchers have the opportunity to research into many aspects, including re-analysis of existing data, verification of results, minimization of duplication of efforts and acceleration of innovation, leading to improved production and attainment of good economic and social standing.

3.2.7 Sharing research data

There is need for agricultural research institutes to provide not only structures and policies for research data sharing, but services to support and educate researchers on concepts of data management and strategies for sharing data that can often be vital for the continuation of research (Karasti, Baker and Hakola 2006). Van den Eynden, Corti, Woollard, Bishop and Horton (2011) buttress the following as benefits of sharing research data:

a) Encourages scientific enquiry and debate;
b) Promotes innovation and potential new data uses;
c) Leads to new collaborations between data users and data creators;
d) Maximizes transparency and accountability;
e) Enables scrutiny of research findings;
f) Encourages the improvement and validation of research methods;
g) Reduces the cost of duplicating data collection;
h) Increases the impact and visibility of research;
i) Promotes the research that created the data and its outcomes;
j) Can provide a direct credit to the researcher as a research output in its own right and
k) Provides important resources for education and training.

In the same vein, Van den Eynden *et al.* (2011) describes various ways of sharing research data including:

a) Depositing them with a specialist data centre, data archive or data bank;
b) Submitting them to a journal to support a publication;
c) Depositing them in an institutional repository;
d) Making them available online via a project or institutional website and
e) Making them available informally between researchers on a peer-to peer basis.

The ease, with which digital research data can be stored, disseminated and made easily accessible online, means that many institutions should strive to share research data to enhance the impact and visibility of the research. The majority of the research funders in their research data sharing policy and mandates insist that publicly funded research data should, as far as possible, be openly available and encourage researchers to share data and outputs to the scientific community and stakeholders (American Psychological Association 2015).

In reviewing literature on data curation, Palathingal *et al*. (2015) concluded that a global trend on curating agricultural research data in the emergence of data-intensive research call for a well-designed technical infrastructure, trained human capital, policies and procedures at every stage of data curation and collaboration among agricultural research institutes in order to fill gaps at every stage of data curation.

3.3 Knowledge, skills and training requirements of RDM

Most extant studies have focused on the training of librarians, IT specialists, archivists and researchers to manage metadata, research data archives, data repositories, data curation, searching and retrieval, access, and web portals (Kuusniemi, Heino and Larmo n.d; Cox and Pinfield 2014; and Molloy and Snow 2012). The Society of College, National and University Libraries (SCONUL) (2015) advance the views of the Digital Curation Centre (DCC) and Research Libraries in United Kingdom on the knowledge and skills required of RDM staff in supporting RDM by highlighting the following:

1. RDM knowledge
   - ***a)*** The research data cycle and the stages of a research career in order to understand where support might be most needed;
   - ***b)*** RDM principles, including RDM planning, curation and preservation;
   - ***c)*** The discipline-specific nature of data; and
   - ***d)*** Open access and data sharing.

2. RDM skill
   - ***a)*** Advocacy, negotiation and diplomacy to work with researchers and other professional staff;
   - ***b)*** Guidance and training to support researchers in carrying out their responsibilities;
   - ***c)*** Advice and guidance to assist with necessary processes and procedures;
   - ***d)*** Understanding researcher requirements in order to anticipate and provide appropriate support;
   - ***e)*** Bibliometrics; and
   - ***f)*** Monitoring data reuse, citations and impact.

According to a study done by Henty (2014) on RDM competencies, the training needs of RDM occasioned by the influence of ICTs needs to address data generation, processing, preservation, dissemination, sharing and reuse. This view is consistent with the argument advanced by Taylor (2014) that skills acquired to curate, access, reuse, and share research data with the advent of new technologies remains one of the major challenges. Taylor continues to explain that researchers, librarians, archivist and IT specialists are deficient in knowledge and skill that pertains manipulation, interpretation and long term access to research data collected. Researchers often require training to enable them to acquire knowledge and skills needed to make their research data available and accessible or how to reuse data and incorporate data in their research process. Also, librarians, IT specialists and archivists require training on provision of research data services (RECODE Project Consortium 2014).

The right skills still need to be recruited and developed, and this would only be possible if the RDM stakeholders have a good understanding of the niche areas that need to be occupied. Therefore, agricultural research institutes should engage in professional development activities for RDM through workshops, conferences, seminars, as well as formal training programs and curricula that enable the gradual development of research data-scientists, RDM skills and knowledge. In the same perspective, RDM advocacy, awareness and data literacy should also be considered as imperative in advancing skills and competences in RDM. However, Lyon (2012) and Lewis (2010) propose that innovative approaches are needed to address the significant knowledge and skill gaps, data literacy and training in RDM especially in the areas of data curation, open access repositories and research data services.

3.4 Information and Communication Technology (ICT) infrastructure for RDM

The digital revolution is transforming the way scientific research is conducted. Henty (2014) illuminated that the growing contribution of ICTs to research has excited researchers the world over as they invest in new ways of conducting research and enjoy the benefits of more

sophisticated computers and communications systems that support measurement, analysis, modeling, simulation, collaboration and publishing. It is important in today's research environment for researchers to embrace the use of ICTs in order to effectively collect, analyse, preserve, share and manage research data while at the same time being able to access multi-scale, multi-discipline and multi-national research data. Australian government (n.d) asserts that development in ICTs is revolutionizing the research sector by setting up high-speed networks, web portals, metadata, and data repositories bringing in substantial potential benefits in data generation, analysis, manipulation, sharing and reuse. Amorim et al. (2015) emphasize the need for compatibility of data repositories, metadata, security systems, data management systems, search mechanisms and community acceptance as they are central to RDM.

A survey conducted by Maru (2004) on ICT in agricultural research and development in Sub-Saharan Africa found out that National Agricultural Research System (NARS) have major gaps and weaknesses in ICT infrastructure, such as

a) Capability, including skills and training;
b) Content, including generation and management;
c) Capital, with focus on funding;
d) Connectivity, not only physical but the ability to access information buy individual and user community;
e) Organisational or institutional culture; and
f) Conceptual framework (legal and policy framework) related to ICT.

Furthermore, Coherence in Information for Agricultural Research for Development (CIARD) (2012) did a case study on Kenya Agricultural Information Network (KAINet) and established that the use of Web 2.0, You Tube and Social Networking to enhance visibility and exchange of research outputs, including metadata, has not been widely implemented and embraced by most of Kenya's agricultural research institutes. In addition, Physical security, network security and security of computer system and files all need to be considered to ensure security of data and prevent unauthorized access, changes to data, disclosure or destruction of data (Princeton University 2017). Data security arrangements need to be proportionate to the nature of the data and the risks involved. Data security may be needed to protect intellectual property rights, commercial interests, or to keep personal or sensitive information safe (Van den Eynden et al. 2011). A qualitative study by Piennar (2010) conducted at the University of Pretoria on RDM practices revealed that ICT infrastructure such as web portals, institutional repositories, networks, hardware and software for RDM were not fully developed to facilitated full operationalization of RDM.

3.5 Collaborative partnerships influencing RDM

Collaboration within institution and among institutions is necessary for the sharing of research data, and for creating and sustaining public-private partnerships among research institutes, and partners (Pinfield, Cox and Smith 2014; Erway and Rinehart 2016; and Flores et al. 2015). Bracke (2011) illuminates that in the long run, however, RDM potential will only be tapped if the many actors in data creation, management and use are able to develop collaborations to build shared infrastructure and to develop and implement best RDM. Moreover, agricultural research institutes should uphold good governance that would promote collaboration within and across research areas, nationally and internationally, and ensure the effective establishment, operation and management of research data infrastructure. Collaborative research networks in agricultural research institutes create a significant amount of new data and it is imperative that this data is well managed to ensure that it is secure, discoverable, accessible, useable and re-usable (Gibson and Gross 2013).

Pinfield, Cox and Smith (2014) interviewed 26 respondents with regard to collaborative partnerships. The findings revealed that collaborative partnerships on one hand have benefits

such as metadata exchange, sharing, and reuse of research data and on the other hand, challenges such as lack of teamwork and policies governing collaborative partnerships. Australian Government (n.d) calls for a national collaborative approach to investment in research data infrastructure in order to reduce duplication, enhance economic use of resources, and optimize research outcomes and benefits. In addition, appropriate access arrangements and agreed standards will facilitate collaboration, fostering multi-disciplinary research uses for existing data, enabling researchers to address emerging problems in new ways.

4.0 RDM initiatives and challenges in agricultural research institutes

RDM in developed countries such as United Kingdom (UK), United States of America (USA), Australia and Canada have made great advancements (Lewis 2010; NSF 2007; and Henty 2014).

4.1 RDM perspective in United Kingdom

Large-scale management of the research data emerged over forty years ago in Europe when the UK Data Archives was established to manage paper-based surveys and other data outputs. This has been given impetus by the growth of digital research data and growing interest in long-term preservation, curation, and storage of research data for reuse and sharing (Lewis 2010). In the year 2001, the UK government funded e-Science Core Program, administered by the Engineering and Physical Sciences Research Council (EPSRC) on behalf of Research Councils UK to establish infrastructure, middleware and documentation to facilitate wide uptake of RDM (Lewis 2010; and Hey and Trefethen 2003). Furthermore, e-Science Core Program also supported demonstrator projects to enable researchers to understand the scope, capability, and implications of e-research projects and the need to manage data that was generated forthwith with a focus on areas (Lewis 2010) such as:

- Data-intensive: generating and often using large volumes of data;
- Collaborative: involving researchers across multiple institutions and transnational limitations;
- Grid-enabled: using high-capacity network and middleware.

According to Lord and Macdonald (2003), the Joint Information Systems Committee (JISC) commissioned a report on the curation of e-Science data and together with the e-Science Core Program, highlighted the role of the Digital curation centre with recommendations about the need to develop national capacity and capability to handle RDM. As can be seen, RDM featured prominently in e-Science Core Program and JISC in the UK which propelled the significance of Data Curation, (Data Curation Centre, DCC) lifecycle model (was a key recommendation in the JISC), technical infrastructure, legal issues, and human capabilities.

4.2 RDM perspective in United States of American (USA)

The growth of digital research has seen the emergence of data-intensive and collaborative research leading to the establishment of the National Science and Technology Council Committee (NSTCC) in the USA and the e-Infrastructure Reflection Group in the European Union to advise on capability, capacity and infrastructure in data management (Van den Eynden *et al*. 2011). These developments have increased investment in data management (Lewis 2010). For example, the USA- NSF has invested funds and cyber-infrastructure for research data curation through DataNet programme (NSF 2007). The introduction of DataNet program was as a result of the introduction of data management plan requirements by the NSF which could result in an effective and efficient RDM and for this reason drew attention to the need for data management infrastructure, both in terms of hardware, human and policy support (Halbert 2013; and NSF 2007). The NSF mandate was neither unprecedented nor an isolated intervention. The National Institutes of Health (NIH) had implemented the first mandate in 2003, requiring researchers to comply with data sharing and data management practices (NIH 2003). Other federal agencies, for example, the National Endowment for the Humanities, adopted a

requirement for data management plan that explicitly emulated the NSF requirement (National Endowment for the Humanities 2013).

To this end, it can be noted that the USA government has laid down strategies to create a comprehensive framework of transparent, evolvable and extensible policies, infrastructure, management and organisational structures that provide reliable and effective access, reuse and sharing of research data.

4.3 RDM perspective in Australia

Australia has also moved with relative alacrity to develop data management of e-research and has set up the Australian National Data Services (ANDS) funded by the Australian government through the National Collaborative Research Infrastructure Strategy (NCRIS) (ANDS Technical Working Group 2007). In this regard, ANDS core purpose is to make Australia's research data assets more valuable for researchers, agricultural research institutes and the nation. Henty (2014), in support of this view opines that Australian agricultural research institutes and researchers are keen to have greater access, sharing, and reuse of research data resulting in greater efficiency in RDM. In light of newly developed strategy, "The 2011 Strategic Roadmap for Australia Research Infrastructure", the Australian government has made significant investments in research data infrastructure to facilitate collection, generation, manipulation, curation, access and dissemination (Australian Government n.d). Carrick (2014) points out that RDM in Australia is an essential component of all research leading to the establishment of, and sharing of 'Australian Code for the Responsible Conduct of Research', jointly developed and issued by the National Health and Medical Research Council (NHMRC), the Australian Research Council (ARC), and Universities Australia. The code assigns researchers and their institutions the responsibility of addressing ownership, storage and retention, access to, and sharing of research data.

4.4 RDM perspective in Canada

In Canada, RDM services have become a high priority for government agencies and post-secondary institutions in recent years. While it has lacked coherent national strategies for developing the digital infrastructure required for e-research, such as those in Australia or the UK, still there remains a growing expectation for sound RDM (Whitehead and Bourne-Tyson n.d). Due to different aspects of digital infrastructure being operated separately at different government levels and not as part of a cohesive whole at the national and institutional levels, the Canadian government funded three main federal research granting council known as the 'Tri-Agencies' with the sole purpose of strengthening RDM in Canada and maintain Canada's research excellence (Government of Canada 2016). The Tri-Agencies (Whitehead and Bourne-Tyson n.d; and Government of Canada 2016) are:

a) The Canadian Institutes of Health Research;

b) The Natural Sciences and Engineering Research Council of Canada; and

c) Social Sciences and Humanities Research Council (SSHRC).

According to Fry, Doiron, Létourneau, Perrier, Perry et al. (2017), the Tri-Agency Statement of Principles on Digital Data Management heightens the need for a collaborative national perspective on RDM that has been missing in Canada. Under its auspices, the statement outlines the agencies' overarching expectations for RDM and the role of researchers, agricultural research institutes, research communities, and research funders in supporting data management (SSHRC 2015). In Addition, the Canadian government through the Tri-Agencies promotes and supports research, research training, knowledge transfer and innovation within Canada. Like other developed countries, the Canadian government and SSHRC (Government of Canada 2016; and SSHRC 2015;) maintains that in promoting access to research results, the Tri-Agencies aspire to advance knowledge, avoid research duplication and encourage reuse,

maximize research benefits to Canadians and showcase the accomplishments of Canadian researchers. In this respect, the Canadian government and research funders are becoming increasingly aware of the value of research data, the importance of fostering reuse of research data and the need for policies to enable excellence in RDM (Government of Canada 2016; and Sewerin 2015).

4.5 RDM perspective in South Africa

South Africa is leading the cluster of African countries in embracing RDM (Van Deventer and Piennar 2015). Some research councils and institutes, and academic and research libraries in South Africa have initiated programs towards the realization of RDM. For example, the University of Cape Town (UCT) has established e-Research centre to work and partner with researchers in finding IT solution for their research work while the University of South Africa (UNISA) has completed investigation into RDM as part of the plan to establish data management (Macanda, Rammutloa and Bezuidenhout 2015). The University of Pretoria, Stellenbosch and Witwatersrand are at different planning and implementation stages (Van Wyk and Van der Walt 2014; Van Deventer and Piennar 2015). An investigation on “Research Data Management in South Africa” by Kahn, Higgs, Davidson and Jones (2014) found that in South Africa, a number of data repositories have been established to manage research data. They include South African National Park, National Health Information Repository and Data Warehouse, and Data Intensive Research Initiative of South Africa (DIRISA). Lötter (2014) and Fernihough (2011) affirm that DIRISA is one of the initiatives aimed at promoting RDM in the country.

Van Deventer and Piennar (2015) postulates that the Council for Scientific and Industrial Research (CSIR), DIRISA and National Integrated Cyberinfrastructure System (NICIS) are setting systems in place in terms of data curation, policies, technical infrastructure, and human capability to enable management, reuse, and sharing of research data. In the same vein, the National Research Foundation (NRF) - South Africa, as the leading government research funding agency, has been involved in many initiatives to allow the sharing of research outputs, datasets research support and knowledge networking databases which contribute to knowledge generation for the support and promotion of research development (NRF 2015). Studies done by Kahn *et al*. (2014); Lötter (2014); and Van Deventer and Piennar (2015) on RDM landscape in South Africa, shows that there are high levels of awareness of RDM in research and academic institutions with notable activities of Network of Data and Information Curation Communities (NeDICC) in most agricultural research institutes. NeDICC aims to promote the development and use of research data including curation standards and practices of agricultural research institutes to ensure the long term preservation and accessibility of digital research outputs (UCT 2016). Kahn et al. (2014) nevertheless singled out issues of leadership, policy and skills as areas that require the most urgent attention.

4.6 RDM perspective in Kenya

In Kenya, there is some attempt, albeit limited, to promote RDM especially in the health and migration sector (Jao , Kombe, Mwalukore, Bull, Parker et al. 2015; Family Health International-Kenya 2005; Olum 2013). Olum (2013) posits that despite Kenya having adequate migration data in various institutions, the data is not sufficiently coordinated, shared, analysed or disseminated. Olum further observed that many of the government and civil institutions have limited capacity, resources and facilities for collection, analysis, use and reuse, and sharing of migration data hence making access and use of migration data difficult. Furthermore, the health sector in Kenya is making strides in embracing the sharing of research data albeit at a rate of limited rapidity. Lairumbi, Parker, Fitzpatrick and Mike (2011) opined that health research data sharing in Kenya is vital among health researchers for example, sharing research data on malaria or HIV/AIDS could enhance clinical vaccine trials and advance breakthroughs in the

health sector. However, sharing health research data is not fully embraced, leading to underutilization of research data.

World Agroforestry Centre based in Kenya organized RDM training for agroforestry research scientists whose aim was to encourage necessary allocation of resources such as, skilled personnel and technical infrastructure for data management (World Agroforestry Centre 2002). Equipped with the RDM training manual, the World Agroforestry Centre made an incredible step in introducing RDM into the agriculture sector. The assessment by scholars (Chisenga 2012; Mugata 2014; Alila and Atieno 2006; World Agroforestry Centre 2002) on RDM in Kenya established that various institutions, specifically agricultural research institutes have rich valuable research data that needs to be managed effectively in order to enhance the institutes mandate, increase agricultural productivity and enhance food security. Mugata (2014) asserts that accessing agricultural research data in Kenya is not easy for researchers and other stakeholders in agriculture due to limited institutional skills, legal framework, infrastructure and strategies that support RDM. However, to facilitate agricultural related content accessibility, visibility and sharing in Kenya, Kenya Agricultural Information Network (KAINet) was established (Mugata 2014). KAINet aims at building a common and freely accessible information system for the generation, collection, processing, preservation and dissemination of agricultural research data and information.

5 Discussions

In analyzing and evaluating literature review on RDM the following issues emanates.

Erway (2013); and Higman and Pinfield (2015) point out that failure to establish legal and policy protocols for RDM is likely to diminish the potential for valuable research outputs to be made available for access, sharing and reuse .For example, Agricultural research institutes are increasingly getting involved in data-intensive research projects that cut across disciplinary borders and also involve communities of researchers participating in large-scale collaborations. In this respect, there is a need to develop legal frameworks, policies and regulations on RDM to facilitate systems and services in enabling research data to be managed, accessed, shared, reused and secured. Fitzgerald and Pappalardo (2007) assert that RDM occurs in legal and policy contexts and the principal areas of law that cover RDM includes copyright, moral rights, patents, confidentially, contract, and privacy. In addition, Erway (2013); and Jones, Pryor and Whyte (2013) emphasize that policies and regulations at every stage of research lifecycle ensure that consistent data management standards and quality are maintained in order to foster management of and access to research institute's intellectual assets and also provide uniform requirements to facilitate data understandability and sharing among research data stakeholders.

According to Higgins (2008), data curation consists of a range of activities and processes focused on capture, appraisal, description, preservation, access, reuse and sharing which adds value to research data throughout its lifecycle. United Nations Environmental Program (UNEP) (2015) claims that in developing countries, agricultural research data existing in different formats or software versions scattered across servers, computers, storage devices or other filing systems, which makes it difficult to change into modern formats or versions and in the process research data is lost. In this regard, there is need for standardized format of data curation to allow uniformity. Concerning funding, Knowledge Exchange Research Data Expert Group and Science Europe Working Group on Research Data (2016) asserts that the sustainability of RDM represents a challenge within the existing funding structures especially research institutes in developing countries and at the core of this particular challenge are issues related to the eligibility of funding for research to allow generation of research data for curation. Moreover, there is a lack of awareness about the importance of metadata among the scientific community and therefore there is a need for research institutions to organize RDM literacy programs to assist researchers and other RDM stakeholders to understand, prepare and use metadata

necessary to enable the discovery, preservation, and reuse of their data (Tenopir et al. 2011). Concerning preservation, RECODE Project Consortium (2014) emphasizes that policies and regulations regarding retention periods and where to deposit research data when researchers leave the research institute, should clearly be stipulated.

On the same breath, European Commission (2016) posits that fuller and wider access to research data is important as it helps to build on previous research results, encourage collaborations and help avoid duplication of effort, speed up innovation, and involve citizens and society in the scientific process. Access to Kenya's agricultural research data faces various challenges as enumerated by Muinde and Gorman (2009) that include: social-cultural (non-visionary leadership), lack of ICT infrastructure, legal, policy and institutional frameworks, and capacity building programs. Muinde and Gorman (2009); and Chisenga (2012) point out that there is a necessity for government to fund, plan and prioritize resource allocation for research to ensure that there is local content which is visible, accessible and sharable online to facilitate information flow.

On knowledge, skill and training required for RDM, literature indicated that a study done by Schmidt and Shearer (2016) on librarians' competencies profile for research data management, guided by interpretive paradigm, enumerated the knowledge that RDM staff should posses must include: knowledge of repositories, data manipulation, data discovery mechanisms, funders' policies and requirements, data centers, data publication requirements of journals, sharing and access, data citation and referencing, metadata standard and schemas among others. In addition, Fary and Owen (2013); and Creamer, Morales and Crespo (2012), in their studies on RDM skills and competencies listed the skills relevant to RDM which included: storage, data migration, networking, legal, financial, security, metadata creation and assignment, scholarly data communications, and preservation. Kennan (2016) interviewed 25 data professionals in Australian scientific research organisation and found out that the most common set of skills required were: interpersonal skills, data specific knowledge and skills, and metadata. In this regard, it would seem knowledge and skills possessed by researchers and other RDM stakeholders in Kenya's agricultural research institutes were inadequate. However, Lötter 2014); and Patrick et al. (2013) pointed out that RDM training should be undertake through capacity building workshops; in-house training and mentorship of research data curators as well attending conferences and seminars.

As far as ICT infrastructure for RDM is concern, literature revealed that while cyberinfrastructure has been revolutionizing digital research, a comprehensive framework for capturing, organizing, preserving, and making research data available and usable has not been created, further access to adequate ICT tool and equipment has not be in tandem with the training of researchers and other data professionals on how to utilize them effectively in RDM (Witt 2008). In relation to ICT skill, Amorim et al. (2015) emphasize that there is a need for compatibility of research data security with data repositories, metadata, security systems, data management systems, and search mechanisms in order to enhance privacy of research data. Moreover, data security is important for protecting intellectual property rights, commercial interests, or to keeping personal or sensitive information safe (Van den Eynden et al. 2011). Therefore, Maru (2004) in a study sums up gaps and weaknesses of ICT used in Kenya's agricultural research institutes to be as follows: Capacity (including infrastructure and skill); Content (including generation and management); Capital (with the focus on funding not only ICT also capacity building); connectivity (not only physical but the ability to access information by individual and user community); and collaboration (within and across research institutes at national, regional and international).

Collaborative partnerships are important catalysts in research project as literature indicated that collaboration between researchers and the public contributes significantly to increased productivity, quality of agricultural products, and diversified crops and livestock (KALRO- Tea

Research Institute 2016). Meanwhile, Pinfield, Cox and Smith (2014) conducted interviews with 26 respondents regarding collaborative partnerships. The findings revealed that collaborative partnerships have benefits such as metadata exchange, exchange RDM human capacity, sharing and reuse of research data on one hand and on the other hand challenges such as lack of teamwork and policies governing collaborative partnerships undermine it. Jahnke and Asher (2012) notes that there is a great need for more effective collaboration tools, as well as online spaces that support the volume of data generated and provide appropriate privacy and access controls.

Therefore, literature revealed that despite absence of legal framework in the agricultural research institutes, individual institutes had RDM policies guiding researchers on research data capture, appraisal, description, preservation, access, reuse and sharing. Further indication is the lack of coordinated RDM strategies in the research institutes led to loss of data and difficulty in accessing, reusing and sharing research data. Furthermore, literature revealed that there was scarcity of RDM knowledge and skill in the agricultural research institutes hence for example, limiting the utilization of research data in Kenya's agricultural research institutes. Generally literature indicated that ICT infrastructure for capturing, appraisal, description, preservation, access, sharing and security of data was inadequate to facilitate RDM. Collaborative partnership enhanced management, access and sharing of research data. Generally, the finding from literature indicated that support from government, research institutes, and collaborative partners could enhance management, access, reuse and sharing of agricultural output (Pinfield, Cox and Smith 2014; Cox, Verbaan & Sen 2012; Qin 2013; Mossink, Bijsterbosch, & Nortier 2013; Grebmer and Spielman 2004; and Lewis 2010).

In a nutshell, reviewed literature in this paper gives content analysis on background information on RDM issues and plays a crucial role in preparing and orientating the researcher with regard to the raging debates taking place in RDM field. More or less it is descriptive in form as Cooper (2011:20) alludes that reviewed literature integrate what others have done and said, criticize previous scholarly works, build bridges between related topics, and identify the central issues in a field. On the other hand reviewed literature cannot provide current trends and investigations to RDM in the wider institutional context, the ongoing drivers for RDM activities and factors influencing the shape of RDM development. However, there is need to undertake empirical studies in RDM in order to provide current detailed synthesis, sufficient criticisms, clear methodology, up-to-date data /information, and further reveal areas of concern that need investigation.

Conclusion

The literature reviewed revealed that RDM have been recognized worldwide, albeit to different extents with more pressure globally on agricultural research institutes embrace RDM to facilitate research data capture, appraisal, preservation, access, sharing and reuse. Furthermore, literature reviewed revealed that for the successful establishment of RDM in agricultural research institutes, the establishment of a formal data governance structure to address RDM issues, enactment of RDM legal, policies and regulations; capacity building programs and plans, incentivisation of researchers; a sound technical infrastructure and collaborative partnerships in boosting relationships among research institutes.

Besides, literature reviewed revealed that RDM in Kenya , for example, is given little attention as attested by the limited documentation or publications of the research that is generated by these institutions, leading to poor management, limited access of such research data, duplication of the research, poor sharing and reuse of the research data (Jao et al. 2015; Family Health International-Kenya 2005; The World Agroforestry Centre 2012; Alila and Atieno 2006; Mugata 2014). This review provide frameworks particular of specific to developing countries by providing evidence of specific challenges that such countries contend with (Ng'eno

2018). Moreover, few literature review on RDM have been done in Africa. The current literature review is therefore significant in contributing to the scholarly research on RDM in developing countries such as Kenya (Ng'eno 2018).

Acknowledgement

I am indebted to my supervisor Prof. Stephen Mutula for his devotion and admirable guidance when writing this article. He gave selflessly of himself in providing technical advice and supervision in making sure the article contributed to knowledge. My gratitude and appreciation to University of KwaZulu-Natal and employer, Moi University, for granting me the opportunity and study leave respectively to undertake this PhD program. In addition, the literature review is revised from my PhD Titled 'Research Data Management in Kenya's Agricultural Research Institutes'- University of KwaZulu-Natal, 2018(the data collection intruments for the PhD can be replicated in related studies).

References

Alila, P. and Atieno, R. 2006. Institute of Development Studies Agricultural Policy in Kenya: Issues and processes. *A paper for the future agricultures consortium workshop, Institute of Development Studies, 20-22 March 2006*. Viewed 25 April 2016, from: *http://www.fao.org/fileadmin/user_upload/fsn/docs/Ag_policy_Kenya.pdf*

American Psychological Association. 2015. Data sharing: principles and considerations for policy development. Viewed 5 October 2016, from: *https://www.apa.org/science/leadership/bsa/data-sharing-report.pdf*

Amorim, R.C., Castro, J.A., Silva, J. R. and Ribeiro, C. 2015. A comparative study of platforms for research data management: interoperability, metadata capabilities and integration potential. Viewed 13 May 2016, from: *http://link.springer.com/chapter/10.1007/978-3-319-16486-1_10#page-1*

Australian Government. n.d. The Australian research data infrastructure strategy. Viewed 5 August 2016, from: *https://docs.education.gov.au/system/files/doc/other/the_australian_research_data_infrastructure_strategy.pdf*

Australian National Data Service. n.d. Data re-use. Viewed 27 October 2016, from: *http://www.ands.org.au/working-with-data/enabling-data-re-use/data-re-use*

Austrian National Data Services (ANDS) Technical Working Group. 2007. Towards the Australian data commons: a proposal for an Australia national data service. Department of education, science and training. Viewed 26 May 2016, from: *http://www.ands.org.au/__data/assets/pdf_file/0009/386982/ardc_eif_annual_report_2011-12.pdf*

Ball, A. 2012. Review of data management lifecycle models. Viewed 20 July 2016, from: *http://opus.bath.ac.uk/28587*

Berlin Declaration. 2003. Berlin declaration on open access to knowledge in the sciences and humanities. Viewed 25 April 2016, from: *http://www.fu-berlin.de/sites/open_access/Veranstaltungen/oa_berlin/poster/Berlin-Dclaration_Simone-Rieger_MPIWG.pdf*

Bracke, M.S. 2011. Emerging data curation roles for librarians: a case study of agricultural data. *Journal of Agricultural and Food Information,* 12 (1), 65-74.

Bush, V. 2009. Research data management. Viewed 14 May 2016, from: *https://net.educause.edu/ir/library/pdf/ers0908/rs/ers09087.pdf.*

Carrick, A. 2014. Research data management: guidelines and planning for researchers. Viewed 22 May 2017, from: *https://www.swinburne.edu.au/media/swinburneeduau/research/docs/pdfs/Research_Data_Management_Guidelines.pdf*

Chisenga, J. 2012. *Opening access to agricultural sciences and technical information in Ghana, Kenya and Zambia.* Presented at SCECSAL XXth conference hosted by Kenya Library Association (KLA) on 4th-8th July, 2012. Venue LAICO REGENCY HOTEL, Nairobi, Kenya. Viewed 4 March 2017, from: *https://core.ac.uk/download/pdf/11890652.pdf*

Coherence in Information for Agricultural Research for Development (CIARD). 2012. Case studies: Kenya Agricultural Information Network (KAINET). Viewed 30 March 2016, from: *http://www.ciard.info/sites/default/files/RAF%20(Kenya).pdf*

Cooper, H. M. 2011. *Research synthesis and meta-analysis: a step by step approach*. 4th (ed). London: Sage.

Cornell University Library. n.d. Metadata and describing data. Viewed 6 June 2016, from: *http://data.research.cornell.edu/content/writing-metadata*

Cox, A.M. and Pinfield, S. 2014. Research data management and libraries: current activities and future priorities. *Journal of Librarianship and Information Science*, 46(4), 299–316.

Cox, A., Verbaan, E. and Sen, B. 2012. Upskilling liason librarians for research data management. Viewed 27 October 2016, from: *http://www.ariadne.ac.uk/issue70/cox-et-al*

Creamer, A., Morales, M.E. and Crespo, J. 2012. An assessment of needed competencies to promote the data curation and management librarianship of health sciences and science and technology librarians in New England. *Journal of eScience Librarianship*, 1(1), 18-26.

Data Curation Centre. 2004. Planning preservation. Viewed 4 July 2016, from: *http://www.dcc.ac.uk/digital-curation/planning-preservation*

Decman, M. and Vintar, M. 2013. A possible solution for digital preservation of e-government: a centralised repository within a cloud computing framework. *Aslip Proceedings: New Information Perspectives,* 65, 406-424.

Dora, M. and Kumar, H. A. 2015. Managing research data in academic institutions: role of libraries, 2015. In CALIBER, 2015, Shimla, March 12-+14, 2015 [Conference paper]. Viewed 18 September 2017, from: *http://eprints.rclis.org/24911/1/50.pdf*

Eaker, C. 2016. Selection and appraisal of digital research datasets. In L. Kellam and K. Thompson (eds.). *Databrarianship: The academic data librarian in theory and practice. American Library Association.* Viewed 4 October 2016, from*: http://trace.tennessee.edu/cgi/viewcontent.cgi?article=1018andcontext=utk_libpub*

Erway, R. 2013. Starting the conversation: university-wide research data management policy. Dublin, Ohio: OCLC Research. Viewed 1 May 2016, from*: http://www.oclc.org/content/dam/research/publications/library/2013/2013-08.pdf*

Erway, R. and Rinehart, A. 2016. *If you build it, will they fund? making research data management sustainable*. Dublin, Ohio: OCLC Research.

European Commission. 2016. Guidelines on open access to scientific publications and research data in horizon 2020: version 2.1. Viewed 20 April 2016, from: *http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-pilot-guide_en.pdf*

Family Health International-Kenya. 2005. Strengthening research and data management: new efforts at the Kenya division of reproductive health. Viewed 29 March 2016, from: *http://pdf.usaid.gov/pdf_docs/Pnadk371.pdf*

Fary, M and Owen, K. 2013. Developing an institutional research data management plan service. Viewed 10 March 2016, from: http *https://net.educause.edu/ir/library/pdf/acti1301.pdf*

Fellous-Sigrist, M. 2015. What are research data? Viewed 1 March 2017, from*: https://www.ucl.ac.uk/tobedeleted-sites/dis-old-June16/research/RDM_presentation.pdf*

Fernihough, S. 2011. E-research: an implementation framework for South African organisation (Unpublished master's research report, University of South Africa). Viewed 26 May 2016, from: *http://hdl.handle.net/10500/4474*

Fitzgrald, A. and Pappalardo, K. 2007. Building the infrastructure for data access and reuse in collaborative research. Viewed 4 June 2017, from: *https://eprints.qut.edu.au/8865/1/8865.pdf*

Fitzgerald, A., Pappalardo, K. and Austin, A. 2008. Practical data management: a legal and policy guide. Viewed 5 June 2017, from: *https://eprints.qut.edu.au/14923/1/Microsoft_Word_-_Practical_Data_Management_-_A_Legal_and_Policy_Guide_doc.pdf*

Flores, J.R., Brodeur, J.J., Daniels, M.G., Nicholls, N. and Turnator, E. 2015. Libraries and the research data management landscape. Viewed 3 December 2015, from: *http://www.clir.org/pubs/reports/pub167/RDM.pdf*

Fry, J., Doiron, J., Létourneau, D, Perrier, L. and Perry, C. et al. 2017. Research data management training landscape in Canada: a white paper. Viewed 21 March 2017, from: *https://portagenetwork.ca/wp-content/uploads/2017/02/Portage_ Training_White_Paper_EN.pdf*

Gibson, D. and Gross, J. 2013. Research data management in a collaborative network. Research global. Issue 33, pp 12-15. Viewed 30 June 2016, from: *http://ro.ecu.edu.au/ecuworks2011/586*

Government of Canada. 2016. Tri-agency statement of principles on digital data management. Viewed 23 March 2017, from: *http://www.science.gc.ca*

Grebmer, K.V. and Spielman, D.J. 2004. Public-private partnerships in agriculture research: an analysis of challenges facing industry and the consultative group on international agricultural research. Washington, D.C: International Food Policy Research Institute.

Halbert, M. 2013. Prospects of research data management. In *DataRe.* r*esearch data management: principles, practices, and prospects.* Washington, DC: Council on Library and Information Resources. 1-15. Viewed 20 May 2016, from: *http://creativecommons.org/licenses/by-sa/3.0/*

Heidorn, P.B. 2011. The emerging role of libraries in data curation and e-science. *Journal of Library Administration*, 51: (7-8), 662-672.

Henty, M. 2014. Dreaming of data: the library's role in supporting e-research and data management. Viewed 3 January 2016, from: *https://digitalcollections.anu.edu.au/bitstream/1885/47617/5/henty_alia_08.pdf*

Hey, T. and Trefethen, A. 2003. The data deluge: an e-science perspective. In F. Berman, G.C. Fox, and T. Hey, (eds), *Grid computing: making the global infrastructure a reality.* New York: Wiley.

Higgins, S. 2008. The DCC curation lifecycle model. *The International Journal of Digital Curation*, 3(1). Viewed 24 March 2016, from: *http://www.ijdc.net/index.php/ijdc/article/ viewFile/69/48*

Higgins, S. 2012. The lifecycle of data management. In G. Pryor. (ed.). *Managing research data*. London: Facet Publishing.

Higman, R. and Pinfield, S. 2015. Research data management and openness: the role of data sharing in developing institutional policies and practices. *Program: Electronic Library and Information System,* 49 (4), 364-381.

Ingram, C. 2016. How and why you should manage your research data: a guide for researcher. Viewed 2 February 2016, from: *https://www.jisc.ac.uk/guides/how-and-why-you-should-manage-your-research-data*

International Standards Organisation (ISO). 2001. *ISO 15489-1:2001 information and documentation: records management standard. part 1: General*. Geneva: International Organisation for Standardization.

Jahnke, L. M. and Asher, A. 2012. The problem of data: data management and curation practices among university researchers. In. L. Jahnke, A. Asher and S. Keralis. *The problem of data*. Washington, DC: Council on Library and Information Resources. Viewed 3 September 2016, from: *https://www.clir.org/pubs/reports/pub154/pub154.pdf*

Jao, I.., Kombe, F., Mwalukore, S., Bull, S., Parker, M., Kamuya, D., Molyneux, S. and Marsh, V. 2015. Research stakeholders' view on benefits and challenges for public health research data sharing in Kenya: the importance of trust and social relations. Viewed 20 April 2016, from: *http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0135545*

Jones, S., Pryor, G and Whyte, A. 2013. *How to develop research data management services: a guide for HEI's.* Edinburgh: digital curation centre. Viewed 23 September 2015, from: *http:// www.dcc.ac.uk/resources/how-guides/how-develop-rdm-services*

Kahn, M., Higgs, R. Davidson, J. and Jones, S. 2014. Research data management in South Africa: how we shape up. *Australian Academic and research Libraries*, 45(4), 296-308. Viewed 30 March 2016, from: *http://dx.doi.org/10.1080/00048623.2014.951910*

Karasti, H., Baker, K. and Hakola, E. 2006. Enriching the notion of data curation in e-science: data managing and information infrastructure in the Long Term Ecological Research (LTER) network. Viewed 3 May 2016, from: *http://www.worldpece.org/sites/default/files/57-227-1-PB.pdf*

Karick, A. 2014. Research data management: guidelines and planning for researchers. Viewed 4 October 2017, from: *https://www.swinburne.edu.au/media/swinburneeduau/ research/ docs/ pdfs/Research_Data_Management_Guidelines.pdf*

Kennan, M. A. 2016. Data management: knowledge and skills required in research, scientific and technical organisations. Viewed 27 June 2017, from*: http://library.ifla.org/1466/1/221-kennan-en.pdf*

Kenya Agricultural and Livestock Research Organisation (KALRO)-Tea Research Institute. 2016. *Information for visitors*. Kericho, Kenya: Tea Research Institute.

Knowledge Exchange Research Data Expert Group and Science Europe Working Group on Research Data. 2016. Funding research data management and related infrastructures: knowledge exchange and science Europe briefing paper. Viewed 12 August 2016, from: *http://www.scienceeurope.org/wp-content/uploads/2016/05/SE-KE_Briefing_Paper_Funding_RDM.pdf*

Kruse, F. and Thestrup, J.B. 2014. Research libraries' new role in research data management, current trends and visions in Denmark. *Liber Quarterly,* 23(4), 310-335.

Kuusniemi, M. E., Heino, T. and Larmo, K. n.d. How to get started with research data management training services for the academic library? Viewed 16 April 2016, from: *http:// www.iss.it/binary/eahi/cont/76_Mari_Elisa_Kuusniemi_Full_text.pdf*

Lairumbi, G.M., Parker, M., Fitzpatrick, R. and Mike, E.M. 2011. Stakeholders understanding of the concepts of benefit sharing in health research in Kenya: A qualitative study. Viewed 24 March 2017, from: *https://bmcmedethics.biomedcentral.com/articles/10.1186/1472-6939-12-20*

Lewis, M.J. 2010. Libraries and the management of research data. In: E*nvisioning future academic library services*. Facet Publishing: London. 145-168.

Lord, P. and Macdonald, A. 2003. E-science curation report: data curation for e-science in the UK: an audit to establish requirements for future curation and provision. Prepared for the JISC committee for the support of research. Twickenham, England: The Digital Archiving Consultancy Limited. Viewed 2 September 2015, from: *http://www.jisc.ac.uk/uploaded documents/e-scienceReportFinal.pdf*

Lötter, L. 2014. *Reflections on the RDM position in South Africa: development research data management services*. Cape Town, South Africa: Research Methodology Centre.

Lyon, L. 2012. The informatics transform: re: engineering libraries for the data decade. *International Journal of Digital Curation*, 7(1), 126-138.

Lyon, L., Ball, A., Duke, M. and Day, M. 2012. Community Capability Model Framework. Viewed 12 march 2016, from: *http://communitymodel.sharepoint.com*

Lyon, L., Patel, M. and Takeda, K. 2014. Assessing requirements for research data management support in academic libraries: introducing a new multi-faceted capability tool. Viewed 28 November 2015, from: *http://ozk.unizd.hr/proceedings/ index.php/lida/ article/view/121*

Macanda, M., Rammulloa, M., and Bezuidenhout, R. 2015. Research data management at University of South Africa (UNISA). Viewed 24 March 2017, from: *http://hdl.handle.net/ 10500/139007*

Macdonald, S. and Martinez-Uribe, L. 2010. A new role for academic librarians: data curation. *El Profesional de la Informacio'n*, 17(3): 273-280.

Maru, A. 2004. ICT/ICM in agricultural research and development: status in Sub-Saharan Africa. Viewed 3 June 2016, from: *http://www.fao.org/docs/eims/upload/ 210126/ ICT_in_ARD_Regional_Status_2004_FARA.pdf*

Molloy, L. and Snow, K. 2012. The data management skills support initiatives: synthesizing postgraduate training in research data management. *International Journal of Digital Curation*, 7(2), 101-109.

Mossink, W., Bijsterbosch, M. and Nortier, J. 2013. European landscape study of research data management: support infrastructure models for data management. Viewed 15 March 2016, from: *http://www.clarin.nl/sites/default/files/SIM4RDM% 20landscape% 20report_1.pdf*

Mugata, R. 2014. KAINeT initiative opening up access to agricultural research information in Kenya. Viewed 22 April 2016, from: *http://www.ciard.info/news-and-events/blog/kainet-initiative-opening-access-agricultural-research-information-kenya*

Muinde, F.N.N. and Gorman, G.E. 2009. Barriers to open access to scientific information in Kenya with particular reference to agricultural information. Viewed 26 August 2016, from: *http://www.ifla.org/annual-conference/ifla75/index.htm*

National Archives and Records Administration (NARA). 2007. Strategic directions: appraisal policy. Viewed 23 June 2016, from: *http://www.archives.gov/records-mgmt/initiatives/ appraisal.html*

National Endowment for the Humanities. 2013. Data management plans for NEH Office of digital humanities proposals and awards. Viewed 15 March 2017, from: *https://www.clir.org/pubs/reports/pub160/pub160.pdf*

National Institutes of Health (NIH). 2003. Final NIH statement on sharing research data. Viewed 30 March 2017, from: *http://grants.nih.gov/grants/guide/notice-files/not-od-03-032.html*

National Research Foundation (NRF). 2015. Databases. Viewed 15 February 2017, from: *http://www.nrf.ac.za/information-resources/databases*

National Science Foundation (NSF). 2007. Cyberinfrastructure vision for 21st century discovery. Viewed 6 July 2016, from: *http://www.nsf.gov/pubs/2007/nsf0728/nsf0728.pdf*

National Science Foundation (NSF). 2011. Digital research data sharing and management, No.NSB-11-79. Viewed 20 July 2016, from: *https://www.nsf.gov/nsb/publications/ 2011/nsb1124.pdf*

Niu, J. 2014. Appraisal and selection for digital curation. *International Journal of Digital Curation,* 9(2), 65-82.

Ng'eno, E.J. 2018*. Research data management in Kenya's agricultural research institutes.* Unpublished D. Phil. Thesis. KwaZulu-Natal, SA: University of KwaZulu-Natal, Pietermaritzburg, School of Social Sciences/Department of Information Studies.

Olum, G. H. 2013. *Enhancing migration data management in Kenya: assessment and recommendations.* Nairobi: ACP Observatory on Migration.

Organisation for Economic Co-operation and Development (OECD). 2004. OECD principles of corporate governance. Viewed 7 May 2017, from: *https://www.oecd.org/corporate/ca/corporategovernanceprinciples/31557724.pdf*

Organisation for Economic Co-operation and Development (OECD). 2007. OECD principles and guidelines for access to research data from public funding. Viewed 4 July 2016, from: *http://www.oecd.org/sti/sci-tech/38500813.pdf*

Palathingal, L., Dascalu, S., Harris, F.C. and Varol, Y. 2015. A brief of data curation literature. Viewed 20 May 2016, from: *https://www.cse.unr.edu/~fredh/papers/conf/143-absodcl/paper.pdf*

Palmer, C.L., Cragin, M.H., Heidorn, P.B. and Smith, L.C. 2007. Data curation for the long tail of science: the case of environment studies. Viewed 28 March 2016, from: *http://www.researchgate.net/publication/228656107*

Parker, R. 2012. What the library did next: strengthening our visibility in research support. Viewed 18 July 2016, from: *http://www.vala.org.au/direct-download/vala2012-proceedings/435-vala2012-session-1-parker-paper/file*

Patrick, M., Byatt, D., De Luca, F., White, W. Rumsey, S. and Wilson, A. J. 2013. Research data management training for support staff. A DaMaRO project survey. Viewed 5 July 2016, from: *http://damaro.oucs.ox.ac.uk/docs/Research_Data_Management Training _for%20_Support_Staff_-_a_DaMaRO_Project_Survey.pdf*

Pienaar, H. 2010. Survey of research data management practices at the University of Pretoria, South Africa: October 2009-March 2010. Viewed 28 March 2016, from: *http://www.ais.up.ac.za/profile/heila_pienaar/index.htm*

Pinfield, S., Cox, A.M. and Smith, J. 2014. Research data management and libraries: relationship, activities, drivers and influences, *PLoS ONE, 9(12)*. Viewed 25 March 2016, from: *http://eprints.whiterose.ac.uk/82499/1/PLOS%20ONE% 20final%20published% 20version.pdf*

Princeton University. 2017. Research data security. Viewed 11 October 2017, from: *https:// www.princeton.edu/ria/human-research-protection/data/*

Qin, J. 2013. Infrastructure, standards, and policies for research data management. Viewed 16 April 2016, from: *http://surface.syr.edu/cgi/viewcontent.cgi?article=1164andcontext=istpub*

Ray, J. M. 2014. Introduction to research data management. In. J. M. Ray. (ed). *Research data management: practical strategies for information professionals.* West Lafayette, Indiana: Purdue University Press.

RECODE Project Consortium. 2014. Policy recommendations for open access to research data. Viewed 3 August 2016, from: *http://www.recodeproject.eu*

Schellenberg, T.R. 1956. *The appraisal of modern public records (Bulletins of the National Archives No. 8)*. Washington, DC: Government Printing Office.

Schmidt, B. and Shearer, K. 2016. Librarians' competencies profile for research data management. Viewed 26 May 2017, from: *https://www.coar-repositories.org/files/ Competencies-for-RDM_June-2016.pdf*

Scholarly Publishing and Academic Resource Coalition. n.d. Institutional repositories and open access-the future of scholarly communication. Viewed 4 October 2016, from: *http:// www.budapestopenaccessinitiative.org/pdf/David_Prosser.pdf*

Sewerin, C. 2015. Research data management faculty practices: a Canadian perspective. Proceedings of the IATUL conference. Paper 2. Viewed 21 March 2017, from: *http:// docs.lib.purdue.edu/iatul/2015/mvd/2*

Smith, M. L. 2014. Data governance: where technology and policy collide. In Ray, J.M. (ed). *Research data management: practical strategies for Information professionals*. Indiana, US: Purdue University.

Social Sciences and Humanities Research Council (SSHRC). 2015. Tri-agencies adopt statement of principles on digital data management. Viewed 23 March 2017, from: *http:// www.sshrc-crsh.gc.ca*

The Society of College, National and University Libraries (SCONUL). 2015. Research data management: briefing for library directors. Viewed 24 July 2016, from: *http:// www.sconul.ac.uk/sites/default/files/documents/SCONUL%20RDM%20briefing.pdf*

Taylor, R. 2014. The SKA and the rise of big data in radio astronomy. Presentation given at the research Africa conference 2014, Cape Town, South Africa. Viewed 26 September 2016, from: http//www.eresearch.ac.za/presentations-2014-day-three

Tenopir, C., Allard, S., Douglass, K., Aydinoglu, A.U., Read, E. et al. 2011. Data sharing by scientists: practices and perceptions. PLoS One 6(6). Viewed 20 November 2016, from: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0021101

Tibbo, H.R. 2003. On the nature and importance of archiving in the digital age. In M. Zelkowitz (ed.). *Advances in computers: Vol. 57. Information Repositories.* Retrieved June 23, 2016 from doi: 10.1016/S0065-2458(03)57001-2.

Thanos, C. 2010. Global research data infrastructures: the GRDI 2010 vision. Viewed 12 September 2016, from: *http://www.grdi2020.eu/Repository/FileScaricati/fc14b1f7-b8a3-41f8-9e1e-fd803d28ba76.pdf*

UK National Archives. 2012. Appraisal policy. Viewed 23 June 2016, from: *http:// www.nationalarchives.gov.uk/documents/information-management/ appraisal_policy.pdf*

United Nations Environmental Programme (UNEP). 2015. *Green economy sector study on agriculture in Kenya.* Nairobi-Kenya: UNEP. Viewed 3 October 2016, from*: http:// drustage.unep.org/greeneconomy/sites/unep.org.greeneconomy/files/publications/ kenya_agriculture_final.pdf*

University of California, Los Angeles. n.d. Data mining: what is data mining? Viewed 9 March 2017, from: *http://www.anderson.ucla.edu/faculty/jason.frand/teacher/technologies/ palace/ datamining.htm*

University of Cape Town (UCT). 2016. UCT libraries joins network of data and information curation communities. Viewed 4 April 2017, from: *http://www.eresearch.uct.ac.za/news/uct-libraries-joins-network-data-information-curation-communities*

The University of Western Australia. 2016. Metadata standards. Viewed 3 August 2016, from: *http://guides.is.uwa.edu.au/c.php?g=325196andp=2178564*

Van den Eynden, V., Corti, L., Woollard, M., Bishop, L. and Horton, L. 2011. *Managing and sharing data best practices for researchers.* London, UK: Data Archives.

Van Deventer, M. V. and Pienaar, H. 2015. Research data management in a developing country: a personal journey. *International Journal of Digital Curation*, 10(2), 33-47.

Van Wyk, J. and Van der Walt, I. 2014. Going full circle: research data management @ University of Pretoria. Presentation at eReseach Africa 2014 conference, held at University of Cape Town, Cape Town, South Africa 23-27 November 2014. Viewed 28 March 2016, from: *http://www.eresearch.ac.za/sites/default/files/image _tool/images/140/ Going_Full-Circle_RDM_UP_VanWyk_VanderWalt_26Nov_2014.pdf*

Whitehead, M. and Bourne-Tyson, D. n.d. Multi-stakeholder engagement in research data management. Viewed 30 March 2017, from: *https://webcache.googleusercontent.com/ search? q=cache:UxfMleJLe8MJ:https://portagenetwork.ca/wp-content/uploads/2016/ 06/ IATUL2016Multi_Stakeholder_Engagement_in_RDM.pdf+andcd=1andhl=enandct=clnk*

Whyte, A. and Allard, S. 2014. How to discover research data management service requirements. DCC how-to guides. Edinburgh: Digital Curation Centre. Viewed 7 July 2016, from: *http://www.dcc.ac.uk/how-*

Whyte, A. and Wilson, A. 2010. How to appraise and select research data for curation. Edinburgh: Digital Curation Centre. Viewed 23 June 2016, from: *http://www.dcc.ac.uk/ resources/how-guides/appraise-select-data*

Witt, M. 2008. Institutional repositories and research data curation in a distributed environment. *Library Trends*, 57(2), 191-201.

The World Agroforestry Centre. 2012. Research data management training manual. Viewed 29 March 2016, from: *http://worldagroforestry.org/research-methods/sites/default/files/ Research% 20Data%20Management%20Manual%20-%20web%20temp.pdf*

Yiotis, K. 2008. Electronic theses and dissertation (ETD) repositories: what are they? Where do they come from? How do they work? *OCLC Systems and Services: International Digital Library Perspectives*, 24, 101-115.

Happiness as an end: a critique of Aristotle's rational eudaemonism

Edward Uzoma Ezedike[1]
Department of Philosophy, University of Port Harcourt,
Port Harcourt, Nigeria.
uzomaezedike@gmail.com

Abstract

This paper examines Aristotle's concept of happiness as encapsulated in his Nicomachean Ethics. Aristotle argues that happiness is the supreme practical good because it is perfect, final, self-sufficing and complete in itself. For him, happiness is simply defined as rational eudaemonism (an activity of the soul according to reason in contrast with mere sensual pleasure). In view of the foregoing, this paper raises the question of whether happiness is actually an end as Aristotle posits. What is happiness and how can we find it? Our objective is to critically evaluate Aristotle's position on the questions raised here and to see whether we can develop a new moral thesis that can truly reflect our existential realities. Although Aristotle's position gives us a moral leap and is quite commendable in its ethico-epistemological profundity, this paper, however, maintains that happiness is an elusive concept. It argues that if at all anything termed happiness exists in this world, it might only be transient, ephemeral and illusory and cannot be seen as an end in the physical absolute terms when viewed from the standpoint of Plato's metaphysical dualism. The paper also argues that Aristotle did not say enough about what we are supposed to do to attain happiness. He gives detailed descriptions of many of the virtues, moral and intellectual, but with a persistent 'air of indeterminacy'. The paper concludes that moral virtues are a necessary component, but not a sufficient condition for happiness.

Keywords: Happiness, rationality, virtue, means, end

Introduction

Apart from his profound reflection on other branches of philosophy, one core area which drew the attention of Aristotle is the larger and vaguer problems of conduct and character. Interestingly, above all the questions that border on the physical world looms the fundamental ethical question of what is the good life? What is the highest good? Why be good? What is virtue and what does it take to live a virtuous life? What is happiness and how can we find it? Aristotle's answers to these questions constitute what is known as his ethics. The word "ethics" is a derivative of the Greek word *ethos* which means character or custom. The derivative phrase *ta ethika* was employed by Plato and Aristotle in describing their personal studies of Greek values and ideals (Solomon 1984: 3).

Aristotle was primarily concerned with the details of everyday normative ethics of conduct and character, unlike Plato who was more interested in the most meta-ethical questions such as the definition of the Good and the Just (Justice). Probably, there has never been a more comprehensive work on the subject of ethics than that of Aristotle. He wrote two major treatises on ethics, namely the *Nicomachean Ethics,* said to have been edited by and named after his son Nichomachus, and the *Eudemian Ethics* which differs in some significant respects from the former (Solomon 1984:66). The *Nicomachean Ethics* is by far the better known of the two treatis-

1. Edward Uzoma Ezedike Ph.D is a senior lecturer in the Department of Philosophy, University of Port Harcourt, Nigeria.

es. Any discussion on the areas of divergence between them is, however, beyond the scope of this paper. For the purposes of clarity, this paper will refer to the *Nicomachean Ethics* as the "Ethics".

Aristotle's treatise on ethics is characterised by a sort of down to earth, common sense approach that captures the "moral intuitions that we bring to philosophy" (Lawhead 2002:80). From his standpoint, ethics is distinctively teleological and constitutes a body of objective knowledge, though not as exact or precise a science as mathematics owing to the peculiarities inherent in human nature. Human beings, for him, just as every other thing in the natural world, have a distinctive moral end to actualise. In the opening page of the *Ethics,* Aristotle posits that "Every practical science has an end. The ultimate end, which is the supreme good" (Ethics BK1,1). From this perspective, it is clear that he sees ethics as a practical science of human conduct the function of which is to guide people towards the goal of achieving human excellence. The stated purpose of Aristotle's ethical treatise is to describe "the good for man". It is less involved than many modern ethical treatises in the justification of the values and institutions described. It seemed sufficient, Aristotle thought, to simply describe such values, for their virtues seems to speak for themselves (Solomon 1984:66).

Moreover, ethics and politics are for Aristotle two mutually inclusive but interdependent phases of one line of inquiry. Ethics is an inquiry into how men may best live, and since men cannot live well in solitude (without organised social relations), ethics finds it completion in politics (Lamprecht 1955:61). However, his justification of the institution of slavery as being essential to the just society and the exclusion of women from political life seems to be a blind acceptance of the prejudices of the age and culture he lived.

Happiness as an intrinsic end (the highest good)

Aristotle begins his "Ethics" by frankly refuting Plato's idea of good as basis for ethics because it is disproved by the doctrine of categories. Plato's idea of good, he argues, is "not relevant to ethics, since a transcendent good is unattainable, and useless even as a guide to the attainment of practical goods" (*Ethics* BKI, I[2]). He contends that happiness is the supreme practical good because it is perfect, final, self-sufficient and complete in itself. Put in a syllogistic form:

i. Every practical science has an end
ii. Ethics is a practical science
iii. Therefore, ethics must have an end.

Aristotle frankly recognises that the aim of life is not goodness for its own sake, but happiness. He makes the general point that the Good must be the good for man, which in turn means that toward which all human activities ultimately aim. This highest or ultimate good (the summum bonum) is identified by Aristotles as "happiness". He used the Greek word eudeimomia for the moral end men ought to pursue. Ordinarily, this word is translated into English as "happiness" or "human flourishing" but its meaning is much the same as what Plato meant by the Greek word we translate as "Justice". The word "happiness" has to do with the complete well-being of the mature and excellently developed man (Lamprech 1955:61). The emphasis, here, is on activity and accomplishment rather than a mere feeling of contentment or satisfaction (Solomon 66). The nature of happiness according to Aristotle is not necessarily that of "the life of enjoyment" "amusement" or "the life of money-making". This means that happiness in the Aristotelian sense is not equivalent to pleasure (which is sensual), though the two words are sometimes used interchangeably in modern English. Pleasures can be sub-divided into good pleasures and bad pleasures respectively. They may be "parts of human happiness or of its antithesis" (Lamprech 1955:61). Some kind of pleasure may lead to pain while some kind of pain may lead to pleasure on the long run. Pleasure, therefore, is not the ultimate end as happiness. Given the primacy

2. It's a reference to Aristotle's *Nicomachean Ethics*. We simply refer to it as *Ethics*. Since it was written in separate Books, we abbreviate each as Bk, for example (*Ethics*, Bk1: 258).

Aristotle attached to happiness (an activity according to reason) as the ultimate, moral end men ought to pursue, we may term his ethical position as rational eudaimonism or ethical teleologism respectively.

Two types of goods: extrinsic good or instrumental good / intrinsic good or ultimate good

Aristotle identifies two types of ends human activities are directed. On one hand, therefore some kinds of activities that merely serves as necessary means for the achievement of other and extrinsic in nature. On the other hand are acts that are desirable not for the sake of something else, but are rather desirable in themselves because of their intrinsic worth. These types of ends are called intrinsic or ultimate ends. They are activities which do not aim at any result beyond the mere exercise of the activity. This is felt to be the nature of actions in conformity with virtue; for to do noble and virtuous deeds is a thing desirable for its own sake. Since happiness lacks nothing and is self-sufficient and something desirable in itself, it is therefore an intrinsic end.

The only problem with the foregoing is that there is no consensus among people as to what kind of life is most happy. Aristotle examines some conceptions of good life namely pleasure (amusement, life of enjoyment), life of money-making, success and honour and rejected them. He, however, concedes that it is not possible to lead the good life completely without them for they are necessary conditions for actualizing the ultimate good (Uduigwowen 2001:131).

Happiness as an end

Happiness, Aristotle maintains, is activity chosen for its own sake, but it must be activity manifesting virtue or excellence, not merely pursued for amusement (*Ethics BK 10,* 258). The peculiar excellence of man that makes him biologically unique among other earthly beings is life of reason. It is by this that he surpasses and rules all other forms of life; and as the growth of this faculty has given him supremacy over other however beings, Aristotle presumed that its development will give him fulfilment and happiness. Therefore, what is happiness for man is not only what is natural to him, but what is unique to him as well. Invariably, the good for man (or *eudaimonia*) must be the life of reason. But whereas many might think the life of reason (contemplation) is a sedentary academic life, Aristotle submits that it is also the active life, the life "rational activity", not a retreat from life (Solomon 1984:67). Thus, one of the central concepts of Aristotle's *Ethics* – the concept of virtue – is defined simply as "rational activity, activity in accordance with a rational principle" (*Ethics* BK1, 7). Therefore, happiness does not consist in pastimes and amusements but in activities in accordance with virtue. But if happiness consists in activity in accordance with virtue, it is reasonable that it should be activity in accordance with the highest virtue; and this will be the virtue of the best part of us (reason). It is the activity of this rational part of us "in accordance with the virtue proper to it that constitutes perfect happiness" (*Ethics* BK 1, 7). This is a life such as we might conceive the gods to lead, "being relatively the divinest part of us", and hence, men become most god-like when they practise the life of contemplation in which happiness consists.

Rationality as the highest virtue

For Aristotle, happiness consists in activity which accords with the highest virtue - which is reason, and this rationality is inherent in human nature, unlike lower animals. What sets us apart from everything else in the world is our rationality. Our ultimate good, he argues, consists in the excellent use of our rational powers (Landau 2012: 261). Aristotle modified somewhat Plato's analysis of human nature and consequently, Plato's list of virtues. He pointed out that human nature has many irrational elements (the appetites, passions, emotions) and also a rational principle. The irrational (or rather non-rational) elements of human nature are in part beyond the power of reason to control and are in part subject to control by reason (Lamprecht 1955: 62).

Aristotle identified three parts of human nature considered as the raw material for transformation in accord with the highest good or happiness, namely:

i. the irrational part which is not subject to rational control
ii. the irrational part which is subject to rational control
iii. the rational part.

Corresponding to the above outlined three parts of human nature will be three kinds of excellence and three ways by which happiness is achieved (if all it comes).

i. Corresponding to the irrational part which is not subject to control by reason is *natural excellence.* This is the product of luck or good fortune. It is not properly to be called virtue because those who do not have it cannot be blamed for their unfortunate condition. For example, the nature excellence of beauty in contrast with ugly or the tall with the short.
ii. Corresponding to the irrational part which is subject to control by reason is moral virtue or moral excellence (Lamprecht 1955:63). Moral virtue is a habit of right action (a fixed disposition) formed by acting rightly in conformity with right principle furnished by reason. Aristotle argued the “none of the moral virtues is engendered in us by nature, no natural property can be altered by habit” for (*Ethics* Bk 11, 35). For instance, it is the nature of a stone to move downwards, and it cannot be trained to move upwards, even though you should try to do so by throwing it up into the air ten thousand times. Similarly, fire cannot be trained to move downwards. Nothing else that naturally behaves in one way can be trained into a habit of behaving in another way. Therefore, moral excellence or goodness of character is engendered in us neither by nature nor yet in violation of nature, “nature gives us the capacity to receive them, and this capacity is brought to maturity by habit” (Ethics Bk 11, 35). This means that experiencing happiness involves both thinking and doing. One must rationally judge what are the right principles to follow and then discipline his/her appetites, feelings and emotions in a habitual manner to those rules. What Aristotle called moral virtue is equivalent to what Plato called temperance, but Aristotle’s treatment of the matter is much more pluralistic (Lamprecht 1955: 63). We shall come back to this in his doctrine of the moral mean.
iii. Corresponding to the rational part of human nature is the third type of excellence called *intellectual virtue or excellence of intelligence*. This is achieved through teaching and sustained reflection. Intellectual virtue has many forms according to the subject-matter with which reflection is occupied (Lamprecht 1955: 64).

In all, Aristotle believed that contemplative activities (thinking, learning, striving to understand and know) rather than pleasures and other external things are the key source of happiness for humans (Barcalow 1994:71). This is to say that the highest good for humans is a life of contemplation, a life guided by reason. Other external goods like "good birth, satisfactory children, beauty" and good friends contribute to happiness but they are secondary.

The doctrine of the golden mean: the key to happiness

Like Plato, Aristotle defines a good human character in terms of moderation, justice and courage which are deemed virtuous by him (Kolak 1998: 193). He opines that virtue or moral excellence depends on clear judgement, self-control (temperance), symmetry of desire and artistry of means. The word "excellence" is probably the fittest translation of the Greek arête, usually mistranslated virtue. The Greek *arete* is the Roman *virtus* (Latin); both implying a masculine sort of excellence (Ares, god of war; vir, a male). Classical antiquity conceived virtue in terms of man, just as medieval theology conceived it in terms of woman (Durant 1961:60). Aristotle holds that

moral virtue consists of cultivating habits which will spontaneously incline us to take the middle course of action (Stumpf 2003: 94).

Human beings have many impulses and desires, each of which begs for satisfaction but none of which, Aristotle suggests, should be permitted, to have ascendency over the other. The path way to moral virtue or excellence, therefore, is the middle way or the golden mean. This is to say that moral virtue is realised at the point where we hit the mean (the moral bull eye). The qualities of character can be arranged in triads, in each of which the first and last qualities will be extremes (deficiency or excess) and vices, and the middle point quality a virtue or moral excellence. Virtue, therefore, is impaired by excess or deficiency in action.

Table of virtues and vices			
Class of action or feeling (Activity)	**Vice (Excess)**	**Virtue (Mean)**	**Vice (Deficiency)**
Fear and confidence	Rashness	Courage	Cowardice
Pleasure and pain	Profligacy	Temperance	Insensitivity
Giving and getting small amounts of money	Prodigality	Liberality	Meanness
Giving and getting large amounts of money	Vulgarity	Magnificence (Generosity)	Paltriness (stinginess)
Anger	Irascibility	Gentleness	Spiritlessness
Truthfulness about one's merits	Boastfulness	Truthfulness	Self-depreciation
Pleasantness in social amusement	Buffoonery	Wittiness	Boorishness
Pleasantness in social conduct	Obsequiousness	Friendliness	Surliness
Shame	Bashfulness	Modesty	Shamelessness
Pleasure in others misfortune	Envy	Righteous indignation	Malice
Reward	Sloth	Ambition	Greed

The Aristotelian mean described above, however, is not absolute, like the mathematical mean, an exact average of two precisely calculable extremes, since ethics in not an exact science. The moral mean fluctuates with the collateral circumstances of each situation, and discovers itself only to mature and flexible reason (Durant 1961: 61). Moral virtue is a habit of choosing the relative mean in actions and emotions. The virtues are engendered in us neither by nature nor yet in violation of nature. According to Aristotle, nature gives us the capacity to receive them, and this capacity is brought to maturity by habit. The faculties given us by nature are bestowed on us first in a potential form and we exhibit their actual exercise afterwards. We learn an art or craft by doing certain things; men become builders by building houses, harpers by playing on the harp. Similarly, we become just by doing just acts, temperate by doing temperate acts, brave by doing brave acts (Ethics Bk 8:31).

The above table implies that achieving the golden mean depends solely on training and practice that is long enough to eventuate in the formation of strong habits (the young and immature are to be guided). Consequently, by consistently acting in virtuous ways, we acquire habits of virtue. The possession of well-established habits is what we mean by character but character is inherently good or bad depending on the nature of the habits. Character is, therefore, the result of habituation – a long and consistent period of moral training. A man of

virtue or good character is one who acts directly, consistently and reliably in accord with his established habits. One can only be considered virtuous if he acts consistently (not a hit and run manner) in accordance with the golden mean over a considerable stretches of time, perhaps in the light of the entire course of his life (Lamprecht 63-64). In Aristotle's words:

> ... this activity must occupy a complete lifetime; for one swallow does not make a spring; nor does one fine day; and similarly one day or a brief period of happiness does not make a man supremely blessed and happy (Ethics Bk 8:13).

It is obvious that the doctrine of the moral mean is the formulation of a characteristic attitude which appears in almost every system of Greek philosophy (Composta 1988:34). For example Plato had it in mind when he called virtue harmonious action; Socrates when he identified virtue with knowledge. The seven Wise Men had established the tradition of moderation by engraving, on the temple of Apollo at Delphi, the motto meden agan; - nothing in excess. Perhaps, as Nietzsche claims in his work *The Birth of Tragedy*, all these were attempts of the Greeks to put in check their own propensity to violence and impulsiveness of character. To be more precise, they reflected the Greek notion that passions are not of themselves vices, but the raw material of both vice and virtue, according as they function in excess and disproportion, or in measure and harmony (Lamprecht 1955: 62).

Happiness and friendship

The golden mean, Aristotle said, is not all of the secret of happiness. We must equally have a fair share of worldly goods, for poverty makes an individual stingy and grasping. Possessions, on the other hand, give one that freedom from care and greed which is the source of aristocratic ease and charm. The noblest of these external aids to happiness is friendship (Durant 1961: 62).

Aristotle clearly states that "friendship implies virtue; and is valuable as a means to the good life, as natural, as the bond if society, and as morally noble" (Ethics, BK 8, 203). Happiness is multiplied by being shared and is more important than justice: for "when men are friends, justice is unnecessary; but when men are just, friendship is still a boon". "A friend is one soul in two bodies".

Friendship, Aristotle argued, is not only indispensable as a means, but also noble in itself. Friends whose affection is based on utility do not love each other in themselves, but in so far as some benefit accrues to them from each other. Similarly, those whose friendship is based on pleasure see it as a means, for we enjoy their company not because of what they are in themselves, but because of utility.

Hence, in a friendship based on utility or pleasure men love their friends for their own good or pleasure, as someone useful or agreeable. Friendship of this nature merely serves an instrumental purpose and not for its intrinsic worth or value. Such kind of relationship is based on an accident in so far as the friend is not loved for being what he is, but as affording some benefit or pleasure as the case may be. Consequently, friendship of this kind is fluid and can easily be disengaged in the event of the parties involved changing and ceasing to be pleasant or useful to each other as earlier enjoyed.

Because utility is not a permanent quality, friendship built on it changes from time to time. When the motive or purpose of such friendship has been satisfied being ephemeral, the relationship itself loses its valid ground for existence and is dissolved, having existed merely as a means to that end. Friendships of utility, according to Aristotle, seem to occur most frequently between people of old age who prefer to pursue profit that pleasure and also between those in the prime of life and young people whose object in life is gain (*Ethics,* 207-208).

The perfect form of friendship, he argues, is that between the good, and those who resemble each other in virtue, " for these friends wish each alike the others good in respect of their goodness, and they are good in themselves" (208). It is those who wish the good of their friends for their friends' sake who are friends in the fullest sense, since they love each other for

themselves and not accidentally. Hence the friendship of these lasts as long as they continue to be good, given that virtue is a permanent quality. “Each is good relative to his friend as well as absolutely, since the good are both good absolutely and profitable to each other” (Ethics Bk 8, 209). Such kind of friendship, he opined, is naturally permanent, since it combines in itself all the attributes that friends ought to possess. Such virtuous friendship is of course rare, because such men are few.

The nature of virtue and taxonomy of virtues

In addition to our discussion on Aristotle's doctrine of the Golden Mean, it would suffice us to take a closer look at the nature of virtue, the taxonomy of virtues, and the relationship between virtues and inclinations. In Aristotle's view, virtues are excellences of character, trained behavioural dispositions that result in habitual acts. Virtues are those excellences of character that make up the good life and sets us apart from animals. Virtue ethics is not only about actions but about emotions, character, and moral habit. As Taylor puts it, it is an ethics of aspiration rather than an ethics of duty (1985:5). It requires us to aspire to be ideal persons (Pojmam 1999:163). A traditional term for a good person is "virtuous", but for a bad person, the term "vicious" is used. This reflects the idea that a good person has good moral qualities referred to as 'virtues" while a bad person inclines towards "vices" (Barcalow 1994: 92). A virtue is a character trait, not a mere habit, or tendency/inclination to act in certain ways. It is a virtuous character that defines a person and not just his/her mere habits. Some people are habitually inclined to performing certain good acts like being generous and courageous but may lack virtue because they do not really understand why it is appropriate to act in such a way. Virtues goes with knowledge and wisdom, (as in Socratic/Platonic tradition), about what is needful and important, and why. On the other hand, inclinations are defined as certain patterns of behaviour we engage in, but which we may not thoughtfully do, or accomplished through the exercise of our rational powers. In addition to rationally and routinely acting right, the virtuous person also has a distinctive set of moral perceptions, thoughts, and motives (Landau 2012: 258-259). For example, a generous person will, definitely, perceive, think, feel, and act differently from a stingy person. His/her motive for giving will also be different. We can offer similar accounts of all of the other virtues. Courage, for example, demands that we correctly perceive various threats and dangers, control our fear in a reasonable way, be motivated by a noble end, and act accordingly. Though Aristotle views courage primarily in the context of citizen's discharge of his civic and military obligations, this virtue, like all others, is relevant in a number ways to our contemporary existential situations.

Virtuous people are defined not just by their actions but also by their inner life. This principle compares with Kant's concept of the "Goodwill". According to Kant, if a man does what is right simply because he likes doing that kind of act (for instance, being generous), that is, if his inclinations led him in that direction, or because doing so serves his self-interest, there would be nothing morally admirable (or virtuous) about him (Kant 1967:214). A virtuous agent perceives, thinks, feels and acts differently from a person who is vicious. As Landau puts it, "People are virtuous only when their understanding and their emotions are well integrated. A virtuous person who understands the right thing to do will also be strongly motivated to do it, without regret or reluctance, for all the right reasons" (Landau 2012: 258). From Aristotle's standpoint, as well as from that of the modern virtue ethical tradition, the foregoing is what clearly differentiates the truly virtuous from the merely "continent" - that is, a person who manages to do right things, but with little or no pleasure or justifiable reason, and only does so by suppressing very strong contrary desires. In this regard, Aristotle states that "Virtuous conduct gives pleasure to the lover of virtue" (Ethics Bk 2: 33). Conversely, pleasure without virtue is not worth pursuing because it is vicious.

On the taxonomy of virtues, it is important to state that traditionally, virtues have been divided into two types, namely: moral virtues and non-moral virtues. The criterion for this demarcation stems from whether they are intuitive or tied to moral principles (Louden 1992: 6).

Moral virtues include; honesty, benevolence, nonmalevolence, fairness, kindness, conscientiousness, gratitude, and so forth. The second type of virtues, that is, non-moral virtues include; courage, optimism, rationality, self-control, patience, endurance, industry, musical talent, cleanliness, wit, and so forth (Pojman 1999: 163). This notwithstanding, the exact classification of various virtues is quite controvertible. Hence, we may not have a water-tight compartmentalization of these virtues because they sometimes overlap. Courage, for instance, is sometimes placed in the "moral" category. Similarly, kindness (as opposed to impartial benevolence), and self-control might fit into both categories. Virtues that are tagged "moral", are more closely linked with what has been considered essential for the moral life and incompatible with the immoral life (Pojman 1999:163).

Aristotle's virtue ethics and contemporary moral theories

The issue which Aristotle appears to conflate is the contemporary demarcation between normative ethics and metaethics. In normative ethics, we are concerned with norms of good conduct (that is, moral acts involving substantive moral judgements), whereby we judge actions as good or bad, right or wrong, virtuous or vicious, obligatory or impermissible, and so forth (Thompson 1976:29). It has to do with the traditional way of evaluating actions based on laid down rules, norms, mores or moral laws within a given society (Ozumba 2001: 74). The second level of ethical consideration has to do with the fact that, in ethical discourses, we make use of concepts which beg for clarification. This second dimension, which bothers on linguistic analysis, is the major preoccupation of contemporary ethics. To some extent, Aristotle's doctrine of the Golden Mean is analytic because of the rational thinking and weighing of options involved in moral decision making by agents.

However, Aristotle's virtue ethics (aretaic ethics), is teleological because it focuses on the end result of our actions (happiness). Moral principles or duties, here, are derived from the virtues which are the dominant moral considerations. This view is supported by Philippa Foot, Alasdair MacIntyre, and Richard Taylor. Aristotle's virtue ethics pre-dates the deontic view which, at contemporary times, focuses on action guiding principles which it considers as the essence of morality. Unlike, Aristotle's virtue ethics, deontologic ethics sees virtues as being derivable from principles, which are instrumental in performing right actions. According to this view, each virtue has a corresponding principle that generates it. This position can be found in the works of William Frankena, Bernard Gert, Alan Gerwirth, John Rawls and Geoffrey Warnock. The third position is the complimentarity school, which holds that both Aristotle's virtue (aretaic) ethics and Kant's duty (deontic) ethics are important, complementary and are necessary components for an adequate or complete ethical system. Those who hold this view include, Robert Louden, Walter Schaller, and Gregory Trianosky (see Pojman 1999: 166-167).

In contemporary times, virtue ethics has reemerged as a major ethical theory owing to the growing dissatisfaction with the 'principle' governed (action centred) ethical systems. A number of contemporary philosophers have advanced the idea of a return to Aristotle's ethics of virtue. They suggest that modern moral philosophy is "bankrupt", and that, it needs to be salvaged from the its bankruptcy (Rachels 1999:176). The foremost person to advance this radical idea was G. E. M. Anscombe in her article entitled: "Modern Moral Philosophy", which was published in 1958. In that article, she suggests that the modern moral philosophy is misguided because it rests on the incoherent notion of a "law" without a lawgiver. Anscombe posits that the very concepts of duty, obligation, rightness and wrongness, on which modern moral philosophy have focused attention, are connected to this incoherent notion. In view of this, she opines that philosophers should cease from thinking about such moral principles as duty, obligation, and rightness, and return to ethics of virtue as conceptualized by Aristotle (Rachels 1999:177). Apart from Anscombe, other moral philosophers such as Philippa Foot, Alasdair MacIntyre, Bernard Mayo, Edmund Pincoffs and Richard Taylor have in their respective works (see references), equally

expressed their dissatisfaction with the promises of the mainstream of the modern ethical tradition and argues for a return to a virtue based ethical system (Pojman 1999:159). Such deficiencies found in the 'principle' or 'rule-governed' ethics such as the overemphasis on the principle of autonomy (as in Kant), the absence of motivational component, and over dependence on rules without reference to their origin are seen to be addressed by virtue ethics.

Despite the calls for a return to ethics of virtue, there are some fundamental problems that are inherent in the theory. The greatest of them is the claim that right actions must be understood by reference to virtue. In other words, an action is right if and only if it comforms to virtue. Ordinarily, it should have been the other way round. This seems to be a misplacement of order because it is quite difficult to justify why virtue should enjoy such priority. This vulnerable point we find in virtue ethics is similar to the problem with the Divine command Theory which holds that what makes an action right is the fact that it is commanded by the 'gods', because such commands are what creates our duty. Virtue ethics, thus, shares a basic structure and a basic weakness with the Divine command theory.

In addition to the foregoing, this paper shares the view that what counts as virtue changes over time and from place to place, and in different circumstances and situations (Pojman 1999:167). The contemporary situationist ethical theory of Joseph Fletcher is a good example (see Fletcher 1966). Whereas, Aristotle regards pride as a virtue, Christian ethics sees it as a terrible vice. Again, whereas Marxists see acquisitiveness as a vice, Capitalists regards it as a virtue (Pence 1984: 282). In his work, The Prince, Machiavelli speaks of need for virtue, especially for new princes who wish to establish and maintain wholly new states. The 'virtue' (virtu in Italian) which Machiavelli introduces, obviously, contradicts most of our traditionally cherished ideals of virtue. For example, he encourages craftiness, stinginess, lying and brutality as mean of acquiring and retaining political power. This is an effrontery and a big challenge to Aristotle's ethics of virtue. We shall examine other problems associated with Aristotle's virtue ethics in the next section.

A critical appraisal of Aristotle's virtue ethics

Beyond every reasonable doubt, Aristotle stands out as one of the greatest moral philosophers the world has ever known. His ethics of virtue, no doubt, represents an exciting and practical moral tradition in antiquity which has continued to generate contemporary ethical debates. Aristotle's emphasis on the importance and indispensability of moral character which is virtue driven is quite commendable. This may have informed the calls in contemporary times for a return to Aristotle's eudaimonistic, virtue ethical tradition as we have already discussed in the preceding section.

However, one of the perennial problems associated with Aristotle' virtue ethics is that it provides no guidance on how to resolve ethical dilemmas (Louden 1984: 311-320). In the *Nicomachean Ethics*, Aristotle did not say enough about what we are supposed to do. He gives detailed descriptions of many of the virtues, moral and intellectual, but with a persistent 'air of indeterminacy'. Aristotle gives an outline of pairs of contrary vices that contrast with each of the virtues, but says very little about where or how to draw the dividing lines and where or how to fix the golden mean (Mackie 1977:186). The work does not contain any additional help, but is merely self contained truism which lacks external clue that drives moral actions. Aristotle's virtue ethics is like telling someone to act as he should act. In other words, "Do what a good person would do" (Pojman 1999: 168). This implies that if a person knows how to act he will not need anyone to counsel or guide him on how to do so. In this circumstance, there are no moral role Models, or *exemplar* model, or an ideal type. How, then, do we decide who becomes our role model in a situation where different people endorse different candidates? Obviously, this situation will lead to ethical pluralism which reduces 'virtue' to something of personal choice. In other words, moral standards will differ from people to people, culture to culture. This would

mean that a virtuous action can only be defined from a relative perspective and there would be no consensus on what is a virtuous act. The necessary concomitant is the problem of virtue relativism. Some of the things Aristotle regards as virtues may count as vices and vice-versa for some people and in some places today, for example, pride, liberality and gentleness.

Further, Aristotle posits that "Virtue is however concerned with emotions and actions ..." (Ethics Bk 3:53). The epistemological problem here lies with knowing what emotions and actions that are the right virtues. Is there any objective way of knowing who a virtuous person is? Are there specific or objective principles of determining a virtuous emotion and action?. This appears unaddressed by Aristotle. Frankena, apparently referring to this problem, argues that "Virtues without principles are blind". He is simply saying that virtues need a framework, or action-guiding principles to direct it.

Morever, this paper specifically, challenges Aristotle's thesis that happiness is an end (in every realm of existence). Given that Aristotle was basically concerned with the details of every day normative ethics – how people ought to behave or conduct themselves in society, he failed to carry the concept of happiness beyond the physical, transient world. Aristotle focused, primarily, on practical human interest, and consequently, restricted his idea of happiness to what he described as “the function of man”. He believed that “happiness is the supreme practical good” (*Ethics* Bk 1, 1), and thus, overlooked some metaphysical dimensions of happiness.

At this juncture, it is quite germane to point out that Aristotle followed Plato in such basic conceptions of his ethical theory more closely than in any other aspect of his philosophical speculations (Lamprecht 1955: 61). However, Aristotle was not consistent in following the platonic tradition to a logical conclusion. If we accept Plato’s idea of the immortality of the soul and Aristotle’s view that happiness is the activity of the soul according to reason, it follows then, that the concept of happiness transcends the physical existential happiness to which Aristotle confined it.

In being more consistent with the platonic tradition, this paper posits that happiness, in the physical realm, may not absolutely be an end since it can only serve some temporal physical ends and nothing more. For those who accept that the soul of man is immortal, it is logical to say that our physical existential experiences cannot give us lasting happiness in the practical sense as Aristotle claimed, because of their ephemerality. At best we can only enjoy temporal happiness, if such exists, in the physical realm as a means to an end. The reason is that ultimate and absolute happiness may not be possible in a world were both good and evil are mutually inclusive. Moreover, it is obvious that those who lack the requisite mental capacities articulated by Aristotle may not achieve happiness in their life time. Happiness, therefore, as a transcendent good, can only be an end in the ideal world where the soul is free from the constraints and contaminations of the physical world.

The possibility of a third dimension: an eclectic approach

Beyond the positions of Plato and Aristotle on the issue of happiness and what actually constitute the highest good, there is the possibility of a third dimensional moral approach. This approach is eclectic and it is based on the view that the highest good for humans does not consist in the realization of a particular intrinsic good to the exclusion of other possibilities. Happiness is a multi-dimensional and multi-faceted concept which can be viewed from different idealistic, realistic and pluralistic perspectives. Virtues such as pleasure, knowledge, justice, freedom and moderation are all possible constituents of the highest good. Consequently, to narrow down our *summum bonum* to the pursuit of happiness alone as Aristotle did, or to narrow it down to justice and the knowledge of the forms as Plato did, will be too restrictive. For example, Joseph Fletcher considers love is the highest good. To some other people, such as Jean Paul Sartre, freedom is the highest good and that is what happiness means to them. Dostoevsky's 'underground man' was willing to give up everything, not only success and

pleasure but even his health, just in order to realize his 'most advantageous advantage', his freedom (Solomon 1997:296).

As we have seen so far from Aristotle, the rational eudaimonist ranks activities according to reason as the highest attainable good. This position sees happiness as an intrinsic end, in an exclusive sense. However, this view only represents an aspect of reality. All other goods considered as intrinsic by some other philosophers, such as freedom, justice, knowledge, success and love should also be considered as ends worthy of pursuit in their own respects. Human beings are not only pleasure seekers, they are also knowledge seekers, power seekers, freedom seekers, love seekers, and so on. A person's *eudaimonia* is rational, if it consists in the seeking of knowledge; insofar as he/she wills, his/her *eudaimonia* consists in the cultivation of virtue; insofar as he/she is feeling; his/her *eudamonia* consists in the experience of pleasure. Our highest good is to realize so far as possible every intrinsic good, in such balance and proportion as our natural endowments and circumstances may permit (Halverson 1967: 280).

Our argument here is that, human beings are multidimensional entities, having diverse needs and aspirations. Some goods are considered intrinsically valuable while others are instrumental depending on circumstances and situations. To treat one of the various intrinsic goods as the only summum bonum will be parochial and unfair. For example, happiness is impossible without love and freedom. We may as well consider these as ultimate values in themselves. Human experiences differ, so do our values and beliefs. Moral eclectics, thus, argue, that all these factors should be considered while assigning values to goods, either as means or end.

Conclusion

In this paper, we have explored and evaluated Aristotle’s concept of happiness in all its ramifications. His realism informed his rejection of transcendent good (happiness being the highest good) as something attainable. This paper raises objection to Aristotle’s confinement of happiness to a “practical good” without regard to man’s metaphysical make-up. In this circumstance, we conclude that his idea of happiness does not make it an absolute end since the soul transcends the physical realm. We have also argued that one or two dimensional approaches to the issue of happiness and the question of the highest good (summum bonus), as in Plato and Aristotle is quite inadequate. To this end, we have explored the possibility of a third dimension, which is eclectic in nature. It is argued that happiness may not stand alone as the ultimate end without other intrinsically valuable goods such as love and freedom, which also may be considered as end in themselves.

We have also done a critique of Aristotle's ethics of virtue in its basic form. It has been argued that moral virtues are a necessary component, but not a sufficient condition for happiness. Some external circumstances beyond a person's control could prevent even those capable of developing moral dispositions from reaching the goal of happiness. A person, in addition to having virtuous character, needs to be principled, wise, healthy and wealthy (Pojman 1999:164). It has also been pointed out that Aristotle's virtue ethics lacks guiding principles for determining how to act.

However, despite the criticisms we have advanced against Aristotle's concept of happiness as an end, his virtue ethics remains one of the most articulate, far-reaching and influential system of moral thought ever put together by any philosopher.

References

Aristotle.1996. *The Nicomachean Ethics*. Trans. Harris Rackham. London: Wordsworth): 203-209, 258-273.

Barcalow, E. 1994. *Moral Philosophy: Theory and Issues*. Belmont, California: Wadsworth Publishers.

Composta, D. 1988. *History of Ancient Philosophy*. Italy: Urbana University Press.

Durant, W. 1961. *The Story of Philosophy.* New York: Simon and Schuster.

Ezedike, E. U. 2014. "Aristotle". In A. F. Uduigwomen and C. A. Udofia (Eds). *A Critical History of Philosophy: Ancient and Medieval*. Calabar: Ultimate Index Book Publishers:228-80.

Fletcher, J. 1966. *Situation Ethics: The New Morally.* Philadelphia: Westminster.

Halverson, W. H. 1967. *A Concise Introduction to Philosophy*. 3rd ed. New York: Random-House.

Kant, I. 1959. *Fundamental Principles of the Metaphysic of Moral*s. Indianapolis. Bobbs-merrill Publishers.

Kolak, D. 1998. *The Mayfield Anthology of Western Philosophy.* California: Mayfield Publishing.

Landau, R. S. 2012. *The Fundamentals of Ethics*. New York: Oxford University Press.

Lamprecht, S.P. 1955. *Our Philosophical Traditions*: A Brief History Of Philosophy in Western Civilization. New York: Appleton-Century-Crofts.

Lawhead, W. 2002. *The Voyage of Discovery: A Historical Introduction Philosophy*. Belmont: California: Wadsworth/Thomson Learning.

Louden, R. 1984. "Some Vices of Virtue Ethics". *American Philosophical Quarterly* 21: 311-20

Louden, R. 1992. *Morality and Moral Theory: A Reappraisal and Reaffirmation*. New York: Oxford University Press.

Machiavelli, N. 1940. *The Prince and the Discourses*. New York: Random House, Modern Library.

Mackie, J. L. 1977. *Ethics: Inventing Right and Wrong*. New York: Penguin Books.

Ozumba, G. O. 2001. *A Course Text on Ethics.* Lagos: Obaroh & Ogbinaka Publishers.

Pojman, L. P.1999. *Ethics: Discovering Right and Wrong.* Belmont, California: Wadsworth Publishing Company.

Solomon, R.C. 1997. *Introducing Philosophy. Problems and Perspectives*. New York: Harcourt Brace Jovanovich, Inc.

Solomon, R. C. 2008. *Morality and the Good life: An Introduction to Ethics through Classical Sources.* New York: McGraw-Hill Publishers.

Stumpf, S.E & Fieser, J. 2003. *Philosophy: History and Problems*. 6th Edition. New York: McGraw-Hill Publishers.

Taylor, R. 1985. *Ethics, Faith and Reason*. New Jersey: Prentice Hall.

Uduigwomen, A.F. 2001. *Introducing Ethics: Trends, Problems and Perspectives.* Calabar: Pyra-mid publishers.

A philosophical analysis of character education as panacea to Nigeria's leadership crises

Okorie Ndukaku[1]
Department of Philosophy, Obafemi Awolowo University, Ile-Ife
okoriendu@yahoo.co.uk

Abstract

A philosophical look through the history of ideas will reveal the importance of morals to leadership. As a matter of fact, morals and morality pervade every aspect of human life. Encompassing and successful leadership is not possible without a good sense of morals. One of the ways of cultivating moral values or virtues is through moral education, with special emphasis on 'character' (character education). This is because education without character is counter-productive. Nigeria as a nation, since its amalgamation in 1914 and subsequent independence in 1960, has witnessed a series of leadership crises at different levels. To many Nigerians, virtually all Nigeria's problems could be blamed on leadership crises or failures. This, in most, if not in all cases, could be anchored in a lack of appropriate moral sensibilities or moral character on the part of Nigerian leaders, as well as prevailing unjust or defective political systems. In view of the above, this paper argues that a part of the reasons why Nigeria has been facing leadership crises and challenges is because our leaders, both past and present, lack the correct, adequate, and required moral values and virtues. This is the result of a lack of moral education and orientation right from childhood. This consequently leads to unjust political structure. In this regard, this paper argues that good leadership and governance skills should be cultivated through moral education, right from our elementary schools, with special emphasis on 'character education'. With this, our leadership orientation would significantly change for the better. The paper concludes that as long as Nigerian society fails to cultivate its leadership skills on character education, it will continue to witness leadership problems, since leadership has to do with character traits of the key players and the political structure in which they operate. This is because both leadership and morality deal with the implications of an individual's action to other human beings.

Introduction

Going through the history of philosophy, there is abundant work right from the ancient period to the contemporary period regarding moral character of individuals. The questions 'what is virtuous character' and 'how is it to be acquired?', 'how should a just society be organized?', as well as; whether good character is the key to good actions were the major pre-occupation of ancient Greek philosophers; Socrates, Plato and Aristotle, etc. One of their arguments is that the key to getting individuals to act the way they should is to instil good character in them. In this regard, it follows that the teaching of moral (character education) is imperative to cultivating leadership skills, such that leadership and good governance can be cultivated through character education. There is a need for systematic moral education to be given a place in the school curriculum (Frank Chapman Sharp and Henry Neumann 1912: 228).

This paper is divided into five sections. The first section examines the nature of leadership. It is in this section that some of the features of leadership can be discussed. Also, some of the

1. Okorie Ndukaku PhD is a lecturer in the Department of Philosophy at Obafemi Awolowo University, Ife-Ife, Nigeria.

attempts at defining leadership as a necessary component of good governance will be highlighted. The second section deals with the concept of moral (character) education. The concept of character education will be discussed under this section. The question of its effectiveness and how it is being organized and operated will be discussed. The features and roles it plays in leadership would also be highlighted. The third section deals with a brief discussion of virtue ethics. This will serve as a theoretical framework of justification for moral (character) education. From this section, the need for the proposed moral (character) education for effective leadership will be made clearer.

The fourth section discusses leadership and character education within the scope of Nigeria. Some of Nigeria's past leaders will be briefly examined alongside their leadership styles and qualities. Some arguments will be presented in this section, showing that although some of our past leaders, especially shortly before independence and after independence, did relatively better than the so-called Nigeria's present leaders and those occupying leadership positions in Nigeria presently. The argument will be that in terms of leadership, Nigeria as a nation has not got it right, and is not yet there. This is why Nigeria as a nation is still facing serious leadership crises. And our failure to teach and cultivate virtuous characters through moral education is largely responsible for such. Hence, the paper concludes that there is a need to emphasize moral education right from our elementary schools. This will prepare people for future leadership but failure to do so will continue to deprive Nigeria of opportunities for training and bringing up good leaders and just political structures.

The nature of leadership

It is quite a difficult task arriving at a generally accepted definition of the concept of leadership, even despite numerous research and literature on it. This has created a number of different approaches of identifying how leadership could be characterized. In wide-ranging survey of the history of the literature on leadership studies, Joseph Rost (1991) found hundreds of different definitions of leadership. In fact, Bernard Bass acknowledges that "there are almost as many different definitions of leadership as there are persons who have attempted to define the concept" (2007, p.16). To pursue this further, leadership is often defined contextually, as for instance, in contrast to management (Kotter 2007). The fact remains that everyone seems to have his or her own idea of what leadership refers. These accounts for the reason why definition of the concept of leadership varies as the individuals that attempt to give the definition vary. According to Palmer (2009):

While everyone seems to be able to intuitively recognize instances of leadership, arriving at a precise definition of leadership for the purposes of scholarly inquiry has not proved to be an easy task.

It has not proved to be an easy task because each scholar or author tends to define the concept from his or her own perspective and experience. This is why (Bass 2001:16) notes that "the meaning of leadership may depend on the kind of institution in which it is found".

However, it is important to point out that although it is a difficult task arriving at a universally accepted definition of leadership, there are still some elements that are common in those definitions, looking at literature concerning the definition. These common elements are what Palmer (2009: 527), describes as "core concepts of leadership".

According to him:

> This core notion of leadership is essential to any complete notion of the concept, and can be seen as an element of any of the various definitions previously proposed. My own view is that the various competing definitions of leadership are arrived at by building on the core notion of leadership in different ways, or by accenting the elements of the core notion in different manners or in relation to different contexts. Thus … I will maintain that any plausible notion of leadership will

> include the core element discussed here. In this view, leadership, at its core, essentially involves influencing others to act in light of a vision of how best to achieve a shared mission (Palmer 2009: 527).

Following from this, one can notice that a close look at any attempt at defining leadership will reveal that leadership deals with the ability to guide, influence, or direct people. Leadership is the art of leading others to deliberately create a result that wouldn't have happened otherwise. It is pertinent to acknowledge that it is not just the creation of results that makes good leadership. Good leaders should be able to deliberately challenge results by enlisting the help of others. A good leader creates winning organizations, groups, associations etc. hence, good leadership is an essential key to corporate success through positive change. Hence, good leadership should possess qualities such as good followership, self-awareness, self-direction, social awareness, ability to motivate, trust, honesty, courage. A good leader must be serviceable, that is, a good leader must be effective or useful. He should be ready to have the spirit of rendering service to others as well as living by example. In line with this observation, Socrates (an ancient Greek philosopher) maintained that unexamined life is not worth living. To him, he who lives an unexamined life is not worthy to be a leader. He totally advocated for a virtuous life in his philosophy. In the same vein, John Rawls in his *A Theory of Justice* emphasized "that a society is well-ordered when it is not only designed to advance the good of its members but when it is also effectively regulated by a public conception of justice" (Rawls 1971: 3). This implies that the welfare and the interests of the members of the society is not just defined by the whims and caprice of the leader rather the collective needs of the members of the society does.

Moreover, a good leader must perform some functions in order to be a team-player. Leadership is not a lonely business. Chemers (2000) argued that leadership research can be reduced to focusing on the functions that leaders must perform to be successful. He stated that leaders must produce an image that arouses trust in followers, develops relationships with subordinates that enable subordinate to move toward individual and collective goal attainment, and uses their knowledge, skills and material resources to accomplish the group's mission. But in order for a leader to instill trust in followers and develop relationship that enables subordinates to move toward goal attainment, a leader requires character. In this vein, it has been widely acknowledged that character is the most essential attribute of good leadership. That is, a leader must be known to be of certain character, the question then is: what is character? How is it acquired? What is the relationship between character and leadership? In attempt to answer these questions, we turn to the next section.

The concept of moral (character) education

Over the years, there has been a growing concern about the moral aspects of education. This is as a result of moral decadence in our societies. It has been widely acknowledged that it is not enough for teachers in formal schools to provide the youth with basic academic knowledge and skills, there should be a conscious attempt at promoting their character development. There is a need for moral education because academic achievement alone does not determine educational progress. It is important to note that moral education involves the guidance and teaching of good behaviour and values, among others. It is taught to young children in schools, providing them with a sense of orderliness, politeness and lawfulness. It also involves a conscious attempt of teaching, challenging and guiding young ones to reason appropriately in their moral perception and judgment. The goals of moral education are essentially the goals of raising good children: youth, who understand, care about, and act upon the core ethical values (such as diligence, compassion, integrity, and fairness) that make for a productive, just, and democratic society. As youths grow in character, they grow in their capacity and commitments to do their best work, do the right thing, and lead lives of purpose. Effective moral education involves creating the kinds of

classroom and school environments that enable all students, without exception, to realize their potential to achieve these vital goals.

It is important to note that moral education and character education are not exactly synonymous. Moral education is the mother term. It is the tree, while character education is one of the branches. According to Joseph and Efron (2005), the seven worlds of moral education are character education, cultural heritage, caring community, peace education, social action, just community and ethical inquiry. Each of them is an approach to moral education. They maintain further:

> ... moral education is a coherent endeavour created with purpose and deliberation. Educators in moral worlds believe that they must create a process through which young people can learn to recognize values that represent prosocial behaviours, engage in actions that bring about a better life for others, and appreciate ethical and compassionate conduct (Joseph and Efron 2005:525).

Character education therefore aims at cultivating and promoting the moral virtues/values that a society holds to be beneficial. It seeks to develop virtue-human excellence- as the foundation of a purposeful, productive, and fulfilling life and a just, compassionate, and flourishing society.

What is character anyway?

Character as a concept can be defined in various ways. It is a philosophical as well as a psychological term. Having acknowledged the goal of character education as the development of character in students or youths, character is also a useful taxonomy in discussions of leadership. The root of the word “character” is the Greek word for engraving. In this vein, Barlow, B. *et al.* take character to mean “the enduring marks left by life that sets one apart from others. Typically, enduring marks are set early in life by our religious beliefs, parental influences, and a child’s early interactions. Character is also marked throughout our lives as we partake in great divides in our nation’s history or solve moral dilemmas throughout our lives (Barlow, Jordan, Hendrix 2003: 564). Many authors acknowledged the importance of character as an essential leadership attribute. According to Berkowitz and Bier

> Character is the complex set of psychological characteristics that enable an individual to act as a moral agent. In other words, character is multifaceted. It is psychological. It relates to moral functioning. (Berkowitz and Bier 2004:73).

From the above, we can deduce that for a moral agent to function well or otherwise, depends on his or her moral character. This is why according to Sarros and Cooper “without character, our actions are routing and often meaningless. “Character helps identify who we are” (Sarros and Cooper: 2006:4). Character is an identifying factor of who an individual is and what he/she is capable of doing. An individual’s character defines him/her. According to Lickona (1991), character development is tri-phasic. The first phase is moral knowing, which includes moral awareness and moral reasoning, and deciding the right course of action. The second phase is moral feeling, which is a concern about doing the right thing. Moral feeling consists of conscience, self-esteem, empathy, and humility. The third phase is moral action, which means acting with competence and will. This is why he sees character as “doing the right thing despite outside pressure to the contrary (Lickona 1991).

Character and leadership

The interplay between character and leadership is often taken for granted. We do expect good leaders to be strong and firm in character, that is, to have a moral imperative to their actions. Leaders with character have been identified as authentic leaders (Fairholm 1991, 1998; Gardner and Avolio 1998; Luthans and Avolio 2003; May, Chan, Hodges, and Avolio 2003; Price 2002). Authentic leaders know who they are and what they believe in; show consistency between their values, ethical reasoning and actions; develop positive psychological states such as confidence,

optimism, hope, and resilience in themselves and their associates; and are widely known and respected for their integrity (UNL Gallup Leadership Institute 2004). This tremendously reinforces the importance of character to effective leadership. This is because personal values lie at the core of character as well as leadership (Rousseau 1990; Rousseau, Sitkin, Burt, & Camerer 1998; Schein 1985).

Furthermore, in reinforcing the interplay between character and effective leadership, Patrick and Locke (1991) argued for the importance of character as a leadership trait. They conducted a qualitative synthesis of earlier research postulating that leaders differ from followers on six traits: drive, desire to lead, honesty and integrity, self-confidence, cognitive ability, and knowledge of the business. According to them, leaders can be born with these traits; can learn them, or both. They stated that it is these six traits that make up the "right stuff" for leaders. They mentioned that these traits make leaders different and should be recognized as part of the entire leadership process. That is, a good and successful leader must possess these qualities stated above.

Other authors also list character as an essential leadership trait. Gergen (2001), suggested three traits we should look for in leaders; character, vision, and political capacity. Clowney (2001) suggested the ideal leader has changed over time with societal changes and paradigm shifts, and we are now living in the era of character ethic. Josephson (1991) emphasize that character is the foundation of effective leadership in that what leaders achieve when they lead will be shared more by the collection of dispositions, habits, attitudes that make up their character than by their education and skills. He admits that it is a character that determines whether they will effectively use their knowledge and skills. There are numerous literatures establishing the imperativeness of character to effective leadership. If we go on and on, the list can be as elongated as possible. We turn to the examination of the interplay between character and leadership in Nigeria. That is, how far has character gone in shaping Nigerian leaders?

Virtue ethics as a theoretical framework or justification for moral (character) education

In ethical literature, the contemporary study of moral theories, virtue ethics is often taken as the third force. Consequentialist theories and agent-relative theories (Deontological theories) being the first and second forces respectively. The third force; virtue ethics is taken to bridge the apparent deadlock between consequentialism and agent-relative morality. Consequentialist and agent-relative moral theories focus on how to produce morally right actions over and above morally wrong actions. Both consequentialist theories (example, utilitarianism and egoism) and agent-relative theories (example, Kantian ethics) have this in common. But while consequentialist theories focus on consequences or outcomes of actions as the criterion for achieving a morally right action, agent relative theories (deontological theories) focuses on the nature or factors inherent to the nature of the action. Virtue ethics as the intervening third ethical theory differ significantly from the two theories above. On one hand, consequentialist theories and agent-relative theories focus on how to produce morally right actions, virtue ethics focuses on the moral agent. That is, how to produce a moral individual with good character. In advocating for moral (character) education in this paper for effective leadership and adequate moral orientation, virtue ethics serves as the justification for such argument. This is because virtue ethics focuses on the character of the moral agent as the actor. Virtue ethicists believe that something is missing in modern ethical theories (consequentialism and agent-relative theories) that focus on what we ought to do. They believe that we should be equally concerned, or even centrally concerned, with the question of what character traits we ought to develop in ourselves (Geirsson and Holmgren 2000 :209).

The introduction of a new moral structure like virtue ethics will enhance the understanding of the moral agent as the actor, rather than focusing on the moral rightness and wrongness of

actions. Virtue ethicists reject the conventional moral philosophy. To them, it is too oriented towards moral rules …They believe that moral philosophy should concern itself less with the assessment of moral actions, and more with the character of the agent who performs them. In particular with the virtues that make a good person good (Shaw 1999: 252). Virtue ethicists see themselves as standing in the tradition of Aristotle (384-322 BC). Aristotle did not formulate a general account of right and wrong nor was he concerned to lay down specific moral rules and principles. He rather focused on moral education and the formation of virtue unlike modern philosophers that formulate ethical rules and principles for moral assessments and evaluations. For Aristotle, good life for human beings consists in the exercise of *arête* (virtue or excellence). This was typified in his *Nicomachean Ethics* where he provides his account of the principal virtues (both those of the intellect and those of character).

To achieve virtue or excellence, certain habits of action and emotion must be acquired. A virtue is a kind of disposition or character trait. And virtue is not acquired by memorizing certain rules or principles but by acting in certain ways which will become firm dispositions (Shaw 1999: 252-3). The essence of virtue ethics is not rule-following but the development of dispositions, habits and character traits that improve human moral lives. These virtues include courage, integrity, bravery, honesty, among others. It is important to note that there is no universal acceptance of the characterization of these virtues. What each society cherishes as a virtue varies from one place to another. There is a need to emphasize the importance of moral character. The reason for using virtue ethics as a justification for moral (character education) is that it focuses on the moral cultivation of characters by moral agents.

Character and leadership among Nigerian leaders

The historical genealogy of Nigeria's leadership experience could be divided into three epochs – the pre-colonial period, the colonial period and the post-colonial period. It may appear disheartening that this discussion will neither follow such historical chronology nor mention all the actors in Nigeria's leadership project in some periods. This will then serve as a basis to extrapolate that (a) Nigerian leaders immediately after independence performed better than the present crop of our leaders (b) These earlier leaders (Nationalists) played politics along ethnic divide, hence could not establish needed and appropriate leadership style (c) Nigeria as a nation had faced and is still facing series of leadership crisis, hence the need for moral education anchored on character education to serve as a panacea. This is in view of the fact of having established that character is an essential element or trait to effective leadership. Through character education, effective leadership would be enhanced or facilitated.

Historically, the years 1914, 1960 and 1963, among others are remarkable in Nigeria as a nation. 1914 being the year the Northern and Southern protectorate of Nigeria was amalgamated. 1960 was the year of independence for Nigeria with the status of a Republic in 1963. There is no doubt, series of political activities took place before the periods building up to the independence but we are not going to discuss that in this paper. But it is important to note that the amalgamation of northern and southern protectorate of 1914 is perceived as a 'forceful union' carried out by the British colonialists for administrative convenience. Nigerians were not carried along to reflect in the words of Rawls "on the social structures which govern their lives", whereas according to Rawls, citizens of every society have the right and responsibility to formulate principles for the structuring of a society which can be reflectively endorsed by all its citizens. Rawls acknowledged this because he recognizes that all human beings share a capacity for introspection, the ability to reflect upon their own thoughts and deeds in order to determine whether they ought to continue as before, comparing how things are actually done to standards of how they ought to be done (Rawls 1971: 40-46). In the amalgamation events of 1914 and the independence of 1960, Nigerians never reflected nor agreed on the principles that should govern them and their affairs. This is also one of the sources of the crisis of leadership in

Nigeria today. The problem is that Nigerians are in a union that they never negotiated and agreed upon the principles for the structuring of Nigeria as a nation. This artificial unity devoid of consensus also contributes to the ethnic division and nepotism that is at base of Nigerian crisis today. This goes back to the colonial era. It is only the citizens' reflection on the basic structure of their society that will reveal whether the system is just or unjust, as justice is one of the cardinal virtues a society should be built upon.

Some key figures in Nigeria's leadership project to be examined vis-à-vis their leadership style are: Dr Nnamdi Azikwe, Chief Obafemi Awolowo, Ahmadu Bello and Tafawa Balewa. These were among the first agitators (Nationalists) for Nigeria's independence.

Nnamdi Azikwe

He was popularly known as the Great Zik of Africa. He was born by Igbo parents. He became one of the most prominent nationalists that fought for Nigeria's independence in 1960. He was one of the pioneer founders of National council of Nigeria and the Cameroons, which was a conglomeration of different organizations in 1944. He had great opportunity of leadership before and after independence.

In Bola Ige's words:

> After the death of Herbert Macaulay. There was no Nigerian who could claim to be more nationalistic than Zik. There was nobody who could say that he had laid out his resources for the anti-colonial struggle more than Zik. He was a very handsome and charming man. He spoke two of the three Main Nigerian languages – Ibo and Yoruba- well, and could use the fact of his birth in Zungeru in 1904 in the then Northern provinces to his own advantage. Partly because he knew how to use his newspapers skillfully to build his image up, and partly because he was a very good orator, his charisma shone more brightly than any other person's (Ige 1995:16)

Zik by all standards was a great leader. He advocated 'pragmatic socialism and welfarism'. He worked in collaboration with other leaders from other regions but was more popular in the then eastern region. At Nigeria's attainment of independence, Zik became the first indigenous Governor-general although a mere representative of the Queen of England, with ceremonial functions. That was the peak or the highest political positions ever attained by Zik in his political career. In summary of Zik's personality profile, Ige outlines this way:

> Zik: charismatic, Easy-going. Dreamer. Visionary. Inspirer. Decidedly undeciding. A leader who follows his lieutenants. Eclectic. Jovial; man of the world. Urbane. Humane. Fun loving. Always looking for compromises. Warm. Likeable. Engaging. General rather than particular. No strong views. Would not mind other people do the work and he appends signature. Cunning. Always suspecting a catch. Always planning a loophole for escape. Not an administrator, or organizer, but schemer/ tactician – a fabius maximums, the "Cunctator". Fantastic public relations man. Keeps political colleagues, friends or lieutenants – even if they go into parties different from his. No strong loyalty to anyone. Would reap where others and sow. One word: ADMIRED? (Ige 1995:310)

From this, it can be inferred that Zik was a good team player as well as a flexible and charismatic leader. Ige's assessment may not be entirely correct but that is his own opinion and judgment. He displayed these qualities as outlined above as a result of his personality and character. I now turn to the next leader; Chief Obafemi Awolowo.

Chief Obafemi Awolowo

He was popularly called Chief Awo. He was born by Yoruba parents in Ikenne in the present-day Ogun state. He was a lawyer by profession. He among other prominent Yoruba leaders formed Egbe Omo Oduduwa in 1948, and subsequently Action Group (AG) in 1951. He was one of the

most prominent Nationalists. He was the leader of the party. He was the premier of western region during regional government. It was during that period that he introduced free and compulsory education. He was charged of treasonable felony and later sentenced to prison for fifteen years. He was the federal commissioner for finance during the Biafra civil war. He advocated democratic socialism. He was a frontline Nationalist and leader of the unity party of Nigeria during the Second Republic. Ige summarizes Awolowo's personality profile this way:

> Awo: Charismatic. serious. Studious. Meticulous. Finicky. Fearless. Methodical. Discriminating. Determined. Purposeful. Strong belief in his personal destiny. Intellectually arrogant (?). Workaholic. Does not believe in compromises – probably suspects compromises. Holds very strong political views (but does not hold strong religious views, and sometimes indulgent about the morals of other people although himself morally un-impeachable or unbeatable). Charming and very friendly in private. Excites strong passions for/against. Care organizer (with eye for details) but no schemer/tactician, except within own party or government. Particularistic cares only for solution of Nigeria's problems and thinks other things would fall into place. For him, political differences lead to political barrier to personal relationships with former colleagues and lieutenants – unlike Zik, Loyal to colleagues and lieutenant on social matters and in public, but willing and ready to listen to stories. Pragmatic activist, doer of his own considered philosophical or visionary ideas. Propagandist. Easily arouses suspicion of other leaders. Elephantine memory. His blunt statements easily misunderstood. Would not reap where he did not sow. One word. FEARED (Ige 1995: 301-302)

From the above, we can infer that Chief Awolowo was a great leader. A man who loved and was ready to lay down his life for his people. But was more prominent and popular among his Yoruba tribal people. This is because he saw Yoruba people as his first constituents. That is, thinking about his Yoruba tribe first before thinking about Nigeria as a nation.

Ahmadu Bello (The Sarduana of Sokoto)

He was popularly known as the Sarduana of Sokoto. He was born of the royal family of Sokoto from Usman Dan Fodio descent. He was the most prominent Northern leader before independence, after independence and till his death during the January 15th 1966 coup d'etat led by major Chukwuma Kaduna Nzeogwu. He was one of the pioneer founders and leader of Northern people's congress formed in 1951. This party became an avenue to which Sarduana played and dominated federal politics from the early fifties, even till his death. He was more or less the absolute leader of the northerners. He was well recognized, respected, admired and revered by the Northerners. In Ige's word:

> **SARDUANA:** Charismatic. Aristocratic. Experienced. Jailed during colonial days. Leadership qualities – humble, friendly, hospitable and accommodating. But also rigorous that nobody exceeds bounds – visitors sitting on the floor in his house, no drinking of alcohol in his presence, etc. Bold. Fearless. Team leader. Used the myth surrounding birth and traditional office to command and keep religious and political respect and leadership. Accommodating with emirs, but could be firm –exile of emir of Kano. Relied much on British administrators, some of whom were very good, e.g. C. Rex Niven (who ghosted the autobiography of Sir Ahmadu). Made and encouraged young educated Northerners to look up: Suleiman Takuma, Waziri Ibrahim, Maitama Sule, Ishaya Audu, Mamman Nasir, Ali Akilu, Abdu-Kadir Ja, Adamu Ciroma, etc. Entrenched politician/traditional ruler relationship that is still strong in Northern Nigeria. Laid no claim to intellectual or academic brilliance, and

> propounded no philosophies. But knew how to pick men and place them in vantage and advantageous positions. One word: RESPECTED? (Ige 1995; 302).

From the above, we can deduce that Sarduana was at home in the north and among the northerners. He was not popular among other tribes. But he did the best for his people, the northerners. He was even the premier of northern region during regional government.

Alhaji Sir Abubakar Tafawa Balewa

He was born in Northern Nigeria, a Hausa and son of a Muslim District Head. He was educated in Muslim and government schools and was trained as a teacher at Katsina College in Northern Nigeria. He taught in secondary schools and was a Native Authority Education officer. He began his political career in 1948 when he was appointed to the Northern Region House of Assembly and later elected by it to the Nigerian Legislative Council. He was a founding member of the Northern people's congress in 1951, of which he was its first vice president. In 1951, he was elected to the federal House of Representatives, and in 1959, he became the first Prime Minister of Nigeria. He was assassinated in January 1966, in the first coup d'état.

However, having examined the first set of leaders produced in Nigeria, it is pertinent to point out that they were not the only leaders as at that period. They were only the major and key leaders of different regions of Nigeria. Zik from eastern region, Awolowo from western region, while Ahmadu Bello and Sir Abubakar Tafawa Balewa from northern region. Each and every one of them played party politics but along ethnic divide. This was why NPC was in control of the North, NCNC was in charge of the east while AG also covered the west. They never trusted each other, hence could not work together. According to Bola Ige commenting about Zik, Awo and Sarduana:

> I wish all three had managed to work together, they would have established for us their political heirs a strong, dynamic and democratic Nigeria which could have become the envy of the whole world (Ige 1995: 301)

This was Ige's wish but it never happened. And since that period up till date, Nigerian leaders had never and are still not able to separate leadership from tribal loyalties and taints. But for effective leadership to take place, leadership must be imbued and backed with character education. Our first set of leaders had their mistakes but despite those flaws, they were able to manage Nigeria better than our so-called present day leaders. Ige, after acknowledging the mistakes of the first set of Nigerian leaders notes as follows:

> In spite of that, I think that the Sarduana, Awo and Zik are the greatest political leaders Nigeria has produced so far, and who have stamped their images on Nigeria indelibly … (Ige, 1995: 300)

This is true especially when we consider what has been happening in Nigeria since then. And how our subsequent leaders till date have piloted the affairs of Nigeria. Corruption, nepotism and ethnic (tribal) politics have grown uncontrollably. But these political anomalies could also be blamed on the political structure established by these first set of leaders. From the discussion above, there was a lack of trust among the leaders. Each of the leaders had more political support within his tribe. This accounts for the very unjust political system and structure that we have in Nigeria today. A structure that emanated from mistrust among the different leaders cannot but be ethnically inclined, nepotic, corrupt and hence unjust. Also, there is the issue of the ruling oligarchy that controls the way the control should be governed. The northern oligarchy collaborates with their southern counterparts to do so.

Conclusion

Leadership as a skill or project has been identified as one of the greatest problems in Nigeria as a nation. This owes to the fact that Nigerian leaders fail to recognize the importance of morals to effective leadership on one hand, and the problem of defective (unjust) political structures

emanating from the colonial era. And in order to have effective leadership in Nigeria, there is the need for moral education with emphasis on character education. This is because character has been acknowledged and established as an essential element of effective leadership. Also, there is the need for Nigerian citizens to reflect and reformulate the principles upon which Nigeria is built upon right from the colonial era. Commenting on Rawls, Michael Frazer rightly noted along this line that John Rawls shares the enlightenment's commitment to finding moral and political principles which can be reflectively endorsed by all individuals autonomously (Frazer 2007, 756). This will go a long way to solve the leadership crisis in Nigeria if the citizens can reflect and agree on the moral and political principles that should govern them.

However, since great leaders are ethical stewards who generate high levels of commitment from followers and leadership rises to the level of ethical and political stewardship when leaders earn the trust and followership of those whom they serve by creating integrated organizational systems that demonstrate the leader's commitment to honouring the steward's duties (Caldwell, *et al.* 2002; Caldwell and Karri 2005; Pfeffer 1998). This paper argued that with the introduction of moral education (character education) in our schools, Nigeria would be able to produce leaders that will become ethical stewards. On the contrary, the paper concludes that as long as moral character and political restructuring as essential elements of leadership continues to be neglected, leadership crises would continue to loom large in Nigeria as we have it presently.

Acknowledgement

I acknowledge the efforts of the editor of this journal as well as the two reviewers of the earlier draft of this paper. The reviewers suggested I give theoretical justification to the discussion. This necessitated the section on virtue ethics. Also, they called my attention to the structural (political) dimension of the problem which made me to expand the discussion from moral to the political aspect of the problem. They corrected some editorial and grammatical errors. These have made the work more robust in terms of quality and quantity. I am grateful.

References

Aristotle, from "Nicomachean Ethics". (1925). translated by W.D. Ross from Aristotle's *Ethics,* from *The Oxford Translation of Aristotle*, edited by W.D. Ross, Vol. 9, Oxford University Press.

Barlow, B. C., Jordan, M. and Hendrix, H. W. 2003. Character Assessment: An Examination of Leadership Levels' .2003. *Journal of Business and Psychology,* Vol. 17, No. 4: 563-584.

Bass, B. 2007. 'Concepts of Leadership' in Vecchio, R. (ed.), *Leadership: Understanding the Dynamics of Power and Influence in Organizations,* 2nd Edtion (University of Notre Dame press, Notre Dame, IN): 3-22

Berkowitz, W. M. and Bier C. M, 2004. Research-Based Character Education,

Annals of the American Academy of Political and Social Science, vol. 591, positive Development: Realizing the Potential of Youth, pp. 72-85.

Caldwell, C. S.J. and Karri, R. 2002. The four Umpires: A Paradigm for Ethical Leadership, *Journal of Business Ethics*, 36, 153-163.

Caldwell, C. and R. Karri, R. 2005. Organizational Governance and Ethical Choices: A Covenantal Approach to Building Trust, *Journal of Business of Ethics*, 58, 249-259.

Chemers, M.M. 2002. Leadership Research and Theory: A Functional Integration, Group Dynamics: *Theory and Research*, 4: 27-43.

Clowney, K. 2001. New Definition of Leadership. *Executive Excellence,* 18: 8-10.

Fairholm, G. W. 1991. *Values Leadership: towards a new philosophy of Leadership*. New York: Praeger.

Frazer, M.L. 2007. John Rawls: Between Two Enlightenments, Political Theory, Vol.35, No. 6: 756-780

Gardner, W.L., & Avolio, B.J.1998. The Charismatic relationship: A dramaturgical Perspective. *Academy of Management Review*, 23: 32-58

Geirsson, H., and Holmgren, M. R. 2000. Ethical Theory: A Concise Anthology, Broadview Press.

Ige, B. 1995. *People, Politics and Politicians of Nigeria* (1940-1970), Heinemann Education Books Plc, Ibadan, Nigeria.

Joseph, B. Pamela and Efron, S. 2005. Seven Worlds of Moral Education, *The Phi Delta Kappan*, vol. 86, No. 7:525-533.

Josephson, M. S. 1991. Character: Linchpin of Leadership. *Executive Excellence*, 16: 2-4.

Kirkpatrick, S. A., and Locke, E.A. 1991. Leadership: Do traits matter? *The executive*, 5: 48-60.

Kotter, J. 2007. 'What Leaders Really Do', in Vecchio R. (ed.), Leadership: Understanding the Dynamics of Power and Influence in Organizations, 2nd Edition (University of Notre Dame Press, Notre Dame, IN): 23-32.

Lickona, T. 1991. *Educating for Character*, New York, and N.Y: Bantam Books.

Luthans, F. & Avolio, B.J. 2003. Authentic Leadership: a Positive development approach. IN Camercon K.S. Dutton, J.E. Quinn R.E. (Eds.) *Positive Organizational Scholarship*, Sanfransisco, CA: Berrett-Koehler.

May, D,R,: Chan, A .Y. L.; Hodges, T.D., and Avolio, B.J. 2003. Developing the Moral Component of Authentic Leadership, *Organizational Dynamics*, 32 (3), 247-260.

Palmer E, D. 2009. Business Leadership: Three levels of ethical Analysis, *Journal of Business Ethics*, vol. 88, No. 3, 15th IESE International Symposium on Ethics, Business and Society Business and Management. Towards More Humanistic Models and Practices, pp. 525-536.

Pfeffer, J. 1998. *The Human Equation: Building Profits by Putting People First* (Harvard Business School Press, Boston, MA).

Price, T.L. 2002. The Ethics of authentic transformational leadership. Leadership Quarterly, 14 (1): 67-81.

Rawls, J. 1971. *A Theory of Justice,* Harvard: Harvard University Press.

Rost, J. 1991, *Leadership for the Twenty-first Century*, Praeger, New York, NY.

Rousseau, D.M. 1990. Assessing Organizational Culture: The case for Multiple Methods. In Scheider, B. (Ed). Organizational Climate and Culture, San Fransisco, CA: Jossey-Bass.

Rousseau, D.M., Sitkin, S.B., Burt, R.S., & Camerer. C. 1998. Not so different after all: A cross-discipline view of trust. *Academy of Management Review*, 23 (3): 393-404.

Sarros C.J. and Cooper, K. Brian, 2006. Building Character: A Leadership Essential. *Journal of Business and Psychology*. Vol. 21, No 1: 1-22

Shaw, W. H., 1999. *Contemporary Ethics, Taking Account of Utilitarianism*, Oxford, Blackwell Publishers Ltd.

Sharp, F.C., and Neumann, H. 1912. A Course in Moral Education for the High School, *The School Review*, Vol. 20, No. 4:228-245.

UNL Gallup Leadership Institute. 2004. Crossing borders on authentic leadership perspectives. Gallup Leadership Institute Summit, 10-12 June. Viewed 6 October 2013, from *www.bus.umich.edu/positive/learning/leadershipsymposium2004.pdf:*

Clinical informatics tools for healthcare quality improvement: a literature review

Kehinde Owolabi[1]
Nimbe Adedipe Library, Federal University of Agriculture, Abeokuta, Nigeria
yomiowolabi2000@yahoo.com

Neil Evans [2]
Department of Information Studies, University of Zululand, South Africa
EvansN@unizulu.ac.za

Abstract

The paper is a review of existing literature on the importance of clinical informatics tools in promoting effective healthcare delivery. The study reports literature on clinical informatics types, benefits and challenges across the globe. The paper explains the dangers of medical errors and how clinical informatics tools can reduce medical errors, increase access to safe, effective and affordable treatment of illnesses, and promote evidence-based medicine. The paper identifies various challenges facing the use of clinical informatics in developing countries. The issues of digital divide in the use of clinical informatics tools, particularly among developed and developing countries of the world, are also discussed. The paper reveals that hospitals at various levels should embrace the use of clinical informatics tools in healthcare delivery, especially in developing countries where there are inadequate medical personnel. The paper has the potential to inform policy makers, improve practice and contribute to research in the area of social informatics.

Keywords: clinical informatics, clinical informatics tools, healthcare, quality, literature review

Introduction

Clinical informatics is the integration of clinical science, computer science and information science to manage and communicate data for clinical practice. Polašek and Kern (2012) define clinical informatics as the application of information communication and technology in all areas of medicine. The essence of clinical informatics is to promote the integration of data, information, knowledge and wisdom to support the decision-making process of medical doctors, patients and other healthcare professionals, and to promote evidence.

In addition, clinical informatics tools are the resources that enable medical doctors to effectively capture, transmit, and adequately use data and ICT knowledge to promote healthcare delivery. The tools facilitate the integration of ICT to support patients and medical doctors in decision making and at the same time promote evidence-based medicine. The American Medical Informatics Association (2018) categorises clinical informatics tools into the following: clinical decision support, clinical information systems, visual images which include radiological, pathological, dermatological, and ophthalmological images. The other types include: dental informatics, implementation and optimisation community, nursing informatics, pharmacy informatics, primary care informatics, computerized physician order entry (CPOE), computerized

1. Kehinde Owolab PhD is a Principal Librarian at Nimbe Adedipe Library, Federal University of Agriculture, Abeokuta, Nigeria. He graduated with a PhD focusing on ICT4D- in the Department of Information Studies, University of Zululand, South Africa in 2017.
2. Neil Evans PhD is a senior lecturer and Head of the Department of Information Studies at the University of Zululand, South Africa. He was the principal supervisor of the PhD project.

decision support system (CDSS), diagnosis image archiving (DIA) and electronic medical record (EMR) (The American Medical Informatics Associations 2018).

Clinical informatics tools are becoming an increasingly important aspect of medical practice, and it has contributed significantly to healthcare development at all levels. The adoption of clinical informatics tools promises several significant benefits, such as time management and better healthcare service. Serious unintended consequences from the non-implementation of these facilities have emerged, particularly in developing countries (Owolabi 2017).

Information and communication technologies have changed the ways and manners health professionals deliver services to their patients. Governments are leveraging ICT in healthcare in order to respond to calls by World Health organization (WHO), that every country should integrate ICT in their health care deliveries (Commonwealth of Australia 2007). In 2005, the World Summit on the Information Society (WSIS) reiterated the importance of access to effective healthcare through use of clinical informatics tools (WSIS 2005). Despite this, medical doctors' inadequate access to, and use of these clinical informatics tools, prevent medical doctors from rendering effective healthcare services.

In addition, inadequate access to and use of clinical informatics tools among medical doctors have brought about medical errors and mis-diagnoses. A review of literature reveals that no comprehensive study has been done on the use of clinical informatics tools in Africa (Owolabi 2017). Studies mainly focused on the use of Internet and computers among medical doctors (Cline and Luiz 2013; Nwargu and Adio 2013; Ruxwana *et al*. 2010; Idowu *et al*. 2008). This review is premised on this gap and provides insightful literature on the usefulness of clinical informatics tools for effective healthcare delivery. The review will focus on the following: clinical informatics tools, computerized physician order entry (CPOE), computerized decision support system (CDSS), diagnosis image archiving (DIA) and electronic medical record (EMR).Even though these tools are designed to support evidence-based medicine, many doctors still either do not have access to these tools or are not familiar with the use of the tools (Owolabi 2017).

To conduct this review, Webster and Watson's (2002) approach was employed. The approach suggested the following when conducting research on systematic literature review, particularly on the health-related research: (1) the need to use the keyword to search from relevant databases, (2) selection of relevant publications with matching criteria and (3) intensive reading to identity relevant publications. The literature search for the study was undertaken in a five-month period, from June to October 2016. Relevant literature has been added in order to update the study. For the purposes of the review, the SCOPUS, EBSCO Host and Google Scholar databases were used for relevant document retrieval. Various search strings were used to get relevant information from the databases, which include: clinical informatics, health information technology and e-health. Searches were limited to publications in English. The review is organised as follows:

Theoretical background

There are many theories relevant to a study of user acceptance of ICT. Many of these theories focus on people's intention to engage in a particular behaviour (i.e. adoption and use of ICT) as a relevant conceptual framework. Moreover, the growing rate of the use of information and communication technology, in various healthcare facilities around the globe, has led to the recognition of technology acceptance as an important issue, in the implementation of technology, in healthcare facilities (Hu *et al*. 1999: Sun *et al*. 2013).

Olasina (2014) notes that research on information and communication technologies has been informed by a number of theories which include: Theory of Reasoned Action (TRA) (Fishbein and Ajzen 1975), The Theory of Planned Behaviour (TPB) (Ajzen, 1991), The Technology Acceptance Model (TAM) (Davis 1989), The Combined-TAM-TPB (Taylor and Todd 1995) and The Model of PC Utilization (MPCU) (Thompson, Higgins, and Howell 1991)

This review is largely informed by the use of the Unified Theory of Acceptance and Use of Technology (UTAUT). The Unified Theory of Acceptance and Use of Technology (UTAUT) is a user acceptance model that was introduced by Venkatesh *et al*. in 2003. The study introduces a model that examines people's intention to use technology and adoption behaviours. According to Venkatesh *et al*. (2003) one of the reasons for creating a unified theory was to make it easier and simpler for researchers to select a theory without necessarily using references or contributing to other theories. The UTAUT condensed the thirty two variables found in the existing eight models into four main effects and four moderating factors (Ventakesh *et al*. 2003:467). The combination of the existing constructs has increased the UTAUT predictive efficiency to 70%, which is a major improvement over the previous TAM theory (Oye, Lahal and Rahim 2012).

The UTAUT theory identifies four key constructs that directly determine user acceptance and usage of technology. These are Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI) and Facilitating Conditions (FC), and four control variables, namely gender, age, experience, and voluntariness of use (Liu 2013).

Performance expectancy is about the perceived benefits a user believes will be gained from using the technology in his or her job, either to improve productivity or the quality of services (Cohen, Bancillion and Jones 2013). Venkatesh *et al*. (2003) describe performance expectancy as the degree to which an individual believes that using ICT would assist him or her with achieving better results. The effect of performance expectancy can be seen as the most salient factor, in medical doctors' acceptance of clinical informatics usage.

Effort expectancy is "the degree of ease associated with the use of a system" (Venkatesh *et al*. 2003). Effort expectancy can be described as the degree of ease of access and use of technology (Venkatesh *et al*. 2003). Almulhey (2015) notes that medical doctors' impression of clinical informatics is one of the factors that determine its use. They further argue that, attitude and ease of use of clinical informatics would also determine its use \

Social influence can be described as the extent to which an individual places importance on others' belief that he or she should use (or not use) a new technology (Venkatesh and Davis 2000). Venkatesh *et al*. (2003) describe social influence as the extent to which an individual allows the opinions of others to influence his/her decision to use a system. Studies have shown that, an individual's intention to use a new technology can be influenced by the views, opinions and perceptions of the people around him or her, particularly in his/ her immediate environment (Venkatesh and Davis 2000).

A facilitating condition is an individual's belief regarding the existence of adequate technical infrastructure as well as management policies and other internal support mechanisms that will encourage the use of the technology (Venkatesh *et al*. 2003). Facilitating conditions refer to the degree to which users believe that organisational and technical infrastructure will support the use of Information and Communication Technology (Venkatesh *et al*. 2003). Holden and Karsh (2010) note that facilitating conditions are very important in the acceptance of technology in healthcare. They observe that the availability of resources, which include technical knowledge and adequate knowledge of computers, are some of the facilitating conditions that promote the use of clinical informatics. Kijasanatoyin *et al*. (2009) likewise note that, facilitating conditions are very important in medical doctors' acceptance of clinical informatics because they are a factor that significantly explains technology use. In the next section we discuss the purposes of clinical informatics.

Purposes of using clinical informatics tools

There are many reasons why medical doctors use clinical informatics tools in hospitals. Verbeke, Karaka and Nyssen (2013) list the various reasons for using clinical informatics tools in healthcare delivery. These reasons include: provision of access to clinical informatics,

knowledge sharing, and improvement of effective healthcare delivery and management of diseases (Deniris and Kneale 2015).The purposes are discussed below.

Provision of access to clinical information

Medical practice has always been described as information-intensive profession and the integration of ICT into the profession is a great advantage, since there are many attendant developments in healthcare delivery, which include the promotion of effective healthcare delivery system. In addition, access to medical information provides medical doctors with new tools to work with, and the opportunity to practice modern day medicine. Shabi, Kuteyi, Odewale and Shabi (2008) list various types of information that medical doctors need. They include: drug information, professional development information, government regulation on medicine, routine patient care, practice organisation and management, diseases' specification information, and new medical information.

Furthermore, there are various ways in which medical doctors seek information. These include: citing professional colleagues, medical texts, the Internet, medical databases, printed journal, courses, conferences and libraries. Krueger (2010) reveals that, out of 8 million people that used the Internet in the USA, in 2004, 66% admitted using the Internet for online health information while in 2009; 24 million Americans reported the same. Sandefer, Khaira, Piceckicsand Speedie (2015) report that over 50% of the hospitals have patient portals, which has promoted effective healthcare. From this, it can be deduced that access to health information on the net has bridged distance barrier by providing access to clinical information knowledge and professional advice to patients at little or no cost. It has also reduced communication gap between medical doctors and patients.

Knowledge sharing

The concept of knowledge sharing has no universal acceptable definition (Fari and Ocholla 2015). Knowledge sharing is the exchange of knowledge between individuals, where one is communicating knowledge and the other is assimilating knowledge(Argyres, Bercovitz, and Mayer 2007).The knowledge or information that is exchanged can be in the form of ideas, results, opinions, and discoveries.

Medical doctors are knowledge-intensive professionals. As the most important group working in hospitals (Berghout, Fabbricotti and Buljac-samardzk 2017), their decisions are usually based on their knowledge and experience. Consequently, their practical and theoretical knowledge are very important in making clinical decisions about the care of patients. Knowledge sharing, in the medical discipline, particularly the sharing of findings and results with young medical doctors, would improve the effectiveness and quality of healthcare and promote collaboration, encourage the ease and timely exchange of medical information and help to reduce medical errors. Udousoro (2014) points out that access to clinical informatics tools by medical doctors assist them to disseminate and share knowledge across borders. With effective knowledge sharing, a medical doctor can send a medical report of his or her patient to a leading expert in another country who can provide advice.

Knowledge sharing, among medical doctors, could bring about improved healthcare delivery, exchange of experiences, ideas, and co-operation, in a knowledge intensive organisation like medicine. Supporting this viewpoint, Cooper, Gelb, Rim, Hawkin, Rodriguez and Prolonec (2012) admit that knowledge sharing among medical doctors is very important for effective healthcare delivery to patients, and that the quality of specialty-based clinical practices is a major determinant for patients' use of medical services. Teaching hospitals, as accredited hospitals for teaching medical doctors and at the same time being the most sophisticated form of hospital institutions, have a paramount need for knowledge sharing among their medical doctors because of the nature of their work, which involves teaching, research and practice.

Effective use of clinical informatics in knowledge sharing, among medical doctors, is a crucial means of improving their competencies and assisting them in decision making. In addition, knowledge sharing among medical doctors has a lot of benefits, particularly towards improving the quality of healthcare delivery.

Improvement of effective healthcare delivery

The quality of healthcare delivery in a country is a function of the level of access to, and use of clinical informatics tools, by the country's health system because they are necessary tools for effective diagnosis, treatment, monitoring and disease surveillance. Supporting this, Olatokun and Adeboye (2009) acknowledge that clinical informatics has become an indispensable tool for reducing diseases and ailments and has provided the Nigerian healthcare system with unprecedented opportunities to meet vital developmental goals, such as poverty reduction and provision of effective medical services.

Clinical informatics tools are continually viewed as having the opportunity to provide solutions to challenges facing the health sector. Disease control and surveillance, disease prevention, patient management and diagnosis, and health information are some of the necessary components of healthcare delivery. The appropriate use of clinical informatics tools in hospitals enhances the quality of research and promotes better healthcare service delivery by medical doctors. It can be said that access to clinical informatics tools provides up-to-date information to support medical doctors' knowledge.

Extant literature indicates that clinical informatics tools can be used to educate and create awareness of various causes of early death and ways in which people, mostly patients with chronic diseases, can perform self-examination.

Management of diseases

There are a lot of health challenges in Africa where diseases such as HIV/AIDS, malaria, cholera, typhoid, yellow fever, obesity and renal failure have been reported to have killed several people. According to the World Health Organisation (WHO) (2015), in the year 2014, 70% of the people that are infected with HIV/AIDS were living in Africa. It becomes imperative to point out the fact that, clinical informatics has the potential to provide solutions to some of these challenges, in the healthcare sectors in Africa. It needs to be noted that many developed countries such as United State of America and United Kingdom have been employing clinical informatics to manage and diagnose diseases for years. Glden (2011) and Stocwell and Filks (2013) highlight the fact that clinical informatics tools can be used to manage diseases through improved clinical outcomes, self-monitoring of health conditions, the use of vaccination and improved medication adherence.

ICT use in healthcare has contributed tremendously to helping medical doctors engage in distant consultation and diagnosis as well as gaining access to medical information for decision making. ICT tools, such as radio and television, have been very useful in disease prevention and control of epidemic in many African countries (Litho 2007). The author explains further that mobile phones, e-mail and Internet can be used for health alerts to people and medical doctors. Likewise, Bowles Dykes and Demiris (2015) identify various ways in which clinical informatics can be used to manage diseases. These include: telemedicine technologies, homecare monitoring health devices, and evidence-based technologies.

Explaining, the importance of clinical informatics tools, Wang, Fau, Allgri, Brenner and Kalmus (2015) note that 80% of healthcare expenditures, in Africa is due to the management of chronic diseases. The report affirms that, clinical informatics tools will dramatically reduce the costs of disease management and improve the quality of healthcare delivery in Africa. Appropriate healthcare support and provision of adequate clinical informatics tools in healthcare

services are cost effective and provide sustainable development to healthcare, not only in remote areas but also in cities. In the next section we discuss the types of clinical informatics.

Type of clinical informatics tools

Castaneda *et al.* (2015) categorise clinical informatics tools into the following types Computerised physician order entry (CPOE), Computerized decision support system. Diagnosis image archiving and Electronic medical record (EMR)

Computerised physician order entry (CPOE)

Jung (2006:10) describes computerized physician order entry (CPOE) as 'a prescription ordering system that allows physicians to enter an order for a medication and clinical laboratory, or radiology test, directly into a computer instead of writing it out by hand, which can cause medication errors'. The Agency for Healthcare Research and Quality (2015) defines CPOE as 'the use of computers by medical doctors to directly make orders electronically for patients'. This method is to replace traditional ways of making orders which is through paper, pen, verbal communication, phones and fax.

Based on this, CPOE is the process by which medical doctors, or other professionals, in healthcare make direct orders of medication, from a computer, with the intention of reducing errors associated with bad handwriting. With CPOE, doctors can employ the use of computer technology to make orders directly for patients' medication. The order is documented in a digital format. From these definitions, there are some salient features that should be noted; that it is only the medical doctors that can make order. The order must be done through a computer interface and must be done in a standardised format.

Computerised physician order entry (CPOE) has been contributing to the development of healthcare delivery in the following ways: reduction of errors, paying attention to patients' safety, improving the quality of healthcare and bringing innovation to effective healthcare. Khanna and Yen (2014) observe that CPOE has contributed to the improvement of medication ordering, particularly in teaching hospitals. From this, CPOE can be seen as a system basically designed for medical doctors to search for information about drug usage and adverse interactions for the treatment of patients in hospitals.

With the introduction of CPOE to healthcare, the problem of illegible handwriting and transcription errors would be a thing of the past. They argue further that CPOE would also improve the response rate of medical doctors and there will be accuracy of information about the medical history of patients (Berghout *et al*. 2017).

Computerised decision support system

Clinical informatics resources are designed to improve and assist medical doctors with making informed decisions about their patients. In an era that relies on accurate and timely information, one of the ICTs that assist medical doctors with decision making is the computerized decision support system (CDSS). Kawamoto, Houlihan, Balas, and Lobach (2005:16) describe computerized decision support system as 'any 'electronic system designed to aid directly with clinical decision making'. Pope, Halford,Turnbell, Pirchard and May (2013) describe CDSS as a computer technology programme designed with the intention to assist clinical personnel, through the combination of professional knowledge, with the use of an algorithmic rule which directs medical doctors in their decision making. CDSS is a computer application used by medical doctors, to assist them with diagnostic and therapeutic decision making in the management of patients' health. Oshroff *et al*. (2007) list various examples of CDSS to include: hand-held computer, computer, smart phone, barcode, and automated drug delivery systems. The technology is designed to improve the healthcare delivery system and reduce costs.

CDSS can be grouped into two categories: the knowledge based and the non-knowledge based. Chang *et al.* (2011) note that knowledge based CDSS can be classified into three forms, which are: the knowledge base, the reasoning engine and a mechanism which is used to communicate with the healthcare user.

CDSS has been implemented in the following areas of medicine: pharmacy, pharmacology and pathology. CDSS is used to assess renal failure, pregnancy, drug allergy and other medication related conditions (Castanedo *et al*. 2015).Uzoka, Osuji and Okure-Obot (2011) list various ways in which computer decision support systems have been found useful in medical practices. These are referral practices, managing clinical complexity, cost controls, supporting clinical diagnosis, evidence-based medicine, standardisation of practices and generally improving healthcare efficiency. From this, it can be summed up that, the major benefits of CDSS system is to support decision making for medical doctors and other allied workers, with various research evidence to inform their decisions.

Diagnosis image archiving

Diagnosis image archiving (DIA) has revolutionised the provision of radiological services in healthcare service delivery because these medical images are now converted from static paper formats to dynamic electronic formats. Diagnosis image archiving is a clinical informatics tool that can transport and store radiographic image such as magnetic resonance imaging (MRI) and computerized axial tomography scan (Weatherburn, Brayan, Nichollas and Cock 2000). DIA is a form of information and communication technology that can be purposely used for a short or long period of time for storage, retrieval, management and distribution of medical images.

In addition, it can be described as an electronic and filmless information system that is used for acquiring, sorting and displaying medical imageries electronically. The DIA has been used for archival, migration, and display of digital images, which have brought about expedite image-based workflow (Dandu 2008).

The storage of DIA can be classified as online, near line and offline. Online storage is about data storage on magnetic discs and redundant array of inexpensive discs (RAID) systems which provide access to data, in a few milliseconds. Images that do not require immediate access are stored in near line storage while offline are storage devices used for long–term storage (Dandu 2008). DIA is the only technology which provides a centralised repository for all imaging data and at the same time delivers diagnostics images such as x-rays, CT scans, MRI scans and radiology reports electronically to medical doctors at the point of care (Hains, Georgious and Westbrook 2012).

The application of ICT, for purposes of storage, retrieval and distribution of medical images, will be useful for medical doctors to support clinical examinations before making decisions. DIA machines are X-ray machines, computerised tomography, magnetic resonance and scanning machine.

The importance of DIA in hospitals where radiographic images are commonly used is to assist in the diagnosis, and management of patients in accident and emergency units. Hains, Georgious and Westbrook (2012) note that, the failure of medical doctors to employ the use of DIA, in accident and emergency units, has brought about an increase in medical errors from 0.6% to 7% in US hospitals. Access to DIA assists patients in the proper management of their health conditions. The use of DIA will create the opportunity to bridge the knowledge-performance gap for medical doctors because it will give them access to various visual information sources that will assist them in making clinical decisions as a result of increased job performance, reduced medical errors, improved accuracy and provision of opportunity for timely and reliable information. Hains *et al*. (2012) state some advantages of DIA as the provision of reliable image storage, access to information as well as permanent storage of information.

Electronic medical record (EMR)

The review of literature on electronic medical records (EMRs) has revealed a number of several definitions arising from various scholars coming from different medical fields (Hayrinen *et al*. 2008). According to the report of e-health Stakeholder (2013) electronic medical record (EMR) is a comprehensive medical record or similar documentation of the past and present physical and mental state of health of an individual, in electronic form, and providing for ready availability of these data for medical treatment and other closely related purposes. Hochwaster,Cuongm, Chuc and Lassen (2014) define EMR as a repository of health user data in digital form, which is stored and exchanged securely, and accessible by multiple authorised users. It has retrospective, concurrent and prospective information, and its primary purpose is to support effective healthcare. From these definitions, the major functions of EMR is to provide adequate information for medical doctors and other allied workers, in making medical decisions; and for hospital management, in decision making on policies.

The introduction of EMR system promotes an increase in effective healthcare delivery, improved quality of care as well as patients' and doctors' satisfaction .For example, Jha *et al*. (2009) studied the use of EMR in USA hospitals, 63.1% of the country hospitals responded to the survey and found that: 1.5% of U.S. healthcare facilities had comprehensive electronic health records; that the facility was present in all the clinical departments and that, 7.6% had a partial EMR system.

In a similar study, Hillestad, Bigelow, Baren, Girosi, Meili, and Taylors (2005) reveal that 4% of U.S. medical doctors were using EMR effectively, while between 15-20 % were using partial forms of computerised record-keeping. Hsiao and Hing (2014) report the findings of a study on the use of EMR in U.S in 2006. The results reveal that 17% of medical doctors used it in their offices; 31% claimed that they used it in emergency rooms; and 29% stated that they used it in outpatients' departments. They further reported that, in the year 2013, 78% of medical doctors used EMR in their hospitals. The reasons for this may not be far from the submission of Miller and Sim (2004) and Silo–Carrol, Edward and Rodin (2013) that, many medical doctors are ready to adopt EMR because they believe it will enhance their job descriptions.

In addition, Jha (2011) lists various types of EMR systems, which include electronic prescription, electronic health information exchange, electronic reporting of data, electronic recording of patients' medical history and clinical decision support resources. Zandieh *et al*. (2008) highlight the advantages of EMR to include the following: improved communication, provision of access to information about patients and generation of funds for healthcare facilities. If properly adopted, EMR will bring improvement to healthcare delivery and the quality of services in the hospitals.

However, Hubner, Liebe, Egberit and Frey (2012) claim that only 22.6% of German hospitals have implemented the electronic medical record system. This poor adoption rate can be attributed to high cost of clinical informatics tools. However, for any meaningful advantage to come from the use of EMR in hospitals, medical doctors are the deciding factors.Tiernney, Achieng, Baker, Biodich, Kayiwa, Mamlin, Musinquzi, Kayiwa and Yeung (2010) conducted a study on EMR in three East African countries: Kenya, Tanzania and Uganda using Open Medical Record System (MRS). The results reveal that EMR implementations were successful in the three countries. South African government introduced the EMR project in 2002 as part of its e-Health strategy introduced by the National Department of South Africa (Kleynhans 2011).

Examining the need for EMR in Nigeria's healthcare system, Benson (2011) recommends the following: the need for adequate planning, the need for medical doctors to have adequate knowledge on how to operate the system and the objectives of the introduction of the system must be maintained, which is to improve patients' safety and provide a high level of information security. What then are the challenges of accessing clinical informatics?

Challenges to access and use of clinical informatics tools

There are several obstacles facing the access and use of clinical informatics tools in many African countries. Idowu *et al*. (2008) categorise the problems into three: the people, government and ICT infrastructure. Simbia (2004) states that, poor access to ICT, poor government attitude, lack of political will and poor data quality are some of the problems facing the use of clinical informatics in African countries. The challenges facing the development of clinical informatics, in Nigeria and South Africa, are discussed in the next section.

Poor access to telecommunication

Telecommunication services are very important for effective operations of clinical informatics tools. Its role, in effective healthcare system, cannot be over emphasised. It is in support of this, that Coiera (2006) lists various telecommunication modes necessary for effective utilisation of clinical informatics tools: integrated telecommunication technology, interactive notification, interactive mode security protocol and a host of others.

However, in many African countries, there is limitation to broadband access. In countries where it is available, it is very expensive for the people. The poor ICT infrastructure status, in many African countries, has made it impossible to effectively allow the healthcare sector to benefit from the opportunity of ICT use in healthcare delivery. Lintho (2010) reveals that due to poor ICT facilities in the continent, very few hospitals are connected to the Internet and many of them have limited access. Internet World Stats (2016) affirms that most countries in Africa are not well connected to the Internet. For example, only 29.6% of the households in Ghana are connected; South Africa claims 52.6%; Angola, 37.3%; Kenya, 68.4%; and Nigeria, 5%. The statistics has revealed that many African countries have problems with inadequate telecommunication facilities, Nigeria and South Africa inclusive.

Poor access to ICT by medical doctors can be traced to inadequate telecommunication services, in Nigeria and South Africa. Though, these countries were rated high in the telecommunication sector as the fastest growing economies, it is glaring that this applies solely to the use of mobile phones. Majority of the health institutions in the two countries have poor access to broadband facilities (Idowu 2008). Kim, Kelly and Raja (2010) note that every 10% point increase in broadband services, particularly in health sector, will lead to an increase in the productivity of medical doctors and other health workers with 1.3%. This indicates the importance of increase in broadband, in clinical informatics. The resource is necessary in operating various clinical informatics tools. From the foregoing, it can be deduced that there is need for adequate broadband facilities for effective diagnosis and reduction in medical errors in African countries.

Resistance to new technology

Technology is meant to improve efficiency, accuracy and productivity. However, technology resistance is a way by which people resist the changes brought about by technology, particularly, when people are faced with new innovation or change (Fagerberg and Stholec, 2009). Idowu *et al*. (2008) note that introduction of innovation or technology may be welcomed with mixed feelings by users.

Medical doctors may resist the introduction of a technology that they believe will have negative impact on their jobs. Idowu *et al*. (2008) and Abdullai and Haruna (2008) list various reasons why medical doctors may resist the adoption of clinical informatics tools, in medical practices. Their resistance may be a reaction to new knowledge, skills and training on how to use the new technology, as well as the tendency of increase in job functions. In addition, people may resist the introduction of new technology/technologies because they may be afraid of job loss, due to reduction of staff. As a result of this, there is need for the government to build confidence

in hospital workers, before introducing the technologies and map out ways to train the hospital staff on how to use them, rather than lay staff off (Zheng 2004).

Poor ICT skills

In this era of ICT, it is very necessary for medical doctors to use the computer and other ICT components for their job performances. Anderson, Asher andWhitler, (2007) note that medical doctors need to possess the following skills, apart from their academic and professional qualifications: computer operating system, use of application software packages, knowledge of databases and medical tools automation, and technical skills. However, the potentials of ICT has not been fully utilised in many developing countries because of poor ICT skills among medical doctors (Gatero 2011).

As a result of poor ICT skills, medical doctors would deny the opportunity to have access to adequate and reliable information Ololube, Ubogu, and Ossai (2007) affirm that medical doctors' lack of ICT skills is a major obstacle militating against the use. There are three approaches to ICT skills competency standard for medical doctors. These are technological literacy, knowledge deepening and knowledge creation (UNESCO 2011). These approaches are development continuums to promote the use of ICT among medical doctors; and each has its usefulness for the healthcare delivery system, particularly in diagnosis, treatment, professional development of medical doctors, medical practices and hospital administration.

The information and communication technology skills of medical doctors, in Africa, are very low (Idowu *et al*. 2008). The authors further assert that many medical doctors in Africa lack the basic skills to operate computers. As a result, many of them would find it difficult to operate clinical informatics tools.

Appraisal of the literature

The health systems of many African countries are haunted by challenges of accessibility and availability of clinical informatics tools, despite the impressive opportunities that can be gained from the adoption of clinical informatics tools in healthcare. Extant literature indicates that clinical informatics tools development is basically limited to advanced countries of the world, with many healthcare facilities in Africa still lagging behind, in clinical informatics' tools access and use.

Clinical informatics tools are becoming increasingly important aspect of medical practice, and it has contributed significantly to healthcare development at all levels. The adoption of clinical informatics promises a number of significant benefits, which include time management and better healthcare. Serious unintended consequences from the non-implementation of these facilities have emerged, particularly in developing countries. Effective healthcare is fundamental to the global agenda of reducing poverty and a major way of promoting human development. Based on this, access to accurate medical information, in various health care facilities, is very necessary for medical doctors to take effective medical decision. Despite the rapid adoption of clinical informatics in developed countries, the effect of adoption of clinical informatics is very poor. The low rate of adoption of clinical informatics is widening the digital divide between developed and developing countries.

There is an urgent need for careful and nuanced methods to develop and establish the use of clinical informatics in poor countries. The application of clinical informatics is not feasible in developing countries where there is a shortage of medical doctors, in both rural and urban areas. Integrating clinical informatics in the healthcare sector of a country would promote universal and effective healthcare coverage and strengthen the already weakened healthcare systems, especially in rural areas. In order for developing countries, particularly African countries, to be economically viable, politically vibrant and socially secure, there is a need for the effective adoption and utilisation of clinical informatics resources in their healthcare facilities.

The implication of this is that medical doctors in Africa are lagging behind in the use of clinical informatics. There is a need for more studies that would establish the relevance, and usefulness of clinical informatics to medical doctors in the continent. Lack of research may be the reason why different governments in the continent have decided not to invest so much in clinical informatics development in healthcare.

Poor access to clinical informatics resources can result in medical errors, lessen the quality of care, and endanger healthcare development on the continent. Incorrect medical diagnoses, on the part of medical doctors, may have serious legal and financial implications on healthcare facilities. Lack of clinical informatics also has serious implications on the fight against preventable diseases and premature deaths, in developing countries. The poor adoption of clinical informatics, in developing countries, can be traced to poor ICT readiness. ICT readiness can be grouped into basic readiness, ICT readiness, government readiness and clinical informatics.

Even among developed countries, some countries lay greater emphasis on clinical informatics than others. For example, Denmark has a very high level of clinical informatics in her health facilities compared to other Scandinavian countries(European Commission 2017) . The prevalence of the digital divide, in many African countries, is a serious threat to the effective use of clinical informatics in healthcare delivery. Reasons for this may be the unavailability of clinical informatics policies and poor budgetary allocation to health. Any implementation of clinical informatics must also be sensitive to the needs of healthcare users. Effective healthcare depends on the accessibility and availability of clinical informatics tools because clinical informatics tools are the backbone of the services that prevent, diagnose and treat diseases and aliments

The literature review indicates a divide in the use of healthcare facilities, particularly between urban and rural healthcare facilities and developed and under-developed countries. Gaps also exist within healthcare facilities (between departments) and healthcare facilities within the same geo-political zone, particularly in Africa. The adoption of clinical informatics can help to bridge this gap. Through the adoption of clinical informatics, challenges such as distance would no longer be a barrier to delivering quality healthcare. The availability of clinical informatics can contribute significantly to the socio-economic development of rural dwellers because the people will have access to effective healthcare delivery.

Conclusion

For effective adoption of clinical informatics tools usage in Africa countries, there is a need for governments to make funds available for healthcare sectors and relevant training on the usage should be put into consideration. This becomes necessary when the clinical informatics availability and usage in developed and developing countries are compared. Based on the reviewed literature, the study recommends the need for developing countries, particularly in Africa, to organise themselves nationally and regionally, in order to benefit more from the developed world in terms of knowledge transfer, capacity building in healthcare and infrastructure development; as related to ICT and effective healthcare delivery.

Also, medical doctors need to improve their ICT skills, in order for them to be able to harness the potential benefits of using clinical informatics tools. The literature review revealed that there is poor availability of clinical informatics tools as a result of which various hospital managements need to partner with relevant stakeholders like government, corporate bodies and ministries or departments of health, multinational organisations, international health organisations such as WHO, and non-governmental organisations (NGO) for incorporation of clinical informatics tools to their healthcare system. This may be through donation of clinical informatics resources.

In addition, adequate budgetary allocation should be earmarked for acquiring relevant clinical informatics tools. In acquiring relevant clinical informatics tools, public private partnership should be encouraged, since the government alone cannot face the burden of effective healthcare delivery.

The study is limited to four types of clinical informatics tools which are electronic medical record, diagnosis image archiving, computerized decision support system and computerized physician order entry. The decision to use four types of the clinical informatics tools was based on the fact that the socio-economic conditions of most countries in Africa do not favourably support the access to, and use of most clinical informatics facilities; particularly the newer, more complicated and expensive systems.

The contributions of this work can be considered from the point of view of literature, practice, and policy. The review adds to literature by contributing to the conceptualisation of clinical informatics and clinical informatics tools, as aspects of social informatics. The review has also provided an insight into the importance and relevance of clinical informatics tools to modern day healthcare delivery. In addition, the study contributes to debates and discussions on clinical informatics and social informatics. This paper should would add more value when read together with recent studies on the theme by the authors.

References

Agency for health care research and quality 2015. CPOE 1-5. Viewed on 4th May, 2016 from*: https://psnet.ahrq.gov/primers/primer/6/computerized-provider-order-entry*.

American Medical Informatics Association, 2018.Informatics areas clinical informatics. Viewed on 13th January, 2018 from *https://www.amia.org.*

Deminis, G. & Kneale, K. 2015. Informatics systems and tools to9 facilitate patient-centered care coordinate. *Yearb Medical Informatics*. 10 (1): 15 -21.

European Commission. 2017. State of health in the EU. Demark country health profile. Ministry of Health.

Anderson, D. Asher, M.L. & Whtter, T. 2007. Physician's computer skills a perquisite to the future in healthcare services*. Journal of KY Medical Associaion.*105 (2): 66-77.

Argyres, N. S., Bercovitz, J. & Mayer, K. J. 2007. Complementarily and evolution of contractual provisions: An empirical study of IT services contracts. *Organization Science, 18(1):* 3-19.

Hu, P. J. Chau, P. Y. K. Liu- Sheng, O.R. & Tam, K.Y. 1999. Examining the technology acceptance model using physician acceptance of telemedicine technology. *Journal of Management Information Systems* 16 (1): 291-112.

Olasina, G. 2014. Predictors of legislators ICT acceptance and use in the performance of legislative functions at the Nigerian National Assembly PhD thesis submitted to the Department of the Information Studies in the University of Kwazulu-Natal Pirtermariburg,

Ajzen, I. 1991. The theory of planned behaviour. *Organizational Behaviour and Human Decision Processes,* 50(2): 179-211.

Fishbein, M. & Ajzen, I. 1975. Belief attitude, intension and behaviour reading Massachusets: Addison-Wesley.

Sun, N. & Rau, P.P. 2013. How to promote patient safety in social media; a comparison between messages in social media: a comparison between messages cross-cultural design International Conference held as part of HCI International Heraklion, Crete Greece, and June.

Cohen, J.F., Bancihon, J. & Jones, M. 2013. South African physicians of e-prescribing technology: an empirical test of a modified UTAUT model. *South Africa Computer Journal* 50 (1):43-50.

Davis, F.D. 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly,* 35(8): 982-1003.

Benson, A.O. 2011. Hospital information systems in Nigeria. A review of literature. *The Journal of Global Health Care Systems*, 1 (3): 1- 26.

Berghout, M. Fabbicoth, I. Buljac, M. Carina, A. & Hilders, J.M. 2017 Medical leaders or master: A systematic review of medical leadership in hospital settings. PLOS/ONE.

Bowles, K. Dykes, P. & Demiris, G. 2015. The use of health information technology for improve care and outcomes for older adults. *Research Geronted Nursing* 8(1):5-10.

Castaneda, C., Nalley, K., Mannion, C., Bhattacharyya, P., Blake, P., Pecora, A., Goy & Stephen, K. 2015. Clinical decision support systems for improving diagnostic accuracy and achieving precision medicine. *Journal of Clinical Bioinformatics* 5**(**4): 23-34.

Chang, J. Ronco,C. & Rosner, E. 2011. Computerised decision support systems improving patient safety in nephrology. *National Journal of Nephrol* 7(6): 348-355.

Oye, N. D. A.Iahad, N. & Rahim, N. 2013. The history of UTAUT model and its impact on ICT acceptance and usage by academicians. *Education and Information Technologies.*19 (1): 251-270

Al-Haider, A.S.& Wan,I.T.1991. Modelling organizational determinants of hospital mortality *Health Service Research* 26(3), 1-22.

Venkatesh, V. & Davis, F. D. 2000. A theoretical extension of the technology acceptance model: four longitudinal field studies, *Management Science*. 46 (2) : 186-204

Kijsanayotin, B. Pannarunothai, S. & Speedie, S. M. 2009. Factors influencing health information technology adoption in Thailand's community health centers: Applying the UTAUT model. *International Journal of Medical Informatics,* 78(6), 404-416.

Venkatesh, V. Morris, G. Michael, G. Davis, G. & Davis, F.D. 2003 .User acceptance of information technology: toward a Unified View. *MIS Quarterly.* (27): 425-478

Thompson, R.L. Higgin, C. A. & Howell, J. M. 1991. Personal computing toward a conceptual model of utilization. *MIS Quarterly*, 15 (1): 144-176

Taylor, S. & Todd, P. 1995. Decomposition and crossover effects in the theory of planned behavior: A study of consumer adoption intentions. *International Journal of Research in Marketing,* 12 (1) :137-156

Liu, J. 2013. E-learning in English classroom; Investigating factors impacting on ESL (English as second language) the Modular Object-oriented dynamic learning environment (Mooodle Learning Environment (Moodle) Phd thesis Lowa State University.

Cline, G.B. & Luiz, J.M. 2013. Information technology systems in public sector health facilities in developing countries: the case South Africa. *BMC Informatics and Decision Making* 13(13): 1-5.

Coiera, E. 2006. Communication systems in healthcare. *Clinical Biochem Rev* 27 (2): 88-98.

Commonwealth of Australia. 2007. Nurses and information technology, Viewed on 13th January 2016 from: *http://www.anf.org.au/it_project/PDF/IT_Project.pdf*

Cooper, C.P. Gelb, C.A. Rim, S.H. Hawkins, N.A. Rodriguez, J.L. & Polonec, L. 2012. Physicians who use social media and other internet-based communication technologies. *Journal of the American Medical Informatics Association*, 19(6):1-7.

Dandu, R.V. 2008. Storage media for computers in radiology. *Indian Journal of Radiology*. 18(4): 287-289.e-Health stakeholder Group 2013. e-health stakeholder group report perspective and recommendation on Interoperability. Department of Health, South Africa.

Faris, S. and Ocholla, D. 2015. Comparative assessment of information and knowledge sharing among academics in selected universities in Nigeria and South Africa. *South Africa Journal of Libraries and Information Science* 81(1).

Fagerberg, J. & Srholec, M. 2009. National innovation systems, capabilities, and economic development. *Research Policy 37*(9):1417-1435.

Gatero, G. 2011. Utilisation of ICTs for accessing health information by medical professional in Kenya;a case study of Kenyatta National Hospital. *Journal of Health Informatics in Developing Countries* 5 (1): 1-7.

Glden, Z. 2011 . Searching for integrated strategy in chronic disease management: a potential role for ICT. *Management in Health* 15(4): 1-9.

Hains, I., Georgious, A. & Westbrook, J. 2012. The impact of PACS on clinical work practices in the intensive care units a systematic ature .*Journal of America Medical Information Association* , 19 (1): 506-513.

Hayrinen, K. Saranto, K. & Nykanen, P. 2008 . Definition, structures, content and use. Impacts of electronic health records; a review of the research literature. *International Journal of Medical Informatics,* 77 (5): 291-304.

Hillestrad, R.Bigelow, A. Baren, A. Girosi, F. Meili, R., S. & Taylors, R. 2005. Can electronic medical record systems transform health care? Potential Health benefits, savings and costs. *Health Affairs* 24(5): 1-5.

Hochwaster, S. Cuongm, D. Chuc, N.T. & Larrson, M. 2014.Towards an electronic health record system in Vietman; A core readiness assignment. *Journal of Health informatics in developing countries developing countries*.8 (2) :93-103

Hsiao, G. & Hing, E. 2014. Use and characteristics of EHR systems among office –based physician practices: United States 2001-2013 NCHS Data Brief No 143 Department of Health Services.

Hubner, U. Liebe, J.Egberit, A. & Frey, A. 2013. IT report Gesindeithswesenschwepunkt IT in KrankenSchwepunkt IT in Kranken hairs.

Idowu, D. C. Cornford, D. &Batin, L. 2008. Health Informatics development in Nigeria. *Journal of Health Informatics in Developing Countries* 2(1): 15-33.

Internet World Stats 2016. Internet usage statistics for Africa. Internet usage statistics for Africa. Miniwatts Marketing Group.Viewed 20 October,2016.From: *http://www.internetworldstats.com/stats1.htm.*

Jha, A DesRoches, G.M. Campbell, G. Donelan, K Sowinya, D. Rao, R. Terris, T. Shields, W. Rosenbauon, S &Blumenal, D. 2009 Use of electronic health record in USA hospital*. New England Journal of Medicine*360 (1) 1628 -1638.

Jha, H. 2011. The promise of EHR around the Conner or down the road? *Journal of the American Medical Association* 308 (8):801- 802.

Jung, E. 2006. Report central: quality reporting tool in an electronic health record. A*MIA.2*(2):1-7.

Kawamoto, K. Houlihan, C.A., Balas, E. A. & Lobach, D.F. 2005. Improving clinical practice using clinical decision support systems: a systematic review of trials to identify features critical to success. *BMJ.* 330(7494): 1-12.

Khana, R. & Yen, T. 2014. Computerised physician order entry promise pevils and experience. *Neurohospitlist* 4 (1):26-33.

Kim, Y. Kelly, T. & Raja, S. 2010. Building broadband: strategies and policies for the developing world. World Bank publication.Vi

Kleynhans, K. 2011. Is South Africa ready for a national electronic health record (HER)? Thesis submitted to the Department of Business Studies for the award of master degree from University of South Africa.

Krueger, A. 2010. 6 ways technology is improving health care. *Business Insider Strategy*.1(1): 1-12.

Lintho, P. K. 2010. ICTs and health in Uganda: benefits, challenges and contradictions.Viewed 20 February 2016, from *http://www.genderit.org/en/index.shtml?apc=a¬¬e¬¬1&x=95473.*

Litho, P. 2004. ICT and health in Uganda: Benefits, challenges and contradictions.GenderOrga. Viewed on 13th January, 2016 from: *https:// www genderit.org/es.node.2208*

Makary, M.A, and Daniel, M. 2016. Medical error-the third leading cause of death in the USA. Miller, R. and Sim, I. 2004. Physicians' use of EMR barriers and solutions. *Health Affairs. 2*3(2): 116-126.

Nwagwu, W. andAdio, A. 2013. Contexts of utilsation of ICT by medical practitioners in private hospitals in Osun State, Nigeria. World *Journal of Scince Technology and Sustainable Development.* 10(3):229-246,

Olatokun, M. &Adeboyejo, C. 2009. Information and communication technology use by reproductive health workers in Nigeria: state of the art, issues, and challenges, *An Interdisciplinary Journal on Humans in ICT Environments* 5(2): 181-207.

Ololube, N. P.Ubogu, A. E. &Ossai, A.G. 2007. ICT and distance education progrmme in a sub - Sahara African country; a theoretical perspective. J*ournal of Information Technology Impact* 7(3): 181-194,

Oshroff, J. Teich, J.M. Middleton, B. &Elane, B. 2007 A roadmap for national action on Clinical Decision Support. *Journal of the Medical Informatics Association.* 14 (2): 141-145.

Owolabi,K.A. 2017. Access and use of clinical informatics among medical doctors in selected teaching hospitals in Nigeria and South Africa. PhD thesis submitted to the Department of Information, University of Zululand KwaDlengenza.

Owolabi, K.A. Mhlongo, T.P &Evans, N.2017. The status and challenges of clinical informatics development in South Africa. *Inkanyiso Journal of Humanities and Social Sciences.* 8(2) :125 -130.

Polasek, O. and Kern, I. 2012. Medical 35 *Europeans Countries, Informatics for Health and Social* Care 37(1):12-22.

Pope, C. Halford, S. Turnbull, J. Pirchard, J. & May, C. 2013. Using computer decision support systems in NHS emergency and urgent care; ethnographic study using normalisation process theory*. BMC Services Research.* 13 (1111): 12-19

Ruxwana,N.LHerselman, M.F &Conrade, D.P. 2010. ICT application as e-health solutions in rural healthcare in Eastern Cape Province of South Africa. *Health Information Management* 39(1):17-30.

Sandefer, R. Khairat, S. Piceckics, D. &Speedie, S. 2015. Medinfor e-health –enabled health: Proceeding of the 15th World Congress on Health and Biomedical Informatics. Sao Paulo, Brazil. 19th -23th, August.

Silow-Carrol,S. Edward, J. W. & Rodin, D. 2013. Using electronic health records to improve quality and efficiency. The experiences of learning hospitals. *Issues Brief Commonweath Fund Publisher.* 17 (1): 1-40

Simba 2006 Application of ICT in strengthening health information systems in developing in the wake of globalization. *African Health Science* 4(3): 194-198

Stocwell, M. &Filks, A. 2013. Utilising health information technology to improve vaccine communication and coverage. *Human Vaccines and Immunotherapectics*9(8): 23 -25

Tierrney, W. M. Achieng, M. Baker, E. Biodich, P. Kayiwa, D. Mamlin, B.Musinquzi, N. Kayiwa, D. & Yeung, A. 2010 . Experience implementing EHR three African countries. *Study Health Technology Information* 160 (1) :371 -375.

Udousoro, N. M. 2014. Use and gratification of ICT by healthcare personnel in Nigeria South-South tertiary hospitals. *Asian Journal of Social Sciences and Humanities.* 3 (4):12 -18.

UNESCO 2011. . UNESCO ICT competency framework for teachers, UNESCO publication: Paris

Uzoka, T.M. Osuji, J. &Obot, O. 2011. Clinical decision support system in the diagnosis of malaria. A case comarasion of two self methodologies. *Expert Systems with applications. A Interternational Journa*l 38(3) :1537 – 1553

Verbeke, F. Karara, G. andNyssen, M. 2013. Evaluating the impact of ICT-tools on health care delivery in sub-saharan hospitals. *Studies in Health Technology and Informatics.* 192 (1): 11-21.

Wang, Q. Fau, A.Allgri, M, D., Brenner, S. &Kalmus, H. T. 2015. Out of pocket expenditure in chronic non communicable diseases in sub –sahara Africa; The case of rural Malawi. *PLOS 1* 10 (1):1- 7.

Weatherburn, G. Bryan, S. Nicholas, A. & Cocks, R. 2000 .The effect of a picture archiving and communications system (PACS) on diagnostic performance in the accident and emergency department. *Journal of Accidents Emergency Medicine*. 17(3): 180-184

Webster J. &Watson R.T. 2002. Analyzing the past to prepare for the future: Writing a literature review, *MIS Quarterly,* 26 (2): 13-23.

WHO (2015). HIV/AIDS fact sheet WHO media, Generva: WHO publication.

WSIS 2005. Plan of action, Viewed on 13thJuly, 8, 2016 from :*http://www.itu.int/wsis/docs/geneva/official/poa.html#c10.*

Zandieh, S. Yoon-Flannery, K. Kuperman, G. Langsam, D. Hyman. D. &KaushL, R. 2008 . Challenges to EHR implementation in electronic-versu paper-based office practices. *Journal General Internal Medicine* 23 (6): 755-761.

Zheng, S. 2004. Overcoming resistance to new technology: employee buy- in is crucial for successful Information System Implementation. *Behavorial Health Management. 1 (2): 1- 5.*

Ethnobotanical study of medicinal plants in southwestern Nigeria and traditional healers' perception of indigenous knowledge digitisation

Oluremi A. Abiolu[1]
Albert Ilemobade Library Federal University of Technology, Akure, Nigeria
ijatuyioa@yahoo.com

Abstract

This paper investigated the ethnobotany of medicinal plants among traditional healers in southwest Nigeria. It identified plants, the diseases they are used to treat, and explored the indigenous healers' perceptions of digitisation of their medical knowledge. Structured interview schedule was used to elicit information from 18 interviewees. The study showed that 44 families, comprising 82 genera and 96 species with Asteraceae, Malvaceae, Euphorbiaceae, Poaceae and Fabaceae having the highest number of genera and species. Species cited with high fidelity levels included Phragmanthora capitata (100%), Anacardium occidentale (100%), Anacardium occidentale (100%) and Gossypium hirsutum (80%). Interviewees possessed an appreciation for computer; and were in full support of documentation and digitisation of traditional medical knowledge. They perceived documentation, digitisation and involving libraries as ways of preserving traditional knowledge. Barriers to traditional healers' practice included use of herbicides, scarcity of medicinal plants, urbanisation, undefined dosages and/or side effects, deforestation, overgrazing activities, and bush burning. Documentation and digitisation of traditional healing knowledge should be treated with urgency thereby preserving the rich culture of Yoruba people for posterity. Libraries for indigenous knowledge systems should be established across Nigeria. Mounting courses at the general or first-degree levels can be contributory to medicinal plants preservation.

Keywords: Digitisation, documentation, ethnobotany, medicinal plants, nigeria, traditional healers.

Introduction

The relationship between plants and human beings has been from time immemorial. All through history, human dependence on plants for food, clothing, shelter, medicine, ornament, horticulture, furniture, wind breaking, organic manure, soil stability, dyes, pesticides, gums, warmth, religious sacrifices, and food for other animals among others cannot be jettisoned. Some ecological services supplied by plants include providing support for energy flow and chemical recycling, air and water purification, soil erosion prevention, influencing local and regional climates, serving as carbon sink, air balances and providing habitats for other organisms (Ijatuyi 2005a; Miller and Spoolman 2013). The effects of plants are becoming more pronounced even in the present day threatened environment.

The use of herbal plants as indigenous remedies to diseases and ailments continues to gain more attention in scientific research. Evidence from Wyk (2002) indicated that a growing international attention in ethnobotany was demonstrated by upsurge in ethnotourism and documented that over 20 universities in USA make available courses in ethnobotany at undergraduate and postgraduate levels. Researchers (Sharma and Kumar 2013) confirmed that

1. Oluremi Abiolu PhD is Deputy University Librarian, Albert Ilemobade Library, Federal University of Technology, Akure Nigeria.

many of the present-day diseases are attributable to the type of lifestyle one engages in. These diseases can be in form of diabetes, nervous disease, vitality, reproductive and others, the use of herbal medicines has proved potent in their treatment.

Ethnobotany is a branch of ethnobiology and is dichotomised as “ethno” – the study of people and “botany” – the branch of science that studies plants (Sharma and Kumar 2011). Ethnobotany provides important information needed for the extraction of active substances from plant sources (Quereshi, Gloazanfar, Obied, Vanleva and Tariq 2016) and up till today, discoveries are continuously being made about plants as sources of drugs capable of tackling human and animal diseases (Quereshi, *et al.* 2016). Quereshi *et al.* (2016) also observed that only 10% of plant resources species inhabiting the earth numbering between 500,000 and 750,000 have had their biological and chemical components examined worldwide. Thus, their potentials and potency are yet to be investigated.

The practice of indigenous medicine is predominantly done by traditional healers who derive their sources of medicine from plants. Ijatuyi (2005b) citing Mundy and Crompton identified some people as sources of indigenous knowledge based on certain factors including age, experience, gender and profession. Among the indigenous communities are professionals who possessed indigenous knowledge including healers, scribes, midwives, blacksmiths, and irrigation tunnel builders (Mabawonku 2005) and are still part of the existing communities today. These skilled practitioners possess knowledge – which is poorly documented, and highly limited in circulation and sharing. To give the indigenous knowledge a broad base, there is the need to properly document and digitise it. Thus, engaging the use of information and communication technologies (ICTs) is imperative. The widespread, availability and convergence of these ICTs provide an incredible capacity for a better way of disseminating information and knowledge, overcoming the barriers of geographical space and time. Wyk (2002) opined that the ICT operating environments for the different countries of the world are uneven. For example, the telephone availability in Tokyo the capital of Japan is far greater than what is available in the whole of Africa put together. However, we have to begin somewhere and continue to progress. The gap identified in the literature in the area of traditional healing lies in the negligibly low documentation and digitisation of beneficial information of plant resources since most of the indigenous knowledge in this regard are confined to oral societies. It is apparent that such knowledge will vanish at the death of their possessors. Apart from death, memory loss can be challenging to indigenous knowledge especially as these healers advance in age.

The focus of this study, ethnobotanical study of plants among indigenous healing practitioners versus their perception of possible digitising of their knowledge shows a long overdue action that can reduce the limitation of orally keeping the records of indigenous medicinal plants and expand circulation and sharing. Information communication technologies (ICTs), the convergence of computers and communications technologies, allow faster, instant and effective processing, storage and accessing of information. ICTs have increased the rate of conversion of information and data into electronic format thereby promoting availability and easy access to information at a very low cost on fingertips globally. In this sense, the internet enables people to gain access to information, create content and disseminate ideas more efficiently (Chu and Du 2013).

Purpose of the study

The objectives of this research include focusing on ethnobotany of medicinal plants by traditional healers in southwest Nigeria; investigating the perception of these traditional healers about digitising; looking into these healers’ awareness on the issue of possible biopiracy of their products and/or service; finding out any challenges to their indigenous profession and proffering some suggested solutions. This is to contribute to efforts that can form precursor for documentation and processing indigenous healing practices in Africa using e-content.

Methodology

Research paradigm

This discourse has adopted mixed methods of quantitative and qualitative research using a survey design. This is because it combines numerical values (quantitative) in the discussion of the socio-demography, frequency of genera and species as identified by interviewees, and the Fidelity Level (FL) of highly cited plant species, while the interviews and ensuing discussions are associated with the qualitative paradigm. The practicality of these mixed methods will be expounded upon in subsequent discussions.

Context of the study

The study was carried out in southwest Nigeria – one of the six geopolitical zones in the country – which also enjoys tropical climate and vegetation and is inhabited by Yoruba people who are one of the major tribes in Nigeria and they have Yoruba as their language. The people in the region are unique with reference to their language, dressing, appearance, socialisation, building style, culture and practices of indigenous medicine. This study used a multistage random sampling technique covering southwest Nigeria- one out of the six geopolitical zones in the country, and focusing on Ondo State, one of the six states in the zone. Two Local Government Areas (LGAs) namely Akure South and Ifedore Local Government Areas were selected from the State for the study because of some parameters: Akure South Local Government Area incorporates Akure, Ondo State Capital and Ifedore Local Government Area has some proximity to the State capital.

Instrument for data collection

The survey focused on eliciting information from 18 traditional healers from the two Local Government Areas stated above. Instrument for data collection was a structured interview schedule but the language of communication throughout the interview was Yoruba, because all the interviewees and interviewers were Yoruba thereby making it easy to flow in the language and atmosphere of the cultural heritage of the study area. The interview was held with the assistance of the researcher's colleague, a traditional healer and the researcher herself. Some of the healers were at first sceptical and unwilling to respond for fear of losing the secrecy of the profession. However, painstakingly, the interviewers were able to explain the objectives of the study and disabuse the interviewees' scepticism thereby soliciting for their freedom in participating in the interview. The interview elicited information on the demographics of respondents, plants names and disease treatment, how the traditional healers got the knowledge on their profession, their perceived computer knowledge, perception of digitisation of indigenous healing procedures and processes, issues of biopiracy and constraints interviewees face in their profession. Since most of the plants cited by study participants were in indigenous names, botanical sources such as information sources (Odugbemi & Akinsulire 2006a; Odugbemi and Akinsulire 2006b; Aigbokan 2014) containing indigenous names, and pictures of plants were used to identify cited plants when difficulty occurred.

Findings

Socio-demographic information of interviewees

Eighteen traditional healers participated in the study with women carrying 72.2% as against 27.8% men participants. Cheikhyoussef, Shapi, Matenge and Ashekele (2011) found women to be more than men in their study. However, this contrasts Tugume, Kakudidi, Buyinza, Namaalwa, Kamatenesi, Mucunguzi and Kalema (2016) who found male practitioners to be dominant. Of all the traditional healers, a majority (78%) of the healers fell above 40 years of age, with 55.6% having tertiary education and 66.7% practiced from their personal houses. Majority (88.9%) of the interviewees had no registration status with the government and 66.7% had no affiliation with

Traditional Healers Association. Means of enrolment mentioned by the healers included mother (33.3%), father (27.8%), grandparents (33.3%), and apprenticeship (5.6%). This is in tandem with that of Cheikhyoussef *et al.* (2011) who found that 90% of their respondents gained their knowledge from their family members and friends. The traditional healers were consulted for many reasons ranging from proximity (72%), affordability (66.7%), and availability (50%). Others noted that modern health facilities around them were inadequate (38.9%), and farther away (27.8%). Zank and Hanazaki (2017) in their study found that one reason that motivated indigenous people to use medicinal plants for health purposes was their low cost. The finding of Dey, Rashid, Millat and Rashid (2014) that modern medical facilities were not sufficient in the areas covered by their research was also of relevance to this study.

Ethnobotanical information of medicinal plants mentioned by study participants

The medicinal plants cited by interviewees were classified into families, genera and species. In all, there were 44 families comprising 82 genera and 96 plant species for the treatment of various ailments. The most cited families of medicinal plants are *Asteraceae* with eight genera and eight species followed by *Malvaceae* having five genera and eight species. *Euphorbiaceae* has five genera and six species, while *Poaceae* has four genera and five species, and *Fabaceae* comprised four genera and four species. Simbo (2010) confirmed in his study that *Asteraceae* is the most applied medicinal plant family in Cameroon. It can be said that the families of most cited medicinal plants may face extinction due to overuse by the traditional healers. Medicinal plants that were cited by at least two interviewees for one disease treatment or the other were sorted and displayed in Table 1.

Table 1: Medicinal plants cited by interviewees and their classification information

S/N	Family	Frequency of genera in each family	Species in each genus
	Laranthaceae	1	1
	Annonaaceae	1	1
	Musaceae	1	2
	Asteraceae	8	8
	Laminaceae	1	2
	Urticeae	1	1
	Malvaceae	5	8
	Anarcardiaceae	3	3
	Myrtaceae	1	1
	Apocynaceae	2	2
	Rutaceae	1	3
	Caricaceae	1	1
	Solanaceae	2	3
	Zingiberaceae	2	2
	Meliaceae	3	3
	Poaceae	4	5

	Compositae	2	2
	Portucaceae	1	1
	Basellaceae	1	1
	Bignoniaceae	2	2
	Moraceae	1	1
	Palmae	1	1
	Piperaceae	3	3
	Fabaceae	4	4
	Araceae	2	2
	Leguminosae	2	2
	Cucurbitaceae	3	4
	Rubiaceae	1	1
	Liliaceae	2	3
	Periplocaceae	2	2
	Bromeliaceae	1	1
	Euphorbiaceae	5	6
	Myristiceae	1	1
	Lauraceae	1	1
	Moringaceae	1	1
	Polygalaceae	1	1
	Steruliaceae	1	1
	Cyperaceae	1	2
	Boraginaceae	1	1
	Morantaceae	1	1
	Crussulaceae	1	1
	Convulvulaceae	1	1
	Nyctaginaceae	1	1
	Amaranthaceae	1	1

Medicinal plants cited by at least two interviewees for the treatment of one disease or the other were sorted and displayed in Table 2.

Table 2: Common names and species of medicinal plants and the disease treatment cited by at least two interviewees

Common Names	Species	Disease Treatment

Mistletoe	*Phragmathera capitata*	Heart problems, Insomnia, Diabetes, Cancer, Anaemia
Bitter leaf	*Vernonia amygdalina*	Diabetes, High blood pressure, Stomach disorder, Skin blemishes, Rashes, Nervous system problem, Typhoid fever, Malaria fever, Sleeplessness
Scent leaf (Tea bush)	*Ocimum gratissimum*	Diarrhoea, Dysentery, Gynaecological problem Pile, Stomach disorder, Backache, Haemorrhoids
Pawpaw	*Carica papaya*	Pile, Infection, Yellow fever, Typhoid fever
Goat weed	*Ageratum conyzoides*	Stomach disorder, Malaria fever, Antibiotic, Backache, Wound/Cut, Bleeding, Heart problem, Ulcer, Cough, Hiccups, Jaundice, Haemorrhoids
Cotton	*Gossypium hirsutum*	Malaria fever, Typhoid fever
Coconut	*Cocos nucifera*	Internal heat, Pile, Typhoid fever, Skin rashes, Diabetes, Detoxification of poison, Solvent for medicines
Yellow Mombim	*Spondias mombin*	Gonorrhoea, Fibroids, Cataract, Typhoid fever, Stomach disorder, Back ache
Plantain	*Musa paradisiaca*	Nervous system problem, Ringworm, Kidney problem
Sand Paper Tree	*Ficus exasperate*	Sleeplessness, Hypertension
Guava	*Psidium guajava*	Malaria fever, Rheumatism
Ginger	*Zingiber officinale*	Malaria fever, High blood pressure, Arthritis, Cancer
Sobo (Red Millet)	*Hibiscus sabdariffa*	Anaemia, Cough
Water leaf	*Talinum triangulare*	Anaemia, Ulcer
Tobacco	*Nicotiana tabacum*	Convulsion, Eczema
Hornbean-leaf sida	*Sida acuta*	Infertility, Arthritis, Malaria fever, Body weakness, Kidney problem, Rheumatism, Gonorrhoea, Blood vomiting
Sausage tree	*Kigelia africana*	Fibroid, Malaria fever, Stomach disorder, Infertility
Siam weed	*Chromolaena odorata*	Body fat reduction, Malaria fever, Headache, Tooth problem, Skin problem, Typhoid fever
Wild lettuce	*Launaea taraxacifolia*	Skin problem, Eye problem
Stool wood	*Alstonia congensis*	Growth of premature baby, Typhoid fever
Lemon	*Citrus limon*	Malaria fever, Cancer, Sore Throat
Bell bean tree	*Markhamia tomentosa*	Anaemia, Infertility
Pigeon pea	*Cajanus cajan*	Boil, Measles, Anaemia

Lemon grass	*Cymbopogon citrates*	Jaundice, Malaria fever, Obesity, Sleeplessness
Corn	*Zea mays*	Oedema, Weak erection
Morinda	*Morindamo morindioides*	Malaria, Cough
Red oil palm	*Elaesis guineensis*	Weak erection, Haemorrhoids
Mango	*Mangifera indica*	Malaria fever
Stinging bean	*Mucuna sloanei*	Malaria fever, Pregnancy sustenance, Haemorrhoids
African parguetina	*Parquetina nigrescens*	Pile, Anaemia, Backache
Pineapple	*Ananas comosus*	Yellow fever, Hepatitis
Christmas bush	*Alchornea cordifolia*	Malaria fever, Anaemia, Sore throat, Cough, Bleeding, Bronchitis
Candle bush	*Senna alata*	Back ache, Skin problem
Alligator pepper	*Alframomum melegueta*	Malaria fever, Fungal finger infection
Neverdie	*Kalanchoe crenata*	Body pain, High blood pressure, Malaria fever, High body temperature
Black night shade	*Solanum nigrum*	Eye problem, Snoring, Headache, Hiccups
Hog weed	*Boerhavia diffusa*	Malaria fever, Heart problem, Kidney stone (Hepatitis), Jaundice, Pile, Rheumatism
Mexican sunflower	*Tithonia diversifolia*	Malaria fever, Typhoid fever, Tumour, Jaundice
Bitter kola	*Garcinia kola*	Cough
African mahogany	*Khaya ivorensis*	Arthritis
Soya-bean (Soybean)	*Glycine max*	Anaemia
Common wild sorghum	*Sorghum bicolour*	Blood purification
Avocado pear	*Persea americana*	High blood pressure

Table 2 shows that the medicinal plants cited by at least two interviewees have potency for the treatment of many diseases. While all of them were used to treat at least a disease, medicinal plants such as *Vernonia amygdalina*, *Argeratum conyzoides, Sida acuta*, *Cocos nucifera, Chromolaena odorata, Occimum gratissimum, Alchornea cordifolia, Kalanchoe crenata, Spondias mombin*, and *Boerhavia diffusa* were used to treat at least six diseases.

A factor that was tested is the fidelity level (FL) of the medicinal plants, which is the frequency of interviewees who mentioned the plant species and the disease treatment. It was calculated in percentage using the formula (Cheikhyoussef *et al.* 2011):

$$FL = N_{P/}N \times 100,$$

Where, N_P is the number of interviewees that cited the particular species, and, N is the number of interviewees that cited the particular species in relation to the disease under consideration (Table. 3).

Table 3: Fidelity Level (FL) of highly cited plant species

Species	Basic Disease Treatment	N	N_P	FL (%)
Phragmanthera capitata	High blood pressure	4	4	100
Vernonia amygdalina	High blood pressure	8	3	37.5
Occimum gratissimum	Pile and stomach disorder	7	3	42.86
Anacardium occidentale	Malaria fever	5	5	100
Carica papaya	Malaria fever	6	3	50.0
Argeratum conyzoides	Malaria fever, fresh wound/cut	6	4	66.67
Gossypium hirsutum	Malaria fever	5	4	80.0
Spendias mombin	Gonorrhea	5	2	40.0
Hibiscus asper	Anaemia	3	2	66.67
Sorghum bicolour	Blood purification	3	3	100
Launaea taraxacifolia	Skin diseases	3	2	66.67

In this study, three species with high (100%) FL are *Phragmanthera capitata, Anacardium occidentale* and *Sorghum bicolour,* used for the treatment of high blood pressure*,* malaria fever and blood purification, and *Gossypium hirsutum* with 80% FL for Malaria fever treatment respectively. Coming next to these are the species with FL 66.67% *Argeratum conyzoides* for malaria fever and fresh wound/cut treatment, *Hibiscus asper* for anaemia treatment and *Launaea taraxacifolia* for the treatment of skin diseases. *Carica papaya* with 50% FL is used in the treatment of malaria fever. The remaining species have a fidelity level that is less than 50%; however, this does not affect their purported potency. Research has demonstrated that plants with high fidelity level are more actively used (Cheikhyoussef *et al.* 2011), and can form precursors of pharmaceutical products but, there may be the problem of overexploitation of such plants.

Traditional healers' perception of indigenous knowledge digitisation: Interviewees' perceived knowledge of computer

The traditional healers were asked whether their indigenous knowledge was documented or not. A majority (72.2%) indicated that it was largely not documented. Three people gave the following reasons for the undocumented status respectively:

I know everything.

The medicinal plants are too many to be documented.

They are found all around us.

The interviewees were asked if they had seen a computer before. About 89% of them had seen one before at home or in offices, while 67% of them had used it before. Further probing was given to digitisation issue; therefore, the interviewees were asked to respond to some general subtheme-statements as shown in Table 4 on the bases of "strongly agree", "agree", "disagree" or "strongly disagree". The responses were dichotomised into documenting and digitising subthemes: firstly, names of medicinal plants, parts used and diseases that such plants are used to treat; and secondly, documenting and digitising including preparation of traditional mixtures, their administration to patients including dosage, and storage.

Table 4: Traditional healers' perception on digitisation of their indigenous knowledge							
		SA	A	D	SD	M	Std
i	Computer can be used to store names of traditional medicinal plants	55.0	44.6	0	0	3.6	0.51
ii	Their records of growth/ecology should be digitised	50.0	50.0	0	0	3.5	0.51
iii	The kinds of diseases the plants are used to treat should be documented	61.1	38.9	0	0	3.61	0.50
iv	The kinds of diseases the plants are used to cure should be digitised	55.6	44.4	0	0	3.59	0.51
v	The health effects of the diseases should be digitised	55.6	44.4	0	0	3.56	0.51
vi	The parts of plants for healing the diseases should be documented	50.0	50.0	0	0	3.50	0.51
vii	The parts of the plants of plants for healing the diseases should be digitised	61.1	38.9	0	0	3.61	0.50
viii	Preparation of traditional mixtures should be documented	50.0	38.9	11.1	0	3.39	0.70
ix	Preparation of mixtures should be digitized	44.4	55.6	0	0	3.44	0.51
x	Administration of traditional mixtures should be documented and digitised	50.0	38.9	11.1	0	3.39	0.70

(The mean values (M) for the responses in Table 3 are as follows: SA (Strongly Agree) is 3.5-4.0, A (Agree) is 2.5-3.4, SD (Strongly Disagree) is 1.5-2.4, and D (Disagree) is 1-1.4)

The responses from interviewees showed that most of them consented to documenting and digitising those subthemes either on a "strongly agree" or "agree" basis as also revealed by their mean values. From this finding, the traditional healers did not perceive documenting and digitising their knowledge as a threat to their profession. The study participants appear to have an understanding of the significance of ICTs in traditional medical practice and were therefore in full support of the use of these technologies on their practice. Houshyari, Gardiner, Pena, Bahadorani, Tootoochi and Adibi (2012) noted that ICT has advanced many changes in the training and practice of medicine with access being one effect of ICT on medical education. In the words of Oluwalana (2018:3), "Nigeria's ethnic landscape is full of very valuable indigenous knowledge systems that can form a springboard for the country's scientific and technological lifting."

Perceived ways of preserving traditional healing knowledge – documentation, digitisation and library Involvement

In order to explore the issues of preserving indigenous healing, traditional healers were asked to state ways by which their practices could be preserved for future generations. All of them (100%) stated that documentation was one way, and 72.2% each identified digitisation, and involving libraries as other ways of preserving their practices for posterity. Rai (2008) regarded the traditional healers as the primary sources from whom information about healing philosophy, methodology and practice can be gained. An interviewee stated that:

> *My father passed down the knowledge on traditional healing to me but I have forgotten much of it in the process of time because I did not write them down. So I think it is not enough to rely on passing it through the word of mouth only.*

She further said that writing the practices down and hosting them on the computer would foster access because things are changing.

Issues of biopiracy

When asked about the controlling body (National Agency for Food and Drugs Administration Council [NAFDAC]) for food, drug and others in the country, about 94% of them also knew the Council and mentioned its acronym as NAFDAC with 61.6% stating its role as that of regulating drugs for use.

Intellectual property rights

The study interviewees were requested to explain what Intellectual Property Rights mean. Two healers responded. One said that:

> *These refer to effective knowledge behind traditional healing.*

Another stated that:

> *They pertained to issues of piracy.*

In addition, these healers were asked to mention what they would do in the event that their "ritual ceremonies, music, symbols, signs, creative arts, objects, preparation and way of administration of their drugs were reworked or rearranged, copied, and even sold for profit without their authorisation," The participants' responses were diverse including:

> *I will be angry.*
>
> *The person will not find it easy.*
>
> *The action is unfair.*
>
> *I will challenge the authority.*

About 28% stated that they would take legal action.

Though biopiracy covers a wide range of area, Rose (2016) pointed out that it occurs when researchers and research organisations take bioresources or traditional knowledge without acknowledging officially their generators or originators, owners, less affluent countries, the indigenous people themselves who are more or less marginalised. Runguphan (2004), therefore, warned that about the rising cases of biopiracy and encouraged the developing countries to urgently address the issues in order to disallow the loss of these biological resources before they invariably become extinct.

Constraints to indigenous healing practices

The traditional healers were requested to mention barriers to their medical practice. Those mentioned include scarcity of medicinal plants (33.3%) due to urbanisation and deforestation and grazing activities (16.7%), use of herbicides (11.1%) which have denatured the plants (16.7%), and defined dosages or side effects (11.1%) not stated on the medicines.

Discussions and conclusion

This study showed that Southwestern Nigeria is quite endowed with a wealth of medicinal plants that are used by traditional healers to treat many diseases, and that there is an undeniable quantum momentum in the natural treatment of diseases in the area. This study revealed the relationship between plants and ailments that people battle with, and that traditional healers used medicinal plants for the therapeutic treatment of many diseases. This is indicative of the fact that these healers provide significant solutions to many health issues and possess valuable knowledge. They acquired this through family relationships or ancestral lineage accompanied with no documentation of any kind other than oral transfer. Identification of medicinal plants, as shown in this study can further enhance their economic and pharmaceutical importance. Plants with high fidelity level were found to be more used than others and as such; this poses risks including their being overexploited.

Certain factors influence local people in consulting these healers, and these include proximity to and inadequacy of modern health facilities. The study also found that indigenous healers possessed some computer knowledge appreciation and opined that the content of their traditional knowledge should be documented and digitised in order to popularize their knowledge and provide easy access in these modern times. Many methods suggested by the study participants in preserving their knowledge were the recent advances including documentation, digitisation libraries. These are scientific means by which traditional knowledge can be preserved and passed on to future generations. On the issue of piracy, many of the traditional healers did not understand the rudiments of intellectual property rights. However, majority would not be passive in the event that their knowledge was tampered with or used without their permission. Among the steps they would like to take are legal action and challenging the authority of such person or group. At the present, there seems to be no legal or legislative body put in place in Nigeria to address, checkmate or take charge of biopiracy issues. This in effect may give room to porous biotrade and thus, the bioresources can be taken over by offenders. In this instance, the sustainable survival of plants especially those with high fidelity level can be jeorpadised.

However some factors constitute problems to indigenous medical practice including use of herbicides which have denatured the plants, scarcity of medicinal plants due to urbanisation and deforestation and grazing activities, and defined dosages or side effects not stated on the medicines.

This study contributed to the documentation of medicinal plants, for which ethnobotany is known. Since the study showed that participants possessed an appreciation for computer, and were in full support of documentation and digitisation of traditional medical knowledge, it will not be too difficult to involve them in these processes. Also, traditional healers, if well recognised and their knowledge popularised, they can be more economically empowered. Valles and Garnatje (2015) opined that citizen science helps the participation of the various populations in any area, and provide for research to be communicated to the academic community and the general citizenry. Thus, this ethnobotanical study is part of the body of citizen science which is contributory to human knowledge and living.

Some limitations exist for this study in that the number of participants could be regarded as small. Also, two out of 18 Local Government Areas were considered. For future however the scope of research could be expanded to accommodate more participants, more LGAs and more states in Nigeria.

The study recommends that documentation and digitisation of these plants should be treated with urgency to preserve traditional knowledge of Yoruba people, for posterity. Libraries including databases for indigenous knowledge systems should be established across Nigeria. Mounting courses for first degree levels can be considered by the nation's education ministry. Creating awareness and setting up an arm of the government to tackle issues surrounding biopiracy and environmental problems are necessary. More research is suggested regarding the

use of medicinal plants and their digitisation among the Yoruba people in particular and Nigerian peoples in general.

Acknowledgement

The researcher gratefully acknowledges the traditional healers who volunteered and participated in the study and the colleagues who assisted in the data gathering exercise.

References

Aigbokan, E.I. 2014. Annotated checklist of vascular plants of Southern Nigeria: A quick reference guide to vascular plants of southern Nigeria: A systemic approach. Benin City, Uniben Press.

Cheikhyoussef, A., Shapi, M., Matengu, K. and Astiekele, H.M. 2011. Ethnobotanical study of indigenes knowledge on medicinal plant use by traditional healers in Oshikoto region, Namibia. *Journal of Ethnobiology and Ethnomedicine*. 7(10), pp.1-12. Viewed 9 June , 2018 from *http://www.ncbi.nim.nih.gov/pmc/articles/pmc.3062575*

Chekole, G. 2017.Ethnobotanical study of medicinal plants used against human ailments in Gubalafto District, Northern Ethiopia. *Journal of Ethnobiology and Ethnomedicine*. 13(55):1-22.

Chu, S. K. and Du, H.2013. Social networking tools for academic libraries. *Journal of Librarianship & Information Science*. 45 (1):64-75.

Dey, A.K., Rashid, M. O., Millat, S.M., and Rashid, M. 2014. Ethnobotanical survey of medicinal plants used by traditional health practitioners and indigenous people in different districts of Chittagong division, Bangladesh. *International Journal of Pharmaceutical Science Invention*. 3(7), 1-7. Viewed 26 July, 2018 from *http://www.ijpsi.org.*

Houshyari, A. B., Gardiner, Z. J. J., Pena, R. A., Bahadorani, M., Tootoochi, M. and Adibi, P. 2012. Information and communication in medical education: An experience from a developing country. *Journal of Pakistan Medical Association* (Suppl. 1) 62(3), 1/5 -5/5, S71-S75. Viewed 26 July, 2018 from *http://jpma.org.kk/PdfDownload* .

Ijatuyi, O.A. 2005a. Trees as forest resources: Their conservation efficiency and effectiveness in environmental sustainability. *International Journal of Environmental Issues*. 3(2): 175-183.

Ijatuyi, O.A. 2005b. Indigenous knowledge: Potentials and challenges. *International Journal of Social and Policy Issues*. 3(1):196-208.

Miller, G.T. and Spoolman, S.E. 2013. Environmental science. 14th ed. New Delhi, Cengage Learning.

Odugbemi, T. and Akinsulire, O. 2006a. Medicinal plants by family names in Odugbemi, T. (Ed.) Outlines and pictures of medicinal plants from Nigeria. Lagos, University of Lagos Press. :73-116.

Odugbemi, T. and Akinsulire, O. 2006b. Medicinal plants by species names in Odugbemi, T. (Ed.) Outlines and pictures of medicinal plants from Nigeria. Lagos, University of Lagos Press:117-161.

Oluwalana, S.A. 2018. Plants and their health benefits. Being a lecture delivered in June 2018 at the Federal University of Technology Akure, Nigeria :1-21.

Quereshi, R., Ghazanfar, S.A., Obied, H., Vasileva, V. and Tariq, M. 2016. Editorial Ethnobotany: A living science for alleviating human suffering. Evidence based complementary and alternative medicine. Viewed 26 July, 2018 from *http://www.dx.doi.org/10.11.55/2016/9641692*

Rai, A. 2008. The role of south Asian traditional healers in counselling: A thesis submitted in conformity with the requirements for the degree of Master of Arts Department of Adult Education and Counselling Psychology. Ontario Institute for Studies in Education of the University of Ontario 1-185. Viewed 26 July,2018 from tspace.library.utoronto.ca/bitsream/9807/17216/1/Rai_Aachal_2008_MA_thesis.pdf

Rose, J. 2016. Biopiracy: When IK is patented for profit. Viewed 25 July, 2018 from *http://theconservation.com/biopiracy-when-indigenous-knowledge-is-patented-for-profit-55589*

Runguphan, T. 2004. Biopiracy in Asia: A case study of India and Thailand. Viewed 26 July, 2018 from *http://www.researchgate.net/publication/29835623biopiracy_in_asia_a_case_student of india_and_thailand*

Schmelzer, G.H., Achigan-Dako, and E.G., Bosch, C.H. (Eds.) 2010. Medicinal plants of Tropical Africa Conclusions and recommendations based on PROTA 11(1): 'Medicinal Plants' Nairobi, Kenya, PROTA Foundation.

Sharma, H. and Kumar, A. 2011. Ethnobotanical studies on medicinal plants of Rajasthan (India): A review. *Journal of Medicinal plants research.* 5(7): 107-112. Viewed 27 July, 2018 from *http://www.academicjournals.org/JMPR*

Sharma, M. and Kumar, A. 2013. Ethnobotanical uses of medicinal plants: A review.*International Journal of Life Science & Pharma Research*. 3(2):-52 – 57.

Simbo, D.J. 2010. An ethnobotanical survey of medicinal plants in Babungo, Northwest Cameroon. *Journal of Ethnobiology & Ethnomomedicine*. 6(8):1-9.

Tugume, P., Kakudidi, E.K., Buyinza, M., Namaalwa, J., Kamatenesi, M., Mucunguzi, P. and Kalema, J. 2016. Ethnobotanicalsurvey of medicinal plant species used by communities around Mabira Central Forest Reserve, Uganda. *Journal of Ethnobiology & Ethnomomedicine*. 12(5):2-28.

Valles, J. & Garnatje T. 2015. A vindication of ethnobotany. Viewed 27 July, 2018 from *https://metode.org/issues/document-revistes/a-vindication-of-ethnobotany.html*

Wyk, B.E. 2001. A review of Ethnobotanical research in Southern Africa. *South African Journal of Botany*:1-13.

Zank, S. and Hanazaki, N. 2017. The coexistence of traditional medicine and biomedicine. A study with local health experts in two Brazilian regions Plos One:1-17. Viewed 25 July, 2018 from *http://www.doi.org/10.137/journal.pene.0174731.*

Exploring the usage of social media in public libraries in Mangaung Metropolitan Municipality, South Africa

Molaodi Margaret Matobako[1]
Department of Information Science, University of South Africa, South Africa
margaret.matobako@gmail.com

and

Williams E. Nwagwu [2]
Visiting Professor, Department of Information Science
University of South Africa, South Africa
CODESRA, Senegal,
willieezi@yahoo.com

Abstract

Social media is one of the innovations which expands the option of web-based technologies to meet the needs of library users without access cost to them, and many public libraries in South Africa have embraced this technology. Against this backdrop, the purpose of the study was to examine the use of social media in the 8 public libraries in Mangaung Metropolitan Municipality in South Africa. Mixed-methods approach and a descriptive and case study research designs guided the study. Quantitative data was collected from 264 respondents using a questionnaire, and qualitative data from 16 library officials using an interview schedule. The study revealed that social media applications were used for conventional and web-based services such as Online Public Access Catalogue (WebOPAC), Prolib and Millennium Library Management System and free Internet access. However, lack of training activities, restrictive Wi-Fi access, low bandwidth, poor library officials' attitudes and short time allocation to access the Wi-Fi make it difficult for the library users and officials to fully benefit from the web-based services available and offered by these libraries. Mangaung Metropolitan Municipality libraries should deliberately implement social media platforms, as this will contribute to how effectively their patrons can use and rely on their web-based services and other services. This study has implications to social media research, development and usage in public libraries.

Keywords: social media, public libraries, library services, information access, Mangaung Metropolitan Municipality, South Africa

1. Introduction

The rapid advancement in information and communication technologies (ICTs) has resulted to radical changes in the provision of information services and brought about several options for handling a wide-range of information effortlessly (Thanuskodi 2011:203***).*** As centres for information dissemination, public libraries play crucial roles in promoting the culture of learning and reading in their communities. With the introduction of social media, the means and strategies

1. Molaodi Margaret Matobako is a PhD student in the Department of Information Science at the University of South Africa, South Africa. This paper is revised from her masters dissertation presented at UNISA
2. Williams E. Nwagwu PhD is a visiting professor in the Department of Information Science of the University of South Africa and Head of Knowledge Management in the Council for the Development of Social Science Research in Africa, Dakar, Senegal.

for achieving the promotion of the culture of learning and reading have been expanded and challenged in some circumstances. Therefore, Mangaung Metropolitan Municipality libraries, namely, Mangaung, BP Leinaeng, Trevor Barlow, Lourier Park, Botshabelo, Selosesha, Fichardt Park and Bainsvlei were compelled to make alternative measures in their web-based services to ensure that users do not only collaborate and share information online in ways previously unavailable, but that this process aligns properly with expected practices (Lihn 2008:630). This is exactly the case in Mangaung Metropolitan Municipality libraries.

The usage of social media in Mangaung Metropolitan Municipality libraries, whether it is for connecting or training the end users, marketing library services, integration, or attracting new features into library websites and information systems, might not always yield the anticipated results because mostly, public libraries are under-resourced in the utilisation of the social media (Merun and Žumer 2011:14). Both the technology and the human resources required to drive the new applications are not as adequate as would be expected.

1.1 Purpose of the study

The aim of this study was to explore the usage of social media in the 8 selected Mangaung Metropolitan Municipality libraries. To attain this aim, the following objectives have been formulated:

- ***i.*** to examine opinions of users on the use of social media in comparison with other library services;
- ***ii.*** to explore the adequacy of computer and training skills of library staff and users in using social media to meet their information needs;
- ***iii.*** to identify the ICTs available in the library;
- ***iv.*** to identify factors that should be taken into consideration in installing web-based services to meet users' needs;
- ***v.*** to examine the benefits and challenges of using social media in the libraries.

2.0 Literature Review

The review is discussed in the next sections.

2.1 Web 2.0 technologies

According to Bawden and Robinson (2009: 2), there is no clear definition of Web 2.0 because it encompasses various tools' sites for information sharing, online social networking and communication. Kaplan and Haenlein (2010: 3) have however defined Web 2.0 as a platform where all users collaborate and participate, and where content and applications are no longer published and created by individuals but all users. Web 2.0 is a second generation of web-based applications and services where the users are also responsible for the content creation and web-based communities such as social networking. According to Merun and Žumer (2011: 13), Web 2.0 is a new standard technology which allows user-centred design, flexible participation, user engagement, constant content change, information sharing, interaction, collaboration and online social services. According to Rehnman and Shafique (2011: 2), Web 2.0 should be regarded as an attitude and not a technology; it is this reason that Web 2.0 is also viewed as a social movement that is community based and socially rich. Web 2.0 is a set of tools and trends that are used when using the Internet, and they are also socio-technological innovations that allow interaction, gathering and sharing of knowledge through practices and experience globally (Rehman and Shafique 2011: 2).

Web 2.0 is creating a new way of information sharing and collaboration which produced a social networking site. However, the definition of Web 2.0 remains unclear because even O'Reilly himself, in 2005, described it as a set of principals instead of a standard (O'Reilly, 2005: 1). Rouse (2006) further explains that social networks have been there as long as civilisations

and societies existed, but it is only recently recognised because of its potential to promote connection of people and organisations in the society

According to Chua and Goh (2010: 204), Web 2.0 application contains mass participation, openness of data and user control of applications because it is seen as a set of ideas that are used in technologies. Merun and Žumer (2011: 14); Hahn (2014) confirmed further that Web 2.0 is the artifice of the plan of O'Reilly Media and MediaLive International companies that promoted a technology conference that was held on the 5^{th} – 7^{th} of October 2004 in San Francisco. Hahn (2014); Rowe, Drew and Dew (2006) further elaborated the fact that Web 2.0 technologies are based on multi-sensory communication, which aims at promoting the usage of the following online social network applications: blogs, RSS, wikis, instant mailing, and emailing, some of which can be useful in the library environment. The Web 2.0 technologies are tools that assist social networks to increase and be effective. Dasgupta and Dasgupta (2009) revealed and mentioned some of the most important components of Web 2.0 for social networks as, folksonomy, communities, file sharing/podcasting, blogging, wikis, and mashups.

Web 2.0 has changed the library user's outlook on the library activities and services. The concept of Web 2.0 has also developed into other disciplines and changed library practices and service delivery. According to Maness (2006); Merun and Žumer (2011: 14), libraries are already moving into Web 2.0, but the move is slow. Merun and Žumer (2011: 14) further elaborated on what Information Tomorrow (2007: 98) has pointed out that libraries have evolved, and Web 2.0 has opened a wide range of possibilities for them. However, even though Web 2.0 services have been integrated within the library field, the challenges remain as some studies have shown that applying Web 2.0 technologies in libraries did not always bring out the desired outcome. Hence, for the usage of Web 2.0 technologies in libraries, regardless of whether it is for communication with users or marketing library services, the most important requirements are to understand the values of the Web 2.0 and how it works.

2.2 Web 2.0 applications in libraries

Web 2.0 applications provide an opportunity for libraries to bridge the geographical distances between them and the communities. Libraries must be present on this cyberspace if they want to satisfy the needs of their techno-savvy users (Boyd and Ellison 2008:211). Mishra (2008) confirmed the submission of Boyd and Ellison (2008:211) by reporting that social networks assist library officials to share information easily with their users and other colleagues. Web 2.0 can be used to perform three major classes of activities in the library: knowledge organisation, knowledge distribution and information communication. Mishra (2008) further described Web 2.0 applications that can be useful in the library environment as Facebook, Twitter, Second Life and MySpace, amongst others.

2.3 Web 2.0 technologies in comparison with other library services platforms

The development of Web 2.0 technologies has influenced the way libraries used to function and render their services. The study conducted by Zickuhr, Rainie and Purcell (2013: 39-40) explained the information of library services in the digital services and emphasised the fact that web-based services influenced how library users access information through an ordinary book on the book shelve in comparison with an electronic books (e-books) accessible on the library computer kiosks or from their gadgets at home. Therefore, it was revealed that the influence affected the library users reading behaviour amongst other activities in the entire library services. The study of Zickuhr, Rainie and Purcell (2013: 39-40) further indicated that libraries are migrating from their normal traditional services (lending and reference services) because of the technological developments within their communities. However, public libraries are still maintaining their standard of providing traditional services for users, who are still relying entirely on them. These types of users prefer and believe in visiting the library to circulate the materials and in-house usage but not the electronic services. Therefore, it is important that public libraries

should undertake serious measures in trying to keep a balance standard to prevent other services from overpowering Web 2.0 technologies related services. Hence, this study aimed at revealing how Web 2.0 technologies compare with other library services and complement each other in Mangaung Metropolitan Municipality libraries.

2.4 Some Web 2.0 features available in libraries

Web 2.0 features provide and allow library users to share information, contribute, post, and search information. Web 2.0 features are regarded as Internet based services that comprise really simple syndicate (RSS), instant messaging (IM) , blogging sites, pod casting, social networking sites, wikis, 3D virtual world such as second life, amongs others. (Tripathi and Kamar 2010:195). These tools have a significant and positive impact on the society because library users and officials can use them for personal and professional use. However, their study is confined to understanding the useful features of Web 2.0 at the level of a library. Tripathi and Kamur (2010:195); van Wyk (2011:8) further revealed that the use of Web 2.0 features is increasing at a high rate. Conversely, features such as RSS feeds, blog, IM, Flickr, YouTube, Facebook, etc., are used mostly in the libraries except wikis, which still needs a strong pick up because it is not commonly used like the others.

The Web 2.0 features can be utilised to market outreach programmes and services in the libraries. The literature reviewed by Rehman and Shafique (2011: 2; Tripathi and Kamar (2010:195); van Wyk (2011:8) reveals that these features can assist the library and be used as a marketing tool that may support and also help the libraries to render their services and offer their resources to their library users in a proactive way. Studies have highlighted the way Web 2.0 features can enhance library services. Tripathi and Kamar (2010:195) advocated the use of Web 2.0 by libraries in order to serve the library users better, and to attract potential users.

Muneja and Abungu (2012) revealed the importance of these features in the libraries as: sharing, communication and promotion of service. The use of Web 2.0 features in the library organisation should respond to the type of different online services the community would want to have. It is therefore obvious that libraries have to embrace the use of Web 2.0 features in order to respond to the requests of their users. However, Muneja and Abungu (2012) highlighted the fact that the application of Web 2.0 features in the library environment is demand-driven and not technology-driven as many users envisage. The study further revealed that it is imperative to engage the community and draw up needs analysis in order to identify the needs required in the preparation of Web 2.0 service design and implementation. van Wyk (2011:8) supports the statement outlined by Muneja and Abungu (2012). According to Tripathi and Kamar (2010: 195), the challenges in generic association when using Web 2.0 features in libraries are: lack of support from management, lack of support from information technology development, lack of expertise and factors such as internet connectivity, amongst others.

2.5 Technical support provided by library officials to Web 2.0 library users

It is not easy to expect library officials to be perfect with the new innovation without been properly trained and prepared. According to Bradley (2007: 196 – 198), library officials must be willing to accept and be ready to work with ICT equipment before they can even attempt to use Web 2.0 technologies. It is important to start with marketing the new product extensively to library officials and indicate its benefits and how it is going to make their current job easy (Bradley 2007: 196). Beside library management team, another group of members that is also as important as library officials is technical support team, because they must handle the implementation of the Web 2.0 technologies as pleasurable as possible. This will make it easy for library officials to provide technical support to officials and users.

Information Tomorrow (2007:4); Bradley (2007: 197) agreed that lack of support from the technical team can also jeopardise the effective results of having Web 2.0 technologies in the library. It is a fact that the technical support team doesn't necessarily operate the Web 2.0

technologies because they are designed specifically for end-users (library officials and users). However, their support is needed, especially when ICT equipment is faulty, such as when there is trouble with network lines and service providers. Therefore, trained and skilled library officials can provide adequate training support to the end-users to effectively utilise Web 2.0 technologies in libraries.

Information Tomorrow (2007: 4); Maness (2006) further highlighted the fact that public libraries' users depend on ICT gadgets like mobile devices for communication, collaboration, interaction, education and information search, and they request immediate response or support. The users therefore depend on equipped and trained library officials to assist them to know how to use these gadgets, especially those that exist in the libraries (Information Tomorrow 2007: 4).

Aird *et al*. (2015), and Dasgupta and Dasgupta (2009) agreed with Information Tomorrow (2007: 4) by revealing that libraries use Web 2.0 technologies to fulfil a range of objectives and they are focusing on promoting library resources and services to their users, hence, they are regarded as a platform for collaboration. According to Tripathi and Kama (2010: 195), there are Web 2.0 tools that can be used to offer technical support, especially to library users, in order to promote the service. Library blog, RSS feeds, etc. can be created and used as a platform to guide the users on how to use Web 2.0 technologies in a particular library.

Bradley (2007: 196) highlighted the importance of training all the beneficiaries of ICTs in the library. The library and information services unit have to introduce various kinds of scheduled training programmes that would cater for unskilled library officials. In such situations, the intervention of library officials through training can determine the benefits and pitfalls of access to Web 2.0 technologies by library users and deploying the technologies to meet users' needs.

2.6 Types of ICTs available in libraries

Generally, ICTs are regarded as a combination of telecommunication and computer tools that enables new products and systems to assist people daily; and they are leading in the corporate world. It is a term that is used for any communication device or application device. According to Statistics South Africa (2013: 8), ICTs are important component of the national economy. There are also various types of ICT equipment available in public libraries. Libraries that have adopted the use of ICT for their operations are regarded as been automated.

Chisenga (2004) conducted a survey indicating that in Africa, some public libraries have already introduced a lot of ICT facilities to their users. Therefore, African libraries need to adopt new innovations related to the latest ICT tools, as done by libraries in the developed countries. Islam and Islam ((2007) studied the availability of ICT tools in Africa and Bangladesh and reported that the availability of ICTs in the libraries affects library services and administration positively. We discuss the research methodology in the next section.

3 Methodology

According to Babbie (1989: 75), research methodology is concerned with the specific tasks of the research process such as research design, sampling and data collection, amongst others. This descriptive study employed a mixed method approach and the case study research design. The study sampled the entire 264 population of library users and officials in Mangaung Metropolitan Municipality libraries. The sample comprises 248 library users and 16 library officials. The whole population was used as the sample because it was a small number for data collection. It was assumed that every citizen of Mangaung Metropolitan Municipality was a potential user of the 8 selected libraries in the Free State Province. The study adopted both quantitative and qualitative research methods. These approaches were used in order to assist us to determine the nature of respondents' knowledge of the social media usage and to have an in-depth understanding of the subject (McMillan and Schumacher 2001: 14 – 16). The hand-delivered questionnaires were used for collecting data from 248 library users, while interview schedules were used for 16 library officials from the 8 selected Mangaung Metropolitan Municipality libraries. A total number of 172

(69.3%) library users returned their copies of the questionnaire. The data collected was analysed using SPSS. All the 16 (100%) library staff were successfully interviewed. The recorded one-on-one interviews were transcribed to ensure a word-by-word account. The research findings follow in in the next section.

4. Results

Section 4.1 to 4.16 represents the results.

4.1 Response statistics

The results and discussions were organised using the research objectives. Table 1 shows the return statistics for each library in the study. Table 1 also shows that the highest response rate was from Bainsvlei Library with 31 (18.0%) followed by Mangaung library with 28 (16.3%) and Selosesha library with 27 (15.7%). Botshabelo library returned 26 (15.2%) of the questionnaires administered to them. Also, BP Leinaeng Library 24 (13.9%), Trevor Barlow Library 21 (12.2%) and Fichardt Park Library 6 (3.5) and Lourier Park Library 9 (5.2%) returned their copies of questionnaire as indicated.

Table 1: Return statistics from the (n=8) libraries

Locations	**Distributed**	**Returned**	**%Returned**
Bainsvlei	31	31	100
Mangaung	31	28	90.3
Selosesha	31	27	87.1
Botshabelo	31	26	83.9
BP Leinaeng	31	24	77.4
Trevor Barlow	31	21	67.7
Lourier Park	31	9	29.0
Fichardt Park	31	6	19.4
Total	248	172	69.4
Mean	31	21.5	
Standard deviation	0	8.6	

4.2 Demographic Characteristics of the Respondents

The study first collected data on the demographic characteristics of the respondents. According to Salkind (2010), demographic information provides data on the characteristics of the participants, and it is essential to determine whether or not the respondents are the representative sample of the target population for generalisation purposes. The age distribution of the respondents in figure 1 shows that a high proportion 79 (45.9%) of the respondents were between the age of 18 - 25 years, followed by 34 (19.8%) who were aged 26 – 34 years, and 23 (13.4%) who were over 51 years. These were followed by 16 (9.3%) of the respondents who were between 35 - 40 years, followed by 14 (8.1%) aged 41 and 50 and the lowest age group was between 13 – 17 years with 6 (3.5%).

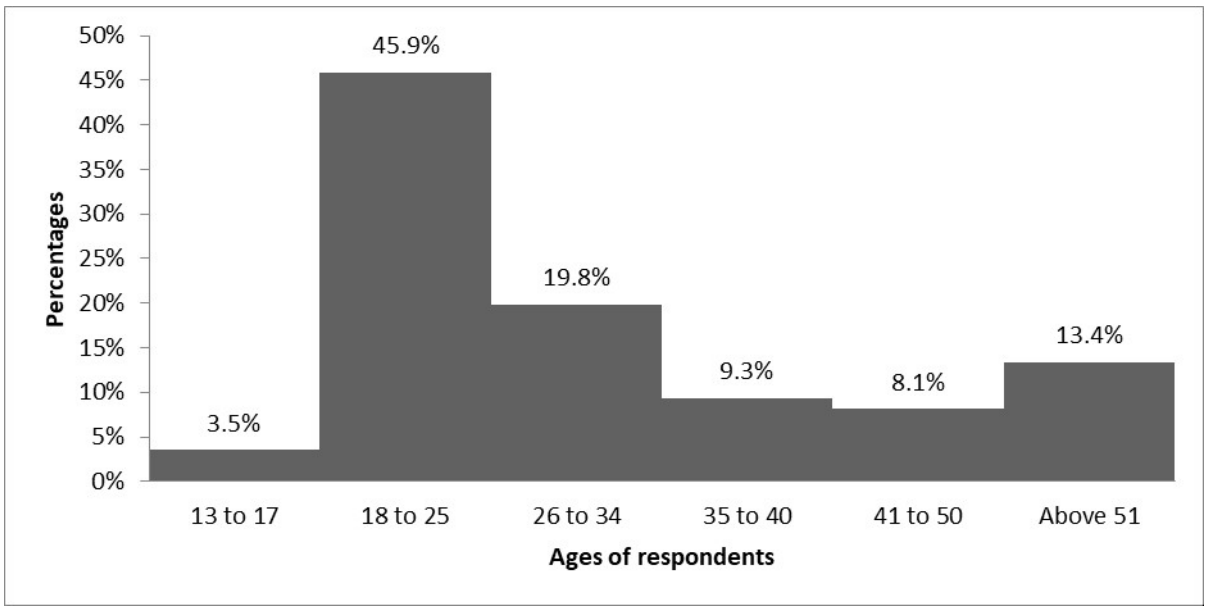


Figure 1: Age distribution of Mangaung Metropolitan Municipality library users

4.3 Opinions of users on the use of social media in comparison with other library services

This section compares other existing library services platforms that are delivered with social media, therefore, the researcher sought to understand the views of library users who are already using the social media in comparison with other existing library services. The most striking factor according to the literature review for the study is the development of web-based services and their subsequent absorption that has influenced the manner in which libraries previously used to function and render their services to users (Zickuhr, Purcell and Rainie 2013: 39-40). The reviewed literature indicated that libraries have developed interest in, and given attention to web-based services in comparison with other library services due to the pressure of technology explosion and the demand from library users (Connaway 2015).

4.4 Library users visiting Mangaung Metropolitan Municipality libraries

Table 2 shows that 86 (50%) of the respondents always (twice a month) visited the libraries, followed by 64 (37%) who did the same only sometimes or every other month, and those who rarely(once a year or less) visited the library were 22 (13%).

Table 2: Frequency of library users visiting the (n=8) libraries

Categories	**Frequency**	**%**
Always (twice a month)	86	50
Sometimes (every other month)	64	37
Rarely (once a year or less)	22	13
TOTAL	172	100
Mean	57.3	
Standard Deviation	26.5	

Therefore, in terms of visiting the Mangaung Metropolitan Municipality libraries, it is reasonably clear that most of the respondents do utilise the facilities.

4.5 How often do you take out materials on your library card?

Table 3 shows a high proportion, 89 (52%), respondents who take out library materials on library cards always or twice a month. While 48 (28%) take out library materials sometimes or every other month, 35 (20%) respondents take out library materials on library card once a year or less.

Table 3: Frequency of library materials taken out on library card		
Categories	**Frequency**	**%**
Always (twice a month)	89	52
Sometimes (every other month)	48	28
Rarely (once a year or less)	35	20
TOTAL	172	100
Mean	57.3	
Standard Deviation	23	

4.6 Library users using Internet in libraries

Figure 2 shows that a large number 113 (66%) of the respondents, indicated that they use Internet in general when they are in the libraries while only 59 (34%) indicated that they do not.

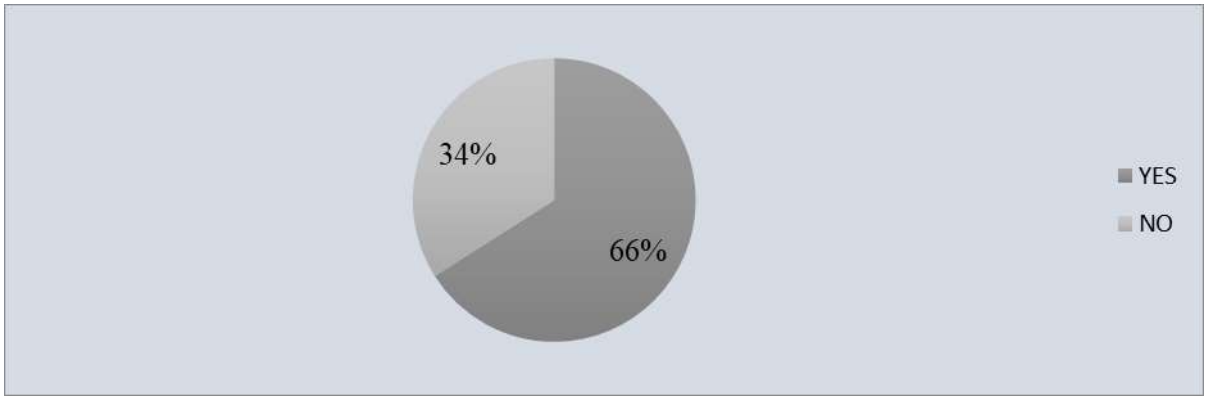


Figure 2 Frequency of Internet usage in (n=8) libraries

Figure 3 shows 100 (58%) of the respondents considering social media in comparison with other existing services as vital while 53 (31%) said that it is an add-on to existing service followed by 19 (11%) of the respondents who indicated that it is a necessary service.

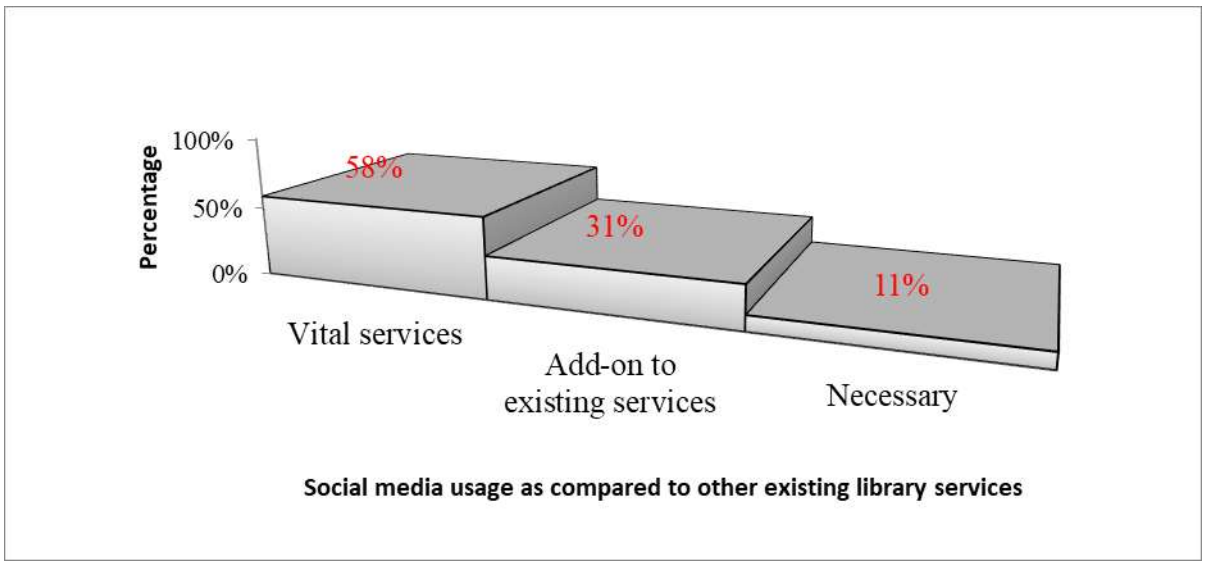


Figure 3: Reflection of social media usage as compared to other existing library services

4.7 The importance of social media availability in 8 libraries

Findings revealed that majority of the respondents, 152 (88%), believe that the availability of social media is beneficial, while the rest, 20 (12%) respondents indicated that it is not beneficial.

4.8 Do these web-based services satisfy and meet library users' information needs in comparison with other library services?

The results revealed that if social media were to be compared to other library services in terms of user's satisfaction, it will meet the needs of a large number, 121 (70%), of respondents while 51 (30%) respondents indicated that their information needs were not met.

4.9 Other reasons for using ICT equipment in the library

Table 4 shows that 55 (32%) of the respondents indicated that they are using ICTs for searching information, 10 (6%) for online job hunting, 5 (3%) for typing documents, 4 (4%) for reading e-books, 2 (1%) for photocopying, 4 (2%) for reading emails, followed by a large number 92 (53.5) of the respondents who did not respond.

Table 4: Reasons for using ICT equipment in the (n=8) libraries of Mangaung Metropolitan Municipality

If you are not using the social networking sites, what are your reasons for using ICT equipment in the library?		
Reasons	Respondents	%
Information searching	22	12.8
Job hunting	10	5.8
Typing documents	5	2.9
Research	33	19.2
Reading e-books	4	2.3
Photocopying	2	1.2
Reading emails	4	2.3
Did not respond	92	53.5
TOTAL	172	100
Mean	21.5	
Standard Deviation	28.5	

4.9 Opinions of the users on the adequacy of computer and training skills of library staff and users in using social media to meet their information needs

We wanted to know the views of library users on the adequacy of library computers and training skills of library. Mangaung Metropolitan Municipality libraries use Mangaung libraries online catalogue because they are members of the Legal Deposit Consortium of South Africa. Library users were requested to explain the level of skills obtained through training and if library computers were at high standard to meet their information needs. This research concluded that 71 (41%), a large number of the respondents, indicated that they are able to find Mangaung libraries online public access catalogue. The findings of the study also revealed that 63 (37%) of the respondents can perform search by using title, author, subject, shelf number. Fifty-eight or (34%) of the respondents indicated that they are able to tell if an item is “on shelve” or “out”, while 89 (52%) of the respondents, indicated that the library doesn’t have such service. Table 5 show the results of respondents’ skills at using Mangaung libraries online public access catalogue.

Table 5: Respondents’ skills at using Mangaung libraries online public access catalogue

Statements	**I can do this**	**%**	**I cannot do this because I don’t know**	**%**	**Library does not have that service**	**%**
Able to find online public access linked to social media	0	0	30	17	89	52
Able to find Mangaung libraries online public access catalogue	71	41	17	11	33	19
Can perform search using Title, Author, Subject, Shelf Number	63	37	42	42	8	5
Able to tell if an item is “on shelve” or “out”	58	34	51	29	8	5
Able to renew library items using Mangaung libraries online public access catalogue	0	0	55	32	57	33

4.10 Library users’ trainings from library officials

Figure 4 shows that 78 (53%) of the respondents agreed that they did get adequate trainings/ skills or support from library officials on how to use computer and the Internet while 68 (47%) didn’t get it, followed by 26 (15%) respondents who didn’t have any opinion.

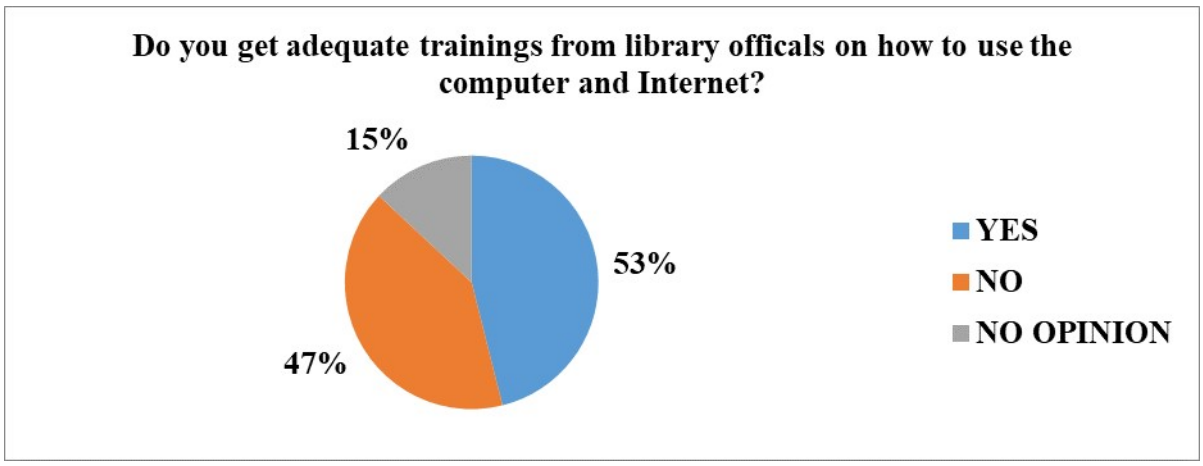


Figure 4: Respondents trainings/ skills or support from library officials

4.11 Library users' ICTs training needs

Table 6 shows that 25 (14.54%) of the respondents requested for training on Microsoft office for typing purposes, 53 (30.81%) basic computer skills, 51 (8.72%) how to use Internet, 7 (4.07%) how to create email account while 36 (20.93%) of the respondents did not respond.

Table 6: Training needs requested by respondents

Respondents' ICTs training needs		
Training needs indicated	No. of Respondents	Percentages
Microsoft office	25	14.54
Internet search	51	29.65
How to create email account	7	4.07
Basic computer skills	53	30.81
Did not respond	36	20.93
TOTAL	172	100
MEAN $\bar{x}\bar{x}$	34.4	
STANDARD DEVIATION	17.11	

4.12 ICT equipment available in the library

In this section, library users are requested to identify and name the ICTs that are available and accessible in their libraries, and who they consult if they have technical problems when they utilise them. All Mangaung Metropolitan Municipality libraries have photocopying machines, computers and tablets and free Internet access. This research therefore concludes that all Mangaung Metropolitan Municipality libraries are in line with other libraries nationally and internationally who provide ICTs. However, the findings of the study also revealed that 68 (47%) of the respondents who access ICTs in the libraries depend on library officials for assistance when they encounter problems, while others indicated that they access ICTs at their educational institutions except the libraries because they do not have access to use social networking sites in all Mangaung Metropolitan Municipality libraries. Table 7 shows a large number, 172 (100%), of the respondents, who indicated that Mangaung Metropolitan Municipality libraries have computers with free Internet access, followed by 148 (86%) who agreed that libraries have printers while 9 (5%) did not agree. Table 7 also shows that 172 (100%) of the respondents indicated that the libraries do not have free Wi-Fi, while 172 (100%) indicated that libraries have

photocopy machines, followed by 115 (67%) respondents who responded that libraries have public telephones but 31 (18%) disagreed. 103 or 60% indicated that libraries have scanners, but they are not accessible to users, and 40 (23%) did not agree that scanners are available. Table 7 shows that 106 (62%) of the respondents indicated that libraries have tablets with free Internet access while 45 (26%) disagreed and 97 (56%) indicated that there are no fax machines, followed by 54 (31%) of the respondents who also indicated that libraries do not have the laminating machines.

Table 7: ICTs equipment available in 8 libraries

ICT that are available in Mangaung Metropolitan Municipality libraries				
Equipment	Yes	%	No	%
Computers with free Internet access	172	100	0	0
Printer	148	86	9	5
Free Wi-Fi	0	0	172	100
Photocopy machine	151	88	0	0
Public telephone	115	67	31	18
Scanner	103	60	40	23
Tablets with free Internet access	106	62	45	26
Other (specify) Fax Laminating machine for users	0 0	0 0	97 54	56 31

4.13 User experiences

Table 8 shows that a large number, 83 (48%), of the respondents indicated that they use Facebook, Twitter and LinkedIn, and 7 (4%) need help, followed by 22 (13%) who never used it. Table 8 also shows that 52 (30%) respondents indicated that they use Wikis, 20 (12%) need help and 32 (19%) never used it. Table 8 shows that 49 (28%) respondents indicated that they use blogs, 24 (14%) need help from other people while 35 (20%) never used it. 43 respondents or 25% indicated that they use Google docs and 27 (16%) need help while 34 (20%) never use it.

Table 8: Respondents level of experience when using social networks

Social Networks	**I can use this by myself**		**I would need help using this**		**I have never used this**	
	Respondents	%	Respondents	%	Respondents	%
Blogs	49	28	24	14	35	20
Wikis	52	30	20	12	32	19
Facebook, Twitter, LinkedIn	83	48	7	4	22	13
Google docs	43	25	27	16	34	20

4.14 Benefits of accessing and using social media by the library users

Empowerment
The results of this study revealed that 98 (57%) of the respondents use social media services in the libraries to empower themselves technologically and to enhance and strengthen the quality of their lifestyle.

Information retrieval
A large number, 149 (87%), of the respondents indicated that information plays an important role in their lives because information can be easily accessible and retrieved online. The learners and students mentioned that they utilise Web 2.0 technologies as research tools to retrieve information easily.

It provides an opportunity of skills and knowledge
The results of the study also revealed that 132 (77%) of the respondents indicated that they have acquired skills and knowledge by doing online job hunting, creating email accounts and curriculum vitae.

Market business online
Thirty-two respondents or 19% indicated that through Web 2.0 technologies, they are able to market their businesses online and the services support the growth of their small businesses

4.14 Challenges of accessing and using social media by the library users

Lack of enough data and low bandwidth
A large number 98 (60%) of the respondents indicated that lack of enough data and low bandwidth make it difficult for them to use social media in some of the Mangaung Metropolitan Municipality libraries.

Lack of Internet search skills
Thirty-8 respondents, or 22%, lamented the fact that lack of Internet search skills delays the process of using it effectively.

Load shedding
Load shedding is a serious challenge in South Africa. It was indicated as one of the challenges by 159 (92%) of the respondents, who said that it is preventing them from accessing web-based services in the libraries.

Lack of enough ICT equipment
The results of the study showed that 151 (87%) of the respondents indicated that lack of adequate ICT equipment in libraries is another challenge that prevent the accessibility of web-based services.

Time allocated to the accessibility of web-based services
A large number, 141 (82%), of the respondents identified the time allocated to the usage of web-based services as one of the challenges.

Library officials' attitude
The results of the study also indicated that library officials' attitude towards users of social media was another challenge. 31 (18%) of the respondents identified that some of the staff members do not want to assist them when they encounter problems with web-based services.

Low level of awareness
63 or 37% of the respondents indicated that they have low knowledge of what social media is all about.

4.15 What should the libraries do to improve use of social media in the libraries?

Trainings

The respondents were given an opportunity to identify any other factor that the libraries should consider when installing web-based services. A large number, 90 (52%), of the respondents identified scheduled trainings before libraries can even consider installing web-based services.

Free Wi-Fi

A large number, 121 (70%)), of the respondents identified the non-accessibility of free Wi-Fi which makes it difficult to use web-based services in libraries.

Marketing of web-based services

Marketing also came out high as one of the factors that should be considered when libraries are installing web-based services, as was identified by 25 (15%) respondents, who mentioned that they were not even aware that the 8 Mangaung Metropolitan Municipality libraries have web-based services.

Online public access linked to social media

The results of the study indicated that a high proportion, 111 (65%), of the respondents use online public access catalogue, which was not linked to any social media.

ICT equipment

It was mentioned by 96 (56%) of the respondents that advanced ICT equipment should be installed and made accessible to users.

4.16 :Interview with Mangaung Metropolitan Municipality libraries officials

4.16.1. Library officials' opinions on the adequacy of computer skills and social media level of experience

All 16 (100%) respondents indicated that they had a very good experience of typing, scanning documents, Internet searching, and printing documents, while 2 (12.50%) of the respondents cannot use tablets. The respondents were also asked to indicate the number of years that they were introduced to Web 2.0 technologies; 14 (87.50%) respondents indicated that it was more than 5 years while 2 (12.50%) were still trying to learn. When it comes to experience on social media at their personal level, the results indicated that 14 (93.75%) respondents were more familiar with Web 2.0 technologies such as Facebook, LinkedIn, Twitter, WhatsApp, YouTube, Blogs, and Millennium computer system, etc. while 2 (12.50%) of respondents had no interest in Web 2.0 technologies. All respondents, 16 (100%) indicated that whenever they experience ICT problems, they immediately report them to their immediate supervisors who will then contact IT specialists in the IT Department. The respondents were asked to indicate the social media that are accessible and that they use in their libraries. The findings of the study revealed that 13 (81.25%) respondents use emails more often, while 16 (100%) use Millennium library system daily, 11 (68.75%) use the Intranet, 4 (25%) respondents use Facebook followed by 16 (100%) respondents who are use Mangaung online public access catalogue. The study also revealed that 9 (56%) of the respondents use Wikipedia to search for information.

4.16.2 Library officials' demographic, opinions, benefits and challenges on the usage of social media in the library

The information recorded on the demographic profiles of the sampled library officials revealed that male respondents were 5 (31.25%), while females were 11 (68.75%). The respondents were asked if they derive benefit when they use social media services in their libraries. The respondents who answered this question positively were the younger generation. The study revealed that 11 (68.75%) young library assistants indicated that they do benefit, while the remaining 5 (31.25%) indicated that it is a waste of time. The respondents were asked to indicate

the web-based technologies that are accessible and that they use in their libraries. The findings of the study showed that 13 (81.25%) respondents use email applications such as Microsoft Outlook more often, while 16 (100%) use Millennium Library Management System daily, 11 (68.75%) use the Intranet, 4 (25%) respondents use Facebook followed by 100% who are using Mangaung online public access catalogue. The study also revealed that 9 (56%) of the respondents use Wikipedia to search for information.

The respondents were asked to explain whether the web-based services has influenced the flow of information resources in their libraries, 8 (50%) respondents revealed that web-based services has influenced the flow of resources because users can substitute the existing resources with online resources while 7 (43.75%) of the respondents explained that web-based services is a waste of time and it will not facilitate the easy flow of information and replace the resources. 10 (62.50%) respondents indicated that they run out of data within two weeks, after which it becomes difficult for the users to access web-based services. Load shedding was another challenge that the 16 (100%) respondents indicated because web-based services cannot be functional without electricity. Restrictions from using social media were another challenge that was indicated by 14 (87.50%) respondents. A large number 14 (87.50%) of the respondents also indicated that libraries cannot interact, communicate, and market their outreach programmes and services effectively or share information with their users because most of the social networks are blocked. It was indicated that lack of training led the library officials' to be negative towards their users and their work; hence, service delivery will always be affected. A high proportion 11(68.75%) of the respondents explained that library management and or IT Department restricted the usage and access to web-based applications such as social networking sites. Surprisingly, 6 (37.5 %) of the respondents stated that introducing web-based services in the library is a serious challenge because some of the younger generations are addicted to social media applications; they use and access them in the information desk, and that affects provision of information to the community. 10 (62.5%) respondents disagreed with this.

4.16.3 Factors to be considered when installing web-based services in libraries to meet the needs of the users

All the 16 (100%) respondents indicated that unlimited access to social media should be granted to library users. They also mentioned that free Wi-Fi should be installed to attract new and old library users. All the 16 (100%) respondents emphasised the fact that libraries must compete with other organisations where Wi-Fi is easily please, clarify. Printing facilities must be available so that the users can be able to type and print their documents. It was also recommended by all the 16 (100%) respondents that they must be equipped with advanced ICT equipment that will make service delivery easy. They also indicated that the training of staff and the marketing of web-based services must be done in advance; before the services can be implemented in the libraries.

5. Conclusions

The analysis of both the qualitative and quantitative data, collected from questionnaire and interviews, revealed the following:

1. Social media services in comparison with other library services

Most of the respondents generally use the Internet, visit the libraries always or twice a month and take out materials using library cards. The findings also show that respondents utilise library online public access catalogue and wish that libraries can create online public access catalogue that is linked to their social media for them to participate in the development of the libraries. Some of the respondents considered the availability of Web 2.0 services as a vital service in comparison with other existing library services. The findings further showed that Web 2.0 services satisfy and meet their information needs in comparison with other library services.

6. Views of library users on the adequacy of library computers and training skills of library officials'

Mangaung Metropolitan Municipality libraries use Mangaung libraries online catalogue because they are members of the Legal Deposit Consortium of South Africa. The study revealed that many of the sampled respondents do not use Mangaung libraries online catalogue because they do not know that the libraries have that service. Further, the respondents who can use it can search item by title, author or subject and they can tell if an item is "on shelve" or "out" or "on hold". A large number of the respondents indicated that they do not have basic computer skills due to lack of structured training by the libraries. Hence, they requested the following training programmes: use of Microsoft Office, Internet search, how to create email account and basic computer skills so that they can be in the position to utilise the Web 2.0 technologies effectively to meet their information needs.

7. Types of ICTs available in the libraries

All 8 Mangaung Metropolitan Municipality libraries have photocopying machines, computers, tablets and free Internet access and in line with other libraries, nationally and internationally, who provide ICTs and Web 2.0 features. However, most of the respondents who access ICTs in the libraries depend on library officials for assistance when they encounter Web 2.0 features problems, while others indicated that they access ICTs and Web 2.0 features at their educational institutions except the libraries because they do not have access to use social networking sites in all of the 8 Mangaung Metropolitan Municipality libraries.

6. Aspects to be considered when installing web-based technologies in libraries

Most of the respondents indicated that structured trainings, uncapped free Wi-Fi, marketing of library web-based services, adequate budget allocation, training of staff, online public access catalogue linked to social media and ICT equipment are to be taken into consideration when installing Web 2.0 to meet the users' needs. The respondents also recommended that libraries should operate as information hub and a safe environment where users can access and utilise Web 2.0 technologies to their advantage at any time.

5 Benefits and challenges of accessing social media in libraries

The availability of Web 2.0 technologies in Mangaung Metropolitan Municipality libraries is beneficial for library users as it empowers them technologically, enhances and strengthens the quality of their lifestyle, plays an important role in their lives because information can be easily accessible and retrieved online, provides an opportunity of gaining skills and knowledge and offers online entrepreneurship opportunities. However, we found that there are also challenges that hampered the effectiveness of the Web 2.0 services in the Mangaung Metropolitan Municipality libraries. These are: lack of data, low bandwidth, lack of Internet search skills, load shedding, lack of enough ICT equipment, time allocated for the accessibility of web-based-services and poor library officials' attitude to library services. The respondents suggested that management of the libraries should investigate the reasons that make staff members unfriendly attitude and deal with the problem with immediate effect because it will affect the library services to meet users' information need.

Conclusivel, regardless of the challenges, the respondents benefit from accessing free web-based services in Mangaung Metropolitan Municipality libraries, and this positively impacts the use of social media and meets the users' needs in comparison with other library services. Despite the fact that these libraries do not offer structured training and have restrictions on the usage of other social media applications, the study concludes that most of the respondents can use and have knowledge of ICT equipment while others still rely on the library staff for assistance.

Based on the findings, it is recommended that the libraries expand their Internet bandwidth to prevent library users from waiting for long when they use social media. This will also enable

more library users to access ICT equipment as well. Furthermore, the library management should have proper marketing strategies in place to promote the web-based services internally and to their communities. The Library management should also ensure that funds are made available to procure ICT equipment that will be enough to cater for more library users. In addition, the library management should introduce structured training programmes for their staff who will then be in the position to assist and train the library users. Also, the time allocated for library users should be extended from 1 to 2 hours to give users enough time to access information. Finally, the library management should consider having alternative power supply systems to be used during power failure as well as considering programmes that can run offline so that library services can still be accessed without being interrupted during power failure. This study has implication to social media research , development, access and use in public libraries in South Africa and perhaps elsewhere with similar challenges.

References

Aird, R., Battie H., Rooney-Browne C., McGettigan L. & Rowley, J. 2015. *A Guide to using Web 2.0 in libraries*. Viewed 26 May, 2015 from *http://www.slainte.org.uk/files/pdf/web2/Web2GuidelinesFinal.pdf.*

Babbie, E. 1989. *The practice of social research*, 4th ed. Belmont: Wadsworth Publishing Company.

Bawden, D. & Robinson, L. 2009. “The dark side of information: overload, anxiety and other paradoxes and pathologies”. *Journals of Information Science*, 35(2), 180-191.

Viewed 13 September, 2015 from *http://www.bollettinoadapt.it/old/files/document/21976david_b-2008.pdf.*

Boyd, D.M. & Ellison, N.B. 2008. “Social Network Sites: Definition, History, and Scholarship”, *Journal of Computer-Mediated Communication* 13. International Communication Association.Viewed 29 March, 2016 from *http://www.onlinelibrary.wiley.com/doi/10.1111/j.1083-6101.2007.00393.x/pdf*

Bradley, P. 2007. *How to use Web 2.0 in your library*? London: Facet Publishers.

Chisenga, J. 2004*. ICT in libraries: an overview and general introduction to ICT in libraries in Africa*. Paper presented at INASP ICT workshop, held at Johannesburg, South Africa on 21-23 July 2004. Viewed 29 March, 2016 from *http://www.iiste.org/Journals/index.php/IKM/article/download/18630/18624*

Chua, A.Y.K. & Goh, D.H. 2010. “A study of Web 2.0 applications in library websites”.

Library & Information Science Research: 32. Viewed 30 September, 2015 from *http://ejournals.library.ualberta.ca.index*

Connaway, L. S. 2015. “The Library in the Life of the User: *Engaging with People Where They Live and Learn”*. Dublin, Ohio: OCLC Research. Viewed 22 January, 2019 from *http://www.oclc.org/content/dam/research/publications/2015/oclcresearch-library-in-life-of-user.pdf.*

Dasgupta, D. & Dasgupta R. 2009. *Social Networks using Web 2.0*. Viewed 23 April, 2015 from *http://www.ibm.com/developerworks/library/ws-socialcollab/ws-socialcollab-pdf.pdf*

Hahn, H. 2014. *What is Web 2.0?* Viewed 23 March, 2016 from *http://www.harley.com/writing/web-2.0/what-is-web-2.0.html.*

Information Tomorrow. 2007. *Information Tomorrow: Reflections on Technology and Future of Public and Academic Libraries*. Rachel Singer Gordon (ed.). Medford: Information Today.

Islam, S. & Islam, N. 2007. “Use of ICTs in library: an imperial study of selected libraries in Bangladesh”, *Library philosophy and practice*. Viewed 29 March, 2016 from *http:// digitalcommons.unl.edu/libphilprac/143.*

Kaplan, A. M., & Haenlein, M. 2010. *Users of the world, unite!: The challenges and opportunities of social media. Business Horizons*, 53 (1), 59-68. Viewed 21 August, 2015 from *http:// www.cs.uu.nl/docs/vakken/b1iuw/materiaal/lit/Users%20of%20the%20world%20unite%20-%20The%20challenges%20and%20opportunityies%20of%20social%20media.pdf.*

Lihn, N.C. 2008. “A survey of the application of Web 2.0 in Australasian university libraries”. *Library Hi Tech*, 26(4), 630-653.

Maness, J.M. 2006. *Library 2.0 theory: Web 2.0 and its implications for libraries*. Viewed 15 May, 2015 from *http://www.webology.org/2006/v3n2/a25.html*

McMillan, JH. & Schumacher, S. 2001. *Research in education: a conceptual introduction*. 5th ed. New York: Longman

Merun, T. & Žumer, M. 2011. *Making Web 2.0 work for users and libraries*. In DK Gupta & R. Savard (eds), Marketing libraries in a Web 2.0 world. Berlin: De Gruyter Saur

Mishra, C.S. 2008. *Social Networking Technologies in Digital Environment: Its Possible Implications on Libraries*. Viewed 15 June, 2015 from *www.http://eprints.rclis.org*

Muneja, P.S. & Abungu, A.K. 2012. *Application of Web 2.0 tools in Delivering LibraryServices: A Case of selected Libraries in Tanzania*. Proceedings of the SCECSAL XXth Conference. 4 - 8 June 2012. Nairobi, Kenya. Viewed 15 December ,2016 from *www.sciencedirect.com/ science/article/pii/S1057231710000445* O’Reilly, T. 2005. *Web 2.0: Compact definition*.Viewed 30 July, 2015 from *http://radar.oreillty.com/archives/2005/10web-20-compact-definition.html .*

O’Reilly, T. 2007. “What is Web 2.0: Design patterns and business models for the next generation of software”. *International Journal of Digital Economics*, 65 (2007):17-37. Viewed 21 January, 2019 from *https://www.sciencedirect.com/science/article/pii/ S0740624X15000763*

Rehnman, A. & Shafique, F. 2011. “Use of Web 2.0 and its implications for libraries: Perceptions of information professionals in Pakistan”, *Library Philosophy and Practice* (*e-journal) Paper 623. Viewed 25 July, 2015 from *http://digitalcommons.edu/libphilprac/623*

Rouse, M. 2006. *Social networking*. Viewed 2 September,2015 from *https:// www.whatis.techtarget.com/definition/social-networking .*

Rowe, D. & Drew, C. 2006. *The Impact of Web 2.0 on Enterprise Strategy*.Viewed 14 April, 2012 from *http://www.cutter.com/content-and-analysis/journals-and-reports/cutter-it-journal/ sample/itj0610a.html*

Salkind, N.J. 2010. *Demographics. Encyclopaedia of Research Design*. SAGE Publications. Viewed 24 January, 2019 from *http://methods.sagepub.com/reference/encyc-of-research-design/n108.xml .*

Statistics South Africa. 2013. *Mid-year population estimation*. Viewed 31 January, 2015 from *www.statssa.gov.za*

Thanuskodi, S. 2011. “Internet use among distance learners in the changing higher education environment at the Bharathiar University, India”. *International Research Journal of Library, Information and Archival Studies,* 1(1) 023-029. Viewed 16 April, 2015 from *https:// www.intersjournals.org/IRJLIAS*

Tripathi, M. & Kumar, S. 2010. *Use of Web 2.0 tools in academic libraries: a Reconnaissance of the international landscape*. New Delhi: Indira Gandhi National Open University. van Wyk, J. 2011. *"*Web 2.0". *Presentation at Carnegie Library Leadership Academy 4 November 2011*. Pretoria: Arcadia.

Zickuhr, K., Rainie, L. and Purcell, K. 2013. *Libraries Services in the Digital Age*. Viewed 28 May,2015 from *https://libraries.pewinternet.org/2013/01/22/library-services/ .*

How our rights affect their rights: rethinking animal rights in Africa

Olanipekun, Olusola Victor[1]
Department of Philosophy, Obafemi Awolowo University Ile-Ife,
Osun State, Nigeria
olanipekuno@oauife.edu.ng, solavy@yahoo.co.uk

Abstract

The issue of animal rights protection is a fundamental one for the animal rights activists especially in Western societies. There are animal rights organisations in the USA, UK and some European countries, with the sole aim of protecting and rescuing animals around the world. There are series of legislations also from the governments of various countries with the aim of prohibiting wanton and unreasonable killing of animals or violation of animal rights. But is it the same in Africa? The answer is not straightforward. Why is this so? Do Africans really believe in the validity of such rights? If they do, are they really thinking about it, just like Westerners? These questions are addressed in this paper, which agrees with the view of the supporters of animal rights. Essentially, it argues that given the enormity of socio-economic and political challenges confronting African countries, the issue of animal rights seems not to be a matter of priority in practice for many African leaders. The focus of this paper is that the inherent challenge of securing human rights in Africa, coupled with socio-economic and political problems confronting African countries, is basically responsible for ineffective protection of animal rights in Africa. Thus, this paper concludes that if human rights are taken seriously in Africa, animal rights will be taken seriously.

Keywords: Animal rights, human rights, African beliefs, African religions, culture

Introduction

The question of the relationship between human beings and non-human animals is an essential one that cuts across every culture, religion and society. In recent time, this question has generated controversies among the ethicists as well as social and political philosophers. The so-called animal rights activists/defenders have engaged their opponents in argumentative discussions at various levels. Scholars such as Tom Regan and Peter Singer defended moral equality of human beings and non-human animals with a resolution that non-human animals have rights. Thus, using animals for education, product safety testing, and experimentation, harmful non-therapeutic experimentation in particular, is not justifiable. Others, such as R.G. Frey, Neil Smith and Edwin Locke, are of the opinion that non-human animals have no rights. Considering how scholars are divided over the subject matter, Tom Regan, Peter Singer, Richard Ryder and Peter Wilson argue in defence of animal rights. For them, non-human animals are like us in many respects; they have similar physiological make-up, biological make-up, and psychological make-up to human beings. Also, animals suffer in the same way that humans do. Hence the conclusion that it is impossible to justify actions that inflict pain on animals. Animals, like humans, are entitled to the basic right to live free of suffering. Meanwhile, scholars such as Frey (1995), Smith (1996) and Locke (1997) are of the opinion that non-human animals have no rights. They argue that animals are not rational, they cannot make moral

1. Victor Olusola Olanipekun is a lecturer in the Department of Philosophy at Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria. He is currently working on his PhD.

choices, they lack the values of human beings; they are property needed to fulfil human needs. Nevertheless, in this paper, I agree with the arguments of the defenders of animal rights. Why is this so? The answer is simply because the main arguments of the opponents of animal rights are not sufficient to establish the non-existence of such rights. It should be reported at this stage that this paper is a preliminary evaluation of the 'state of the art' of African thought regarding animal rights. The paper will be developed in another full-blown article in order to tdeal with the arguments that this one could not exhaust.

This paper is divided into three sections. The first discusses the issue of animal rights and the beliefs of Africans about it, the second discusses Tom Regan's reasoning on why animals have rights. The third section considers some arguments to establish why animal rights protection in Africa is facing challenges in present conditions. Let us begin the discussion with the issue of animal rights in particular, and the question of rights in general.

Animal rights and the question of rights

Rights have become a dominant concept in the moral and political discourse of contemporary democracies, displacing to some extent, at least where moral issues are concerned, talks on the common good, general wellbeing and social justice (Campbell 2010:669). For the sake of clarity, issues of this controversial nature require definitions of terms. In what way are we using the term "right"? Following Mill's explanation on rights:

> When we call anything a person's right, we mean that he has a valid claim on society to protect him in the possession of it, either by the force of law, or by that of education and opinion … To have a right, then, is, I conceive, to have something which society ought to defend me in the possession of. If the objector goes on to ask, why it ought? I can give him no other reason than general utility (Mill 1962:309).

From the above quotation, the fundamental point to be made here is that for every right there must be a corresponding obligation or duty on the part of others to protect such rights. This view is also supported by Campbell. In his view,

> More recently, it has become common to associate rights with responsibilities, although it is often not clear whether this is meant to curtail the scope of rights by making people's rights conditional on the fulfilment of their duties, or to strengthen the impact of rights by emphasising the duties of various parties to uphold the rights of others (Campbell 2010:669).

The next question is: do animals have rights? The straightforward answer according to the activists is yes. According to Peter Wilson,

> Philosophers have been arguing for millennia over exactly where rights come from. There have been nearly as many theories put forward as there have been philosophers. They range from divine commandment to majority rule to pure self-interest. Some philosophers even deny that there are such things as rights. In the interest of time, let's take the pragmatic approach and just assume rights exist and that humans possess them. Animal rights must then stand or fall on the ability to show that it is inconsistent or irrational to grant rights to humans but to deny them to animals (Wilson1999:17).

Granted that animals have rights, what are these animal rights? From the *Free Dictionary*, animal rights is defined as the right to humane treatment claimed on behalf of animals, especially the rights not to be exploited for human purposes. The concept of animal rights is the ideal that the most basic interest of animals should be afforded the same consideration as the similar interest of humans. Now, one important question is this: who should protect animal rights? The answer to this question is not far-fetched. From Campbell's quotation above, the duty of securing animal rights lies with human beings. In other words, for there to be animal rights and for animal rights to

be protected, there must be a corresponding duty or responsibility on the part of human beings to protect such rights.

Now, what are the objectives of animal rights defenders? For Regan, animal rights activists are committed to a number of goals, including:

- the total abolition of the use of animals in science;
- the total dissolution of commercial animal agriculture;
- the total elimination of commercial and sport hunting and trapping (Regan 1985:13).

The question of rights is a complex one among scholars because it could be used either in a moral or in a legal sense. In other words, one might be talking about moral rights or legal rights. One clear line of demarcation between the two is that, while legal rights are justiciable, moral rights are not. But in championing animal rights, what kind of rights are we talking about? What is the concern of philosophers as regards the status of animals? The simple answer is that philosophers are interested in the two, depending on the direction of the discussion. Tom Regan and Peter Singer, for instance, defend moral equality of human beings and non-human animals. According to Regan, it is wrong when any animal's rights are violated in pursuit of benefits for others (Regan 2002:88). The import of Regan's view is that non-human animals (lower animals) have the same moral rights as human beings (higher animals or human animals). In other words, non-human animals have the same moral status as human beings. Now, what are the African views and beliefs regarding animal rights? Do Africans also believe that animals have the same moral status as human beings? These questions are addressed in the next section.

The issue of animal rights and Africans' beliefs

Do Africans believe in animal rights? The answer to this question is a complex one. There is no consensus on African beliefs on animal rights, just as there are divisions in Western societies over the reality of rights for non-human animals as well. It is a common belief for Africans, especially the devotees of indigenous religions, that sacrifices and rituals must be performed as a matter of duty; as part of religious rites and worship, in order to appeal to gods and ancestors. In fact this is considered a pious act. Thus, to perform some of these sacrifices, animals must be slaughtered in the ritual process. In other words, a traditionalist considers slaughtering of animals for ritual purposes part of his/her religious obligations.

However, is the idea of defending animal rights a totally foreign or alien concept to Africans? My answer is no. This answer is borne out by the fact that defending human rights and non-human animal rights cannot be removed from African socio-cultural experience, following the communitarian nature of African societies. Now, when we move further to the question of whether or not Africans believe that human and non-human animals are equal in some morally relevant respects as championed by Regan and Singer, the answer is complex. It is believed that Africans live in a cultural or religious universe, but the truth is that some of them really believe in the existence of animal rights while some do not. Let us now consider Tom Regan's defence of animal rights.

Tom Regan on why animals have rights

Tom Regan, a foremost animal rights activist, has written extensively on this subject. In fact, Regan and Singer were known for championing the moral equality of human beings and animals. Some of Regan's works include Regan (1983) *The Case for Animal Rights*, Regan (2001) *Defending Animal Rights*. Regan (2002) "Empty cages: animal rights and vivisection." Regan (2004) *Animal Rights, Human Wrongs: An Introduction to Moral Philosophy*, and Regan, (2004) *Empty Cages: Facing the Challenge of Animal Rights.* In some of these works, we were able to establish Regan's arguments in support of animal rights. The arguments are physiological, by cognitive-ability, and psychological.

Physiological argument

Regan observes that human and non-human animals are alike physiologically. Drawing from Darwinian analysis, Regan argues that,

> In all essential respects, these animals are physiologically like us, and we like them. Now, in our case, an intact, functioning central nervous system is associated with our capacity for subjective experience. For example, injuries to our brain or spinal cord can diminish our sense of sight or touch, or impair our ability to feel pain or remember. By analogy, Darwin thinks it is reasonable to infer that the same is true of animals that are most physiologically similar to us. Because our central nervous system provides the physical basis for our subjective awareness of the world, and because the central nervous system of other mammals resembles ours in all the relevant respects, it is reasonable to believe that their central nervous systems provide the physical basis for their subjective awareness (Regan 2002:84).

Following the above quotation, Regan's position is clear. But whether the position is correct or not is open to another philosophical debate. However, this author finds the basis of Regan's argument too weak, in the sense that both Africans and non-Africans will find it difficult to accept that non-human animals have rights just because they resemble human beings. Thus, a stronger argument will be needed.

Cognitive-ability argument

According to Regan, human and non-human animals have certain cognitive abilities in common. He states that,

> In addition, both humans and other mammals share a family of cognitive abilities (we both are able to learn from experience, remember the past, and anticipate the future) as well as a variety of emotions (Darwin (1976) lists fear, jealousy, and sadness). Not surprisingly, again, these mental capacities affect their behaviour. For example, other mammals will behave one way rather than another because they remember which ways of acting had pleasant outcomes in the past, or because they are afraid or sad (Regan 2002:84).

Psychological argument

Regan opines that the psychological complexity of mammals is a clear indication that non-human animals are like humans. According to him,

> Moreover, that these animals are subjectively present in the world, Darwin understands, is required by evolutionary theory. The mental complexity we find in humans did not arise from nothing. It is the culmination of a long evolutionary process. We should not be surprised, therefore, when Darwin summarises his general outlook in these terms: "The differences between the mental faculties of humans and the higher animals, great as it is, is one of degree and not of kind" (Darwin 1976: 80). The psychological complexity of mammals (henceforth "animals," unless otherwise indicated) plays an important role in arguing for their rights. As in our case, so in theirs: they are the subjects-of-a-life, their life, a life that is experientially better or worse for the one whose life it is. Each is a unique somebody, not a replaceable something (Regan 2002:85).

The summary of Regan's view is that human and non-human animals are alike and as a result, equality and sameness of the two species ought to be emphasised. The nucleus of his argument is that, without a doubt, if humans have rights, so too do these animals (Regan 2002:85).

Metz presents a different account. According to him,

> The African theory entails that even if there is no intrinsic difference between two beings, there could be a (modal) relational difference between them, because capacity to have a life that is shared with, and cared for by, normal human beings, that grounds

> differential degrees of moral status. The idea that humans have a greater moral status than animals is a persistent intuition, and invoking the property of degree of capacity for communal relationship is a more attractive way to account for it than is the speciesist one of the bare fact of human life (Metz 2011:6).

The import of this quotation is that Metz provides a clearer picture of how Africans' view of the relationship between human beings and non-human animals ought to be understood. Africans believe that even though humans have a greater moral status than lower animals, this does not rob lower animals of their rights. Even among human beings, a rational adult will be seen as having a higher moral status than an infant or an imbecile. Yet, that will not rob an imbecile of his/her rights. If a foetus should have rights as far as pro-lifers are concerned, why not non-human animals? This question is the author's argument in support of the view of the defenders of animal rights. Let us now move to the challenges of protection of non-human animals rights in Africa.

The challenges of protecting non-human animal rights in Africa

In this section, I want to divide the challenges of protection of non-human animal rights in Africa into two, namely the major versus minor challenges. The major challenges include the challenges of human rights in Africa, lack of functional animal rights policies in Africa and poverty. The major challenges are discussed first.

The challenges of human rights in Africa

Violation of human dignity largely affects non-human animals in Africa. Bringing so many war-torn countries in Africa into the picture, it is obvious that there is gross violation of human rights in those places. Now, championing the idea of animal rights in most of these places will as a matter of fact be of secondary importance. The big problem is demanding animal rights from a person who does not respect a co-human being. Apart from the manifest violation of human rights in Africa, it is a fact that many African countries have lost and are still losing their citizens in diaspora to unjust killings in different parts of the world, without taking any considerable measures to demand justice. This remain a serious challenge to the protection of animal rights in Africa. According to Mbia,

> Human rights abuse or violation in Nigeria has been a contentious and perennial phenomenon … the ugly and image denting phenomenon has been the hallmark of successive administration (both military and civilian) in the country. This has manifested itself few years ago in the unlawful arrest, torture, genocide, etc. (Mbia 2007: 108).

One important fact in Mbia's argument is that this view can be extended to many other African countries. They have similar features.

Lack of functional animal rights policies in Africa

Closely related to the first is the second: that there is a lack of functional animal rights policies in many African countries. Despite the fact that the first International Pan African Animal Welfare Alliance (PAAWA) Conference on 'Mainstreaming Animal Welfare in Africa's Development' held in Nairobi, Kenya, from 2nd-4th September, 2013, there are still other policy issues. Even in a place like South Africa with all the structure on ground, we still need to revisit the issue of animal rights in the country.

Poverty

Poverty is arguably the dominant problem in most of the African countries, to which all other issues relate. According to Mandiyanike (2009:144), "Extreme and persistent poverty, hunger, disease, and ignorance have come to characterise life in a typical developing country". It is a fact that many Africans are living below the poverty line. This was caused by many internal and external factors. As a matter of fact, it is not out of place to trace poverty to unemployment in African countries. According to Corrigan, unemployment is a significant problem and one of the

key causes of poverty (Corrigan, 2009:10). As a result, a good number of Africans resorted to hunting, fishing, and factory farming or using animals as farming tools as a means of livelihood. Giving that one of the greatest instincts in life is the instinct for survival, African leaders will need to create enough alternative jobs in order to dissuade those who engage in the kind of jobs that affect the rights of non-human animals.

Minor challenges

African culture and tradition

It is strange to tell a typical African man that his dog or cat should be accorded rights, respect and dignity just like his children. The average African man was brought up with the mentality that animals are created for human needs, use and enjoyment.

African Religion and Animal Rights

Case I: Ogun festival in Nigeria involves beheading dogs in public as part of the necessary rituals for festivity by the devotees.

Case II: Zulu festival in South Africa also involves beheading bulls or cows openly as part of the ceremony.

Case III: Sallah festival also involves slaughtering rams and goats to commemorate the festival.

Animal rights in Africa: issues and challenges

In this paper, three arguments are developed as justifications to address the question of why animal rights may not succeed in Africa:

Religion and Cultural Arguments

The question of ritual slaughter of animals. Certain gods demand the fresh blood of animals, e.g. Ogun (god of iron in Yoruba land).

> Even the new-found religions, such as Islam and Christianity, permit ritual slaughter of animals for ceremonial purposes.

Human rights argument

Violation of human rights in Africa poses a serious challenge to the protection of animal rights in Africa. In Wiredu's reflection, the problem that bedevilled modern Africa is … how to devise a system of politics that, while being responsive to the developments of the modern world, will reflect the best traditional thinking about human rights (Wiredu 1990:260). Thus, the implication of Wiredu's conception is that thinking about human rights is more pressing than some other challenges. While Africans are still struggling with the question of human rights, the question of animal rights may not be of the utmost importance. This, from this author's point of view, suggests a critical reflection on these two important questions.

1. Do animals have rights?
2. Do non-human animals have equal moral status like human beings?

While the first question could be answered in the affirmative by defenders of animal rights, both in the west and Africa, the second is not so straightforward. In reviewed previous studies, no African writer has defended this position like Peter Singer.

According to Cornwell,

> The driving force behind Africa's experiment with democracy came both from ideology conviction and the growing impatience of an ever bolder public consciousness, and from the related manner of the continent's prevailing economic woes. On the other hand, the politically conscious urbanised, professional and studies bodies began to rail against the continued failure of their rulers to match rhetoric and promises to economic progress, for much of Africa had experienced a steady decline in living standards in the 1970s and 1980s. On their part, the World Bank, the International Monetary Fund (IMF) and other

> bilateral aid donors also made it quite clear that if further financial assistance was to be forthcoming, African leaders must protect the rights of the people. More specifically, they had to become politically more accountable to their people, and curb corruption (Cornwell 1995:15).

I think one way by which human rights can be protected the more in Africa is to agree with the directives of the IMF and World Bank that African leaders ought to be more accountable to their people. The import of this is that, if the rights of the people are well respected, it will reflect in the way they react and respond to the rights of non-human animals. The truth is that many Africans do not know that they have any rights due to the behaviours of some leaders. By extension, a person whose rights are not protected will see no reason for discussions on animal rights. In another development, Galadima noted

> a process of organizing and managing legitimate power structures, entrusted by the people, to provide law and order, protect fundamental human rights, ensure rule of law and due process of law, provide for the basic needs and welfare of the people and the pursuit of their happiness (Galadima 1998:117).

According to Regan (2002:88), it is wrong when any animal's rights are violated in pursuit of benefits for others.

The need for an attitudinal shift to the question of animal rights in Africa

African traditional religions and culture, which formed the basis of the African belief system, can be engaged to change the orientation of millions of African people who are still sceptical about such rights because we are not ignorant of such scepticism. Attitudinal shift towards a more enlightened and morally awakened society is needed where more people are working towards rights for animals than ever before.

Do non-human animals and human beings belong to the same moral community? The answer is yes. The point here is to raise arguments that will appeal to African tradition, culture and religions.

Conclusion

The issue of animal rights is a complex one that is wider than the scope of this paper. In fact it is not as simple as many writers may argue. However, based on the scope of this paper, the following conclusion could be reached.

- Every animal (both higher/lower) has a right to fair treatment
- Non-human animals are animals
- Therefore, every non-human animal has the right to fair treatment

It is our submission in this paper that the idea of defending animal rights is not a totally foreign or alien concept to Africans. But, the challenge is that the question of rights is not really taken seriously in many African countries; with manifest violation of such rights up till today despite the democratic structure on ground. How can a country that could not protect the rights of her citizens effectively protect the rights of non-human animals? It is our view in this paper that human rights protection is a key to the protection of animal rights. This is because if one respects human rights and understands the pain that comes with the violation of such rights, it will be easy to accord rights to non-human animals that share essential features with man. From the paper, some of the identified common problems in African countries are unemployment, access to land, weak educational systems, gender discrimination, and poor health care systems. The argument is that African leaders should focus more on building a society with enviable principles of tolerance, magnanimity and fair-play, which are essential for socio-political order, so that both human and non-human animals will have a sense of belonging in the same environment. In other words, the protection of fundamental human rights is essential for the enhancement and protection of fundamental animal rights.

References

Campbell T. 2010. “Rights” in John Skorupski (ed) *The Routledge Companion to Ethics*, London: Routledge, pp. 669-679.

Conrnwell, R. 1995. “The Collapse of the African State” in Jakkie Cilliers and Peggy Mason (eds.) *Peace, Profit or Plunder? The Privatisation of Security in Wartorn African Countries,* Johannesburg: ISS. pp. 61-80.

Corrigan T. 2009. *Socio-economic Problem Facing Africa: Insight from Six APRM Country*. Johannesburg: SAIIA.

Galadima, H.S. 1998. “Militarism and Governance in Nigeria”. *A Journal of the Institute of Governance and Social Research*, 1(1):1

Francis D. 1990. *Human Rights in Africa: Cross-cultural Perspectives,* Washington, DC: Brooking Institution.

Mandiyanike D. 2009. “Socio-economic Challenges: The African Context, *African Affairs*, 108(2):144-145

Mbia, M. S. 2007. “The Abuse of Fundamental Human Rights in Africa” in Yakubu J. A., Moronkola O.A. and Sokoya G. O. (eds) *The Abuse and The Society*, Ibadan: Royal People Nig Ltd.

Metz T. 2011. “An African Theory of Moral Status: A Relational Alternative to Individualism and Holism”. *Ethics Theory Moral Practice*, 12(2):6

Mill J.S. 1962. “Utilitarianism”, in Mary Warnock (ed.) *Utilitarianism,* London: Colin/ Fontana.

Regan T. 1985. “The Case for Animal Rights” In Peter Singer (ed.), *In Defense of Animals*, New York: Basil Blackwell, 13-26. .

Regan T. 1983. *The Case for Animal Rights,* London: Routledge & Kegan Paul.

Regan T. 2001, *Defending Animal Rights*. Illinois: UI Press.

Regan T. 2002. *Empty Cages: Animal Rights and Vivisection*. Cambridge: MIT Press.

Singer P. 1975. On Racism, *Animal Rights and Human Rights*. London: Harper Collins.

Wilson, P. 1999. “Animals Have the Right to Live Free of Suffering” in Roleff T. L., (ed.) *The Rights of Animals*, San Diego: Greenhaven Press, Inc.

Wiredu K. 1990. “An Akan Perspective on Human Rights” in Abdullahi Ahmed and Francis Deng (eds.) *Human Rights in Africa: Cross-Cultural Perspectives*. Washington DC: Brookings Institution.

Inkanyiso

Guidelines for submission

Copyright
The copyright of any article accepted for publication in *Inkanyiso* belongs to *Inkanyiso*. The author of such an article who wishes to publish it in another journal may be granted permission to do so after the lapse of six months, on condition that she or he acknowledges its prior publication in Inkanyiso in a footnote.

Disclaimer of warranties
Inkanyiso. JHSS takes no responsibility for the content published within this journal, and disclaims all liability arising out of the use of or inability to use the information contained herein. We assume no responsibility, and shall not be liable for any breaches of agreement with other publishers/hosts.

Editorial objectives of *Inkanyiso*
The Journal's objectives are to publish papers of broad interest in the humanities and the social sciences.

Reviewing process
(a) Every submitted paper that the editors deem acceptable as to topic, style, length and general quality will be sent to at least two peer referees for blind review.
(b) The referees will be scholars of standing, members of the Editorial Advisory Board, the Journal Management Team and others identified by their specific expertise and publication profile.
(c) The referees will comment on the papers' eligibility for publication in *Inkanyiso*, taking originality into account as well as the quality of research, argument, use of sources and writing style. Each referee will be granted not more than one month for this process.
(d) The Reviewers' Evaluation Form will be enclosed with each manuscript for the reviewer's guidance. It will require a referee to classify her or his response to a paper in one of four categories: acceptance as is; acceptance with specified changes; rejection with the possibility of revision and resubmission for another issue; and rejection.
(e) After receiving the referees' reports, the Editor-in-Chief will verify manuscripts for publication in *Inkanyiso*. Selected parts of these reports will be sent back to the authors (without disclosing referees' identity) in order to explain the Journal's acceptance or rejection of the paper and in order to guide revision either for the upcoming issue or to help the author rewrite for future submission.
(f) Accepted authors should make the required corrections and email their final document to the Editor within the time specified.
(g) The Editor, after verification, compiles all the manuscripts into an issue with the addition of an appropriate introduction and then sends the issue to the publisher.
(h) Publication is normally expected within the specified dates that will normally be June and December each year.
(i) It is our policy to encourage and support novice and established authors. However, in order to improve on the quality of publications, manuscripts that are unanimously recommended by at least two reviewers for substantive revision or rejection may not be published.

Page fees
Page fees may be levied to cover the costs of publication once the Journal is SAPSE accredited.

Manuscript requirements
Length of articles
These should comprise 4000-8000 words, including the list of works cited and notes. Shorter essays (500-2000 words) such as book reviews and debates on topics introduced by specific papers may be accepted.
Format
Papers should be submitted electronically, as email attachments formatted in a recent version of MsWord or Rich Text Format. While each article should be accompanied by a note in which the author provides his or her full names, personal telephone number and email address, the article itself should be stripped of all references to the author's identity. This is in order to assist the blind review process.

Style of articles

Inkanyiso uses a specific version of Harvard style. Authors should make sure that their papers are already formatted in this style before submission to the journal.

An *abstract* of the paper comprising a single paragraph of no more than 300 words should precede its first paragraph.

Numbered subheadings may be used throughout the article, but are not compulsory unless referees request them.

Single quotation marks are used in Harvard style for direct quotations from texts and for 'mention' of words and phrases to be discussed or defined. Double quotation marks are used only for a quotation-within-a-quotation. End punctuation is placed *after* the closing quotation mark.

Footnotes should be used very sparingly or not at all. If possible all information should be included in the main text. If footnotes are used, they should not exceed about five in number and should not be used for references, only for parenthetic material not directly relevant to the argument in hand but of use or interest to a researcher in the field.

Textual references should be used in preference to notes wherever possible. All textual references should include page numbers, unless the original text does not display page numbers. A reference should accompany almost any mention of a text, not only direct quotations from it. Textual references normally include the author's surname, the date of publication and the relevant page numbers. They are punctuated thus, with a colon separating date and page number, but no space after the colon: (Thorpe 1999:135-141).

The list of works cited (*References*) should include all texts referred to in the article and no other texts. The list should be alphabetized, unnumbered and arranged on the page as indicated in the examples below. Each item in the list should include the following, in the order designated: author's surname; author's initials or names (depending on how the author is designated in the text described); date of publication; title and subtitle, separated by a colon (upper-case used only for the first letter of the first word); place of publication and publisher.

Please note that the 'place of publication' *must* be a town or city; it may not be a country, province, state or other area. The place of publication must *precede* the publisher's name and be separated from it by a colon. A list follows that demonstrates the required punctuation and arrangement. If an author uses a type of text not included in this list, a more comprehensive handbook of Harvard Style should be consulted. Here is a sample list of works cited (with annotations):

References

Arom, Simha. 2000. Prolegomena to a biomusicology. In Wallin, Merker & Brown. 27-29. **[*NOTE WALLIN AND SLATER ENTRIES BELOW – only refer to an edited work in this way if more than one essay is cited. See TAFT below for the citation of one essay only from an edited collection.*]**

Buthelezi, Mangosuthu. 1990. Personal interview on August 5, 1990. Empangeni. `[Cassette recording in possession of author.] **[*INTERVIEW*]**

Davies, R T (ed). 1963. *Medieval English lyrics: A critical anthology*. London: Faber & Faber.

Gumbi, Rachel Vuyiswa. 2009. Personal communication on January 16, 2009. **[*INTERVIEW*]**

Jacobs, D. 2001. A bibliometric study of the publication patterns of scientists in South Africa 1992-96, with special reference to gender difference. In: M. Davis & C.S. Wilson(Eds.). Proceedings of the 8th International Conference on Scientometrics and Informetrics, Sydney, 16-20th July 2001, Vol.2, 275-285 **[CONFERENCE PROCEEDINGS]**

Mason, B L. 1994. The psychological effects of violence on children: An exploration of a sample of black primary school children from the Natal Midlands. Unpublished masters thesis. Pietermaritzburg: University of Natal. **[*THESIS*]**

Oosterlinck, A. nd. Knowledge management in post-secondary education: Universities. Accessed online on September 8, 2008, at: *http://www.oecd.org/dataoecd/46/21/2074921.pdf.[**NO DATE**]*

Schiesari, Juliana. 1992. *The gendering of melancholia: Feminism, psychoanalysis, and the symbolics of loss in Renaissance literature*. Ithaca: Cornell University Press.

Sembene, Ousemane. 1976. *Xala*. Transl. Wake, C. London: Heinemann. **[*TRANSLATION*]**

South African Law Commission. 1997. *Project 90, discussion paper 74: Customary marriages*. Accessed online on August 17, 2007, at: *http://www.doj.gov.za/salrc/dpapers/dp74_prj90_cstmar_1998.pdf.* **[*GOVERNMENT DOCUMENT*]**

Taft, R. 1981. The role and personality of the mediator. In Bochner, S (ed). *The mediating person: Bridges between cultures*. Cambridge: Schenkman. 53-88.

Taylor, Hollis. 2008. Decoding the song of the pied butcherbird: An initial survey.
Transcultural Music Review 12. Accessed online on November 8, 2008, at:
http://www.sibetrans.com/trans/trans12/art13.htm.

Thorpe, W H.1958. The learning of song patterns by birds, with especial reference to the song of the chaffinch *Fingilla coelebs*. *The Ibis* 100:535-570.
Wallin, Nils L, Merker, Björn, and Brown, Steven (eds). 2000. *The origins of music*. Cambridge: The MIT Press.

Address for submission

Papers should be submitted electronically to the Editor-in-Chief at *Docholla@unizulu.ac.za*