Volume 17 • No 1

JOURNAL FOR

17

2019

New Generation Sciences

ISSN 1684-4998

Central University of Technology, Free State

JOURNAL FOR NEW GENERATION SCIENCES
ISSN 1684-4998

JOURNAL FOR NEW GENERATION SCIENCES

VOLUME 17 NUMBER 1

The Journal for New Generation Sciences is available full-text on Sabinet Online's African Journal Archive via the SA ePublications platform, an Open Access platform. The articles are indexed on the Central University of Technology, Free State's Institutional Repository and also available via Google Scholar.

EDITORIAL

All scientific contributions are welcomed. Visit www.cut.ac.za/jngs for guidelines.

All contributions should be sent to:

Prof LOK Lategan
The Editor: Journal for New Generation Sciences
Central University of Technology, Free State (CUT)
Private Bag X20539
Bloemfontein
9300
E-mail: Llategan@cut.ac.za

TABLE OF CONTENTS

JNGS 2019 Volume 17 No. 1

EMERGING WISDOM ON THE VALUES AND PRINCIPLES TO GUIDE COMMUNITY ENGAGEMENT IN SOUTH AFRICA

R BHAGWAN
DURBAN UNIVERSITY OF TECHNOLOGY

Abstract

Values and principles are fundamental to institutionalizing and guiding community engagement in higher education. This paper documents findings made from a qualitative inquiry with engaged academics, administrators and students who have been involved in successful engagement projects. Data was collected using interviews and focus group discussions from six universities across South Africa. Six core values and four principles emerged as being important to guide community engagement in South Africa. This emergent data cohered with the growing literature in the field and provides valuable direction for those working towards creating and sustaining successful community partnerships.

Keywords: Community, engagement, values, principles, participatory

1. INTRODUCTION

Poverty, homelessness, family disintegration, violence, addictive behaviours and other social ills reflect much of the community landscape in South Africa. It is within this milieu, that higher education institutions which through the influence of colonialism, have for years perpetuated privileged ways of knowledge construction and viewed academia as being more powerful over communities. Growing discourse has seen a shift in notions of the university as an ivory tower that promotes academic elitism and intellectual isolation to more innovative institutions engaged with real-world problems of society, that are open to outreach, community service, community based research and service learning (Adamuti-Trache & Hyle, 2015:74). This has grounded community engagement as an integral part of academic life, with a defined form of scholarship. Community engagement emphasises the importance of local, national, international communities and industries and steers the traditional university beyond the position as a "generator of workforce and creator of knowledge toward a community-engaged university as incubator of cultural and socio-economic vitality" (Bartkowiak-Theron & Anderson, 2014:1). It synergizes then the strengths of community, industry and public service inputs and interweaves them with the intellectual expertise of higher education institutions. In so doing it positions higher education institutions, not as isolated realms of knowledge, that creates and transfers information, but as co-partners who work in tandem with wider society.

Whilst a community can be a geographical or territorial concept, it has also been conceptualised along relational lines and involves social network relationships. Others have posited that it is a social system that includes families, groups or organizations (Fellin, 2001). Broadly however communities can be thought of as "open collectives of legally independent entities (e.g., individuals, groups, firms, universities, and government agencies" that share common goals of collective welfare (Gustafsson & Jarvenpaa, 2018:124). Felin and Zenger (2013) argued that the strength of higher education institutions, lies in their ability to tap into broader landscapes of knowledge rather than single organizations, alliances or partnerships and that they can address complex societal problems and opportunities in more productive ways.

In South Africa, attention to community engagement has been growing steadily in order to bridge years of disconnect, disengagement and the marginalization of communities within the elitist spaces of academia. In an effort to undo these threads of social injustice, the Department of Higher Education and Training (DHET, 2014:10) called for higher education to "redress past inequalities and to transform the higher education system to serve a new social order, to meet pressing national needs, and to respond to new realities and opportunities". It is against this backdrop that community engagement has begun to emerge more strongly as a core function of higher education, and has begun strengthening its position "to enable the co-creation of contextually relevant knowledge that will enable community development" (Wood, 2016:17). In line with this Zuber-Skerritt (2012) asserted that without this mutual exchange of knowledge, it will be challenging to generate knowledge that can enable community change and development. Universities are ideally positioned to enable socio-economic development, because they are home to a range of disciplines that have deeper

understandings of these kinds of problems and the potential solutions to address these problems. Teaching and research have always been seen as the primary function of universities, i.e. their first and second mission. Attention towards this third mission, which involves interaction with the community and other stakeholders has grown exponentially as scholars begin to value the need for more campus-community partnerships and promoting a huger sense of civic responsibility in higher education (Inman & Schuetze, 2010). It embraces social, enterprising and innovation activities that universities undertake, and is therefore critical to teaching and research that will create societal benefits (Benneworth, 2013). Concomitantly much has been done to enrich scholarship, research, teaching and learning, to prepare students to become engaged citizens, strengthen democratic values and civic responsibility and address social problems for the betterment of communities (Bhagwan, 2017).

Despite this paradigm shift towards the third mission, academics and students continue to grapple with the complexities of how to engage, within this emerging area of scholarship. A valuable starting point is to illuminate the core values and principles that must guide the engagement process. Both the rigidity of academia and the adversities experienced by under resourced communities present multiple challenges, unless academics and students begin with a core set of values and principles. This paper not only builds on the young threads of empirical research in this field locally, but adds to the discourse on the core values and principles that are being used to guide community engagement in South Africa. It begins with a brief review of the literature and methodology used. This is followed by a discussion of the findings made.

2. LITERATURE REVIEW

In South Africa community engagement has been used as a broad term to include multiple activities that range from service learning, professional service and community based and applied research (Albertyn & Daniels, 2009). A perusal of the literature reflects that the key values and principles that have guided engagement thus far, includes a respect for the historical and contemporary dynamics of communities. Furthermore it ensures that academic objectives are in tandem with community issues and priorities, creating appropriate structures and processes to promote accountability, optimal community participation and ownership. Lastly, strengthening and sustaining community initiatives (Lazarus, Bulbulia, Taliep & Naidoo, 2015).

In an international context community engagement has been described as “a process of inclusive participation that supports mutual respect of values, strategies and actions for authentic partnership” of people affiliated through geographical location, shared interests and circumstances to address issues affecting community well-being (Ahmed & Palermo, 2010:1383). Duke (2009) noted that the language began to evolve from that of community service and outreach to engagement, which conveyed notions of the reciprocity of relationship and more particularly the shared and joint conceiving, creating, owning and use of research. In line with this contemporary approaches to community engagement have shifted from the mere delivery of knowledge and service to the public, to one of an “interactive exchange of knowledge between higher education institutions and their communities in the context of partnership, reciprocity and mutual learning” (Weerts & Sandmann, 2008:79). This led to further conceptualisations of engaged scholarship as being a two way relationship between academia and the community that is underpinned by mutuality in the relationship (Franz, 2010; Sandman, Furco & Adams, 2016).

This paper has adopted the definition articulated by the Centre for Higher Education which states that community engagement is a systematic relationship between Higher Education institutions that is “characterised by mutually beneficial interaction in the sense that it enriches learning, teaching and research and simultaneously addresses societal problems, issues and challenges (Centre for Higher Education Transformation (CHET, 2003:4). Holland (2005:12) asserted that higher education institutions “must become participants in a highly complex learning society where discovery, learning and engagement are integrated activities that involve many sources of knowledge generated in diverse settings.” Hence in community engagement “the scholarship of discovery pushes the agenda of collaborative research between universities and communities” (Mtawa, Fongwa & Wangenge-Ouma, 2016:127).

3. RESEARCH METHODOLOGY

This study was guided by a qualitative approach, where interviews and focus group discussions were used to collect data from academics. Also included, were administrators and students who were involved in community engagement (n=33). Although community partners were also interviewed, for the purposes of this paper only the data related to staff and students will be presented. There were six higher education institutions that were selected to participate in this inquiry nationally. The institutions were identified through the projects they were involved in and were selected for the following three reasons: (1.) they were deemed as "flagship projects" at their respective institutions; (2.) were seen to be able to provide rich information in comparison to projects that were only being initiated at other institutions; (3.) each institution was different to the other in that they represented a diversity of engagement activities which included volunteerism, outreach work, service learning, community based research and other forms of engaged activity. Institutions were further selected based on their geographical location thereby providing a diverse range of community contexts that these institutions engaged with. Moreover they were selected from the South African Higher Education Community Engagement database list, which contained a list of institutions with best practice community engagement projects. After ethical clearance was received a schedule to conduct interviews and focus group discussions at the respective institutions was drawn up to facilitate data collection.

After recording the interviews they were transcribed and an initial reading of the data was undertaken to identify descriptive patterns and inductive codes that emerged from the participants' words and concepts (Maxwell, 2005). The data was subsequently coded using broad categories and deductive codes based on a conceptual understanding of community engagement (as defined in the preceding section), and according to the research questions (Miles & Huberman,1994). A second round of coding was then conducted by undertaking a rigorous analysis of the transcripts and the field notes, in order to understand more clearly the values and principles underpinning the process of engagement. In order to ensure validity and trustworthiness data was triangulated from several sources which included community partners, academics, community engagement administrators and students.

4. FINDINGS AND DISCUSSION

In this section the key findings of the study related to the following research question viz. "What values and principles are used to guide community engagement?" are discussed. Twelve focus groups were held and 26 interviews conducted with academics, administrators and students who were involved in community engagement at their respective institutions. A thematic analysis of this data revealed that there were six important values and four core principles that were important to guide successful community engagement. The values are presented first, followed by the principles in the subsections that follow.

4.1. KEY VALUES

The key values embraced by the sample included social justice, integrity, inclusivity, trust, respect, and care. The values identified in the data cohere with many of those identified within the Higher Education Academy's (2015) framework for student engagement through partnership. It identifies the following nine scholarly values as being important viz. "authenticity, inclusivity, honesty, reciprocity, empowerment, trust, courage, plurality, and responsibility" (Healey, Flint & Harrington, 2016:6). According to participants in this study, community engagement should be guided by similar values as mirrored within their respective university's vision and strategic framework. The latter is consistent with literature which supports the need to institutionalize community engagement within the mission of the institution.

4.1.1. Social justice

Bridger and Alter (2006:173) argued that public scholarship requires a strong set of civic and interpersonal skills, which in turn is based on open dialogue, fairness, sustainability and social justice. Social justice emerged as an important value in the present study. Students in particular recognized this saying that "our student volunteer training is based on asset based development, diversity, social justice and the overarching emphasis is learning and unlearning about social justice". Students are therefore more "passionate …I want to do social justice work, I want to do some kind of work that has a social impact". Another academic reported that it is about "reframing the knowledge construction

project and it's about building relationships between people in broader society and the people who are part of the academic community…and about promoting social justice through doing this". Another said that it has to do with how people "understand how their own lives are impacted by the lives of others, and how their own actions in the world, impact the lives of others. So it's that very understanding that we are tied up in and with each other's struggles" and work "in a way that brings about social change". One academic concluded that success of their engagement work to the fact that they "have a very strong social justice model" which "resonates with community groups, so they want to work with us".

Social justice is an important value within the South African context as it strives to tackle issues related to poverty, access to social well-being and equality and justice, particularly for vulnerable individuals and communities. It is linked to "the pursuit of common good through principles upholding non-hierarchical and democratic processes" and a shared commitment to helping others" (Zuber-Skerritt, 2012:13). Community based learning which is facilitated through engagement as evidenced in the data can create rich opportunities for teaching students, about societal injustice and for building skills related to empowerment, social support, capacity building and anti-oppressive practice, thus making it important to consider in teaching, learning and engagement. Social justice engagement projects linked to volunteerism and community outreach projects, can therefore help students focus on promoting the rights of vulnerable people and addressing societal wrongs, and teach students about injustices simultaneously. Engagement driven through the lens of social justice then not only increases the university's empathy to vulnerable communities but creates opportunities to transform communities through a collective, mutually empowering experience (Plummer, Allen & Lemieux, 2011). Higher education institutions in South Africa, should therefore give concrete attention to social justice as part of teaching and research and how students can serve as agents of social change within their respective disciplinary homes. In order to redress past imbalances and build democracy in all facets of life, students must be given opportunities to understand the various forms of injustices through exposure to communities and society and be capacitated to develop initiatives that counter these inequalities.

4.1.2. Integrity

Integrity was another significant thread in the data. One academic described engagement as "a relationship and the integrity of building those relationships, not coming in and saying we know". Reflecting on this a student said "you have to be honest, and I think sometimes that is where academics fail because we are going to spaces and we romanticize". Another academic said that engagement should be underpinned by "a genuine desire to understand the lived experiences of community members and building university-community engaged partnerships. Similarly a student said that it is about "how to enter the community, what is expected from them, don't raise expectations when you are in the community". Both students and academics agreed then that it was important to be honest with regards to the reasons for engagement and not to be deceptive. This is a crucial factor before beginning the process of engagement.

One academic clarified that integrity refers to the fact that "research output should not drive the agenda but rather a genuine desire to be a co-partner with community members in learning and knowing. Relationships must be at the heart of such partnerships as opposed to distilling research output". This supports earlier discussions regarding the objective of engagement and the need for research to be undertaken with genuine consideration for the needs of the community. Moreover projects are often initiated without sustainable long term plans in place. Authentic engagement requires mutually beneficial partnerships that are sustainable, a point which is discussed further in the sub-sections that follow.

4.1.3. Respect

The third value that emerged in the data was that of respect. Community engagement scholars demonstrate respect for communities, by recognizing community values and interests that matter to community members as people (Holzer, Ellis & Merrit, 2014:853). Within the data two threads related to respect were visible viz. valuing people and respect for cultural diversity. With regards to valuing people one student said that one has to know "you're dealing with people, you are working for people and having that value for someone else, respecting someone else". In a similar vein another asserted that "you don't impose things," and there is a need to engage with "respect for basic human rights"

and to respect "whatsoever is right, in the community". A study undertaken by Holzer *et al.* (2014:853) revealed that one way of demonstrating respect is through doing research that is relevant to the community. One academic affirmed the need to "get permission before you do" anything. Creighton (2006 cited in Beere, Votruba & Wells, 2011:204) uncovered similar issues in his study, as most community participants felt disrespected by higher education partners, who saw themselves as elitist. Respect and a deeper understanding of the need for equity within community-university partnerships are fundamental to engagement.

Respect for diversity was also strongly voiced in the data. The sentiments of the samples are reflected in the following comment that "the other important thing is representation. There's a difference when I walk in, because I am Black. So people will feel more comfortable with some people rather than the other side". One student noted that "we need to be very sensitive to our culture as well. Because we are so diverse, and culture plays a role of who we are as South Africans … so gender and culture, they play a role in these things". In a similar vein another said "acceptance, tolerance and respect for the different cultures, because when you go out, the cultures are quite different". In most instances engagement then may involve academics and students from cultural backgrounds that are different to communities. The ability to negotiate entry respectfully with community elders or leaders and be respectful of diverse customs and traditions whilst in the milieu of the community is critical to understanding the community, their needs and to be able to partner with them to develop mutually beneficial projects. Language as well may pose a barrier, warranting the need for a translator who is familiar with same so that both university and community members can be able to understand each other.

Agbo (2010:187) argued that to ensure mutual, reciprocal interaction and to develop positive intercultural relationships, research relationships must be negotiated with respect for the wishes of local inhabitants. This is tied up with the need to do research that is "community-based…and supported by the community as a whole". It is also consistent with conceptualizations of community based participatory research, which is underpinned by an understanding of and respect for divergent interests within partnerships and communities" (Smith *et al*., 2015:3).

4.1.4. Inclusivity

Inclusivity was also viewed as an important value by academics and students. One academic said that there should be "equity partnerships, respect and consultation beforehand. You shouldn't start a process without consultation". Another student argued that "what is important is … we are really like understanding what the community requires and how we can assist in resolving those problems, it's a mutual understanding. We don't need to force it, we don't need to think that they need this, they have to say it, we have to discuss it, come to an agreement before designing whatever kind of solutions, which are dealing with communities". Another academic concluded that engagement is about "understanding the community needs, discussing, co-designing, coming to a solution, where you are not imposing a solution, but is a mutual agreement to solve those problems and listen to what they want. If possible arrive at a solution which, at the end, is not like you have given them a solution, but you have developed it together, that solution".

Community engagement then is about "building authentic partnerships, including mutual respect and active, inclusive participation; power sharing and equity" (Tindana *et al*., 2007:1452). It is therefore important to meet communities, on their own terrain and terms rather than imposing university stakeholders on them. It further alludes to the notion that communities do not necessarily have to assume a stance of readiness to receive the university. Rather communities should be empowered to become fully involved in the engagement process and partnerships should build on community strengths and mutually agreed upon concerns. It is particularly important that students and academics work within a good understanding of Ubuntu as it reflects the community spirit of interconnectedness and care for each other (Ncubu, 2010:80). The notion of "I am because we are," and the African community's belief in a universal bond of sharing that interconnects all humanity coheres with inclusivity. Moreover in a holistic sense Ubuntu is actually at the heart of community engagement and its guiding principles should be used to underpin all engagement efforts.

Inclusivity is closely intertwined with the value of integrity which supports the need to distil practice wisdom or engage in research by engaging with communities whose expertise and knowledge are

respected as being equitable to those of the researchers. That builds the integrity of the relationship. One academic said, that the university must "respect the community enough to involve them. Its involvement, you involve the community when you are planning. You also have to enquire about the community". These values should be used to engage people. Sandmann (2008) emphasised the values of equity and fairness, saying that although it is not always possible for there to be equal resources, each partner must bring in something tangible. Communities especially those that are historically marginalized "may perceive a power differential between them and researchers" (Holzer *et al., 2*014:854), which entrenches the need to intentionally ensure inclusivity throughout the process.

Another important point to consider related to inclusivity, invites the views of the Kellogg Commission on the Future of State and Land-Grant Universities. They expressed that "to the non-academic, the university is a near-inscrutable entity, "which suggests that communities partners, be given easy access to university departments, services and resources (Beere *et al.*, 2011:197). What is important then is that South African higher education institutions create deliberate spaces which allow for community partners to be able to access for visits and meetings.

4.1.5. Trust

Trust was also seen as a crucial value that both samples believed needed to be upheld. Engaged scholars such as Smith *et al.* (2015:4) believed that "mutual trust, respect, genuineness and commitment" should underpin the relationship. Echoing the voice of many other participants, one academic said that "it's building trust," and also how to deal carefully with knowledge, with communities marked with many intentions and in many contexts". Reflecting on his engagement experience, a student said that "the first day when I went to do the interviews I couldn't really get much a response from the spaza shop owners, so what I decided to do was to keep going, so that they can identify with me and know that okay this person is doing her research …. I tried to establish a level of trust between myself and the shop keepers". One student added that it was important that "they can trust us as we trust them".

In this vein, one academic posed the question "how do we engage, do we engage from a place of trust, of honesty, of integrity" and "is it a two way stream or is it from an academic perspective?" The question posed here interlinks with earlier discussions related to the need for inclusivity of community partners in conversations around what the perceived needs of community members are. It reinforces the need for the community voice in terms of identifying issues and working in tandem with university partners for mutually beneficial outcomes. Beere *et al.* (2011:200) argued that it takes time to forge partnerships and to build trust and open up genuine communication that transcends differences in social status, education, culture and experience. One engaged administrator, expressed that "I had to negotiate a whole lot of things, I had to negotiate individual differences and ways of engagement, student prejudices, fears of students and what they were able to do and not do and community expectations. In this way partnerships were channelled and worked". These voices from the data, point to crucial issues that surface at the interface of community-university engagement and how to deal with it.

A study by Creighton (2006 cited in Beere *et al.,* 2011:204) found that efforts to engage with communities and to demonstrate respect for them, results in increased community trust, greater participation and an improved uptake on research findings. Community engaged scholars should therefore proactively seek to build trust with community members. Beere *et al.* (2011:195) suggested that, where there are issues of distrust, the university should attempt first to develop a partnership with a single, trusted well respected agency in the community and then faithfully fulfil its commitments to this partnership.

One student cautioned that university stakeholders should know "the boundaries that we can and cannot push. There are a lot of unsaid and unseen things and sometimes I think we need to be mindful of those. Sometimes we might be going into spaces with the intention to learn, but we need to be cautious of offending other people because we ourselves are ignorant. People are not objects they have got feelings just like we do". It is important within the mix of diverse cultural community contexts, that university members exercise care when entering and be respectful of community dynamics whilst in community spaces. It is important to hear and respect the voices of all during engagement and from the outset be aware when community members are unhappy with any of the activities or plans within their space. Community-Campus Partnerships for Health reiterated this

saying that the "relationship between partners is characterised by mutual trust, respect, genuineness and commitment" (Smith *et al*., 2015:4).

4.1.6. Care

Care emerged as another salient value for successful engagement. One academic argued the need for "a caring relationship. You have to care, and I'm using the word care because … we always feel that 'word,' is not academic … but I think ... you need to care. And it's not just about the people … it's about the outcome. It's about the whole process. For me it sums up excellence, it sums up the value, it just sums up that whole".

Another participant expressed that often you are "coming from that very academic paradigm, that process, that conceptualization, you put the thing on paper but the way you see, it doesn't allow for those processes to happen. And that for me, is where I'd say the relationships come in". In line with care, a student said "you just have to have the passion … to interact with people … for you to engage or to volunteer". Other participants identified the spirit of Ubuntu as a dimension of care. One student said that "the main value guiding service learning is Ubuntu. The spirit of Ubuntu … you do it for the love of it, because you want to help people...to be humanitarian". Ubuntu philosophy is underpinned by the belief that "to be human is to affirm one's humanity by recognizing the humanity of others" (Ramose, 2002:324). Kindness, generosity, compassion, benevolence, respect and concern for others (Shanyanana & Waghid, 2016:108), together with compassion, reciprocity and dignity, a spirit of caring and community, interconnectedness, interdependence and empowerment (Ncube, 2010: 80), underpin Ubuntu philosophy making it integral to guiding engagement as discussed earlier. Care then appears to be a significant dimension in guiding engagement.

4.2. CORE PRINCIPLES

There were four primary principles that were visible in the data. These formed a natural synergy with the values identified. One academic suggested that there should "be a set of principles that students should be taken through prior to engagement with communities". This supports the need for some sort of preparedness before engagement. The primary principles are discussed in the sub sections that follow.

4.2.1. Transparency

The first principle that emerged in the data was transparency, which resonates with trust. In a community-university partnership, transparency is needed within the community to ensure constant community presence within conversations and plans. This is also interrelated with the value of inclusivity and can be seen within the following comment by an academic viz. "It took a lot of engagement and iteration and I think it's crucial to have that form of constant engagement, institutionally, but also in public spaces meetings…being visible. That is where the partnership started crystallising".

In this vein another academic explained that transparency was related to "communication …meetings where things were explained to community, what to expect, what not and … having academic output and community output". This is linked to other important principles in the engagement literature, which speak to pluralism, representation, decentralized decision making and autonomous participation. According to O'Mahony (2007:144) pluralism reflects the diversity of contributors and the co-existence of several approaches and methods. He added that whilst no single entity controls a material or financial source and that decision making related to knowledge production is based on distributed decision rights, equal access to knowledge and transparency in decision making processes. Decision making and shared resources as articulated by O'Mahony (2007) should therefore be factored into engagement plans.

4.2.2. Sustainability

Engagement is a cyclical and iterative process that does not stagnate (Smith *et al.,* 2015:4). This is linked with the second principle identified in the data viz. sustainability. One administrator expressed the need for "constant engagement". Expressing this in a more direct sense, another academic participant asserted that "you shouldn't start something if it cannot be sustained and the only way you can sustain it, is if you ensure that there's partnerships with the communities themselves, so that they take ownership of it and they can sustain that. The whole thing …. (is) you must ensure capacity building, you must build capacity. If you don't capacitate people, how can you expect things to be sustained?" This provides specific direction to those embarking on a community engagement project, to consider how they can capacitate community members to continue with the project once the university disengages from the process.

Another academic pointed out that although students considered themselves "well meaning" and "passionate about finding a solution … we need to be realistic, that students move on". Hence it is important to find other ways for the community to sustain itself. The issue of sustainability supports earlier discussions regarding the need for respect when entering community spaces and moreover not for exiting without having fulfilled clearly mutually negotiated issues. It moves away from traditional research approaches where once a study is completed, students and academics exit without concern for what the community may have expected from the partnership or for whether community needs have been fulfilled. These linear relationships are destructive to enhancing community-university partnerships and may leave communities resentful, distant and resistant to any future projects. Engagement should also be grounded on past initiatives where possible. This enables a deeper reflection of the processes and outcomes allowing for improvement, before outcomes are achieved (Smith *et al.,* 2015). Relationships should therefore be "built through prolonged engagement, based on commitment to democratic and life enhancing values" (Wood, 2016:14).

4.2.3. Mutually beneficial relationships

Mutually beneficial relationships emerged as the third important principle in the data. One participant spoke of the importance of building "more cohesive partnerships" saying that "we all are still working in silos". Another expressed that "engagement… has an element of sharing knowledge and mutually constructing or mutually defining an issue in different capacities … this is where the co-production comes in".

Those involved in engagement offices expressed that "community engagement should be understood as mutually beneficial partnerships between communities and the university. It means that it's reciprocal, and so that means that people have come together to plan something jointly so that both sides of this partnership are going to get something of equal benefit, out of this arrangement". In line with this perspective an academic clarified, that "a lot of people still see community engagement as that very outreach kind of model. They talk about things like soup kitchens or donations …where you don't really get anything back from what you've done". This was an important point in the data and suggests the importance of higher education institutions conscientizing staff that community engagement is not mere charity based activity but is a deeper scholarship built on mutually beneficially relationships.

These misconceptions may be related to the notion that "one of the hardest things for academics to understand about community engagement is that they think, well what could I get from someone else? I'm in academia … What could I possibly need to get from someone else? I'm a professor … (but), that's where the shifts have to start taking place, and that's where we start to unpack this idea of an asset based approach to community development and understand the assets that are out there in the community … (and) work to build off the assets … giving students opportunities to work with things that we don't have in our classrooms for students. The kinds of experiences and expertise that is out there, that they can learn from". Collectively what this suggests is the need for some sort of preparedness about what engagement is and the processes that underpin it. Moreover it suggests the need for academics and students to realize that communities are already rich sources of knowledge and that they can be co-partners in producing contextually relevant knowledge that are richer sources of wisdom as opposed to that within Western textbooks. More importantly it suggests the need for seeing the community space as a classroom space with academic assets that students can learn from.

The data further reflected that community engagement was "a learning experience for everyone involved … because everyone is given the opportunity to learn from their engagement with each other". The "overarching emphasis is learning, especially learning and unlearning about social justice". In line with these excerpts from the data, Hall and Bèrubè (2010) wrote that open communication, democratic engagement and sustainable learning and development to attain mutually beneficial outcomes, is aligned with participatory research methodologies which are being lauded as the pathways to enable community engagement in higher education. As affirmed in earlier discussions engagement should mirror co-learning, shared decision making and mutual ownership of the problem and its solutions (Smith *et al.,* 2015:3), so that genuine and authentic learning can occur.

Summing up the views of most students in the study, and the crux of community engagement, one said that there is a misconception that the community has "to listen to me because I'm going to help them. You should go with the thinking that you are going to learn from them, as much as they are going to benefit from you". Whilst the rigidity of academia, bureaucratic academic structures and traditional notions of where knowledge comes from (Wood & Zuber-Skerritt, 2013) may stymie such thinking there needs to be greater openness to the values and principles that emerged from this inquiry.

Moreover the data collected mirrors contemporary understandings of knowledge mobilization which speaks of an "active process of moving knowledge into the hands of those who can use the knowledge … and knowledge transfer recognizes that academic research, in order to engage with community knowledge, needs to be deliberately or intentionally worked with so as to facilitate its use by non-academic groups" (Hall & Bèrubè, 2010:279). Furthermore it recognizes that knowledge is created in community and that there is or can potentially be an exchange of knowledge between those who create knowledge in both formal academic and other contexts. Communities therefore should facilitate co-learning, shared decision-making, and mutual ownership of the problems and its solutions. This leads to the last important principle of valuing knowledge.

4.2.4. Valuing knowledge

This theme was reflected in the words of one academic who said that "we must value all knowledge, as of equal value to our own scientific knowledge". Without that approach of valuing all knowledge as of equal value" we cannot truly engage. Similar to the issues raised in the preceding sub-section, one academic cautioned against viewing the university as "representative of the resource expert" because that reflects "imbalance". She expressed if this "shift in perception" occurs it is "beautiful". Another academic affirmed valuing community knowledge saying that "through his (community member), practical knowledge of knowing what's possible, what's not possible, he was a valuable resource as a barefoot electrician… we needed his practical knowledge".

A student expressed similar sentiments, saying that engagement was "about shared learning and if you open up the space and say to the person I don't know show me, this is what I know. For instance this is the knowledge that I can share with you that may empower you somehow, but what can you give me to empower myself. So it should be a joint or a collective sharing. I really believe in co-creation and building a space where everybody has something to contribute … the biggest principle is co-learning and co-creation".

Writers such as Creighton (2006 cited in Beere *et al.*, 2011:204) concurred with the sample, saying that academics must accept that their knowledge, whilst valuable "is not the only source". This defies traditional notions that scientific knowledge can only be generated by specialist scholars, scientists, or theorists and then applied by practitioners (Zuber-Skerritt, 2015:7). The community "want us to recognize that they have the capacity to teach us as well as learn from us" and hence they "should be seen in terms of their strengths, wisdom, knowledge and experience assets" (Beere *et al.,* 2011:193). A linear focus on research output only will thwart genuine relationships from forming. Community based participatory research approaches, on the other hand are premised on equal partnerships between scientific or academic communities and community stakeholders such as members, researchers or organizations. Some of the most important principles guiding this methodology are power sharing, trust building, proper communication, establishing mutually beneficial goals and co-learning/capacity building and co-learning between community stakeholders and researchers (Adebayo & Salerno, 2017:2). This enables the co-production of knowledge.

Moreover the “triple helix,” framework underpinned by collaboration between government, academia and industry which has evolved to drive university technology transfer, is critical not only to creating new knowledge, but promoting economic and social development (Miller, McAdam & McAdam, 2018:7; Etzkowitz & Leydesdroff, 2000:112). The diversity embedded within the three primary spheres of industry, government and academia, pool together diverse interests and practices thereby allowing challenges and “puzzles for participants, analysts and policy makers to solve” (Etzkowitz & Leydesdroff, 2000:112). Triple helix organizations are therefore designed to strategically address salient industrial, technological and societal challenges (Gustafsson & Jarvenpaa, 2018:123). More recently this has been extended towards a quadruple framework which involves stakeholders at various stages throughout the university technology transfer (Cunningham, Menter & O’Kane, 2018:137). Quadruple helix relationships however are based on a shared research agenda and these sectors must collaborate to promote and benefit from: their relationship for greater creativity (Cunningham, Menter & O’Kane, 2018:137).

Universities abroad have placed greater emphasis on new innovations and their potential to translate promising research ideas and discoveries successfully into products and services that are for the benefit of both local communities and larger society. These universities provide funding opportunities and business development support to start-ups, provide an infrastructure for industry-sponsored research, develop collaborative industry-university educational and training programs and help students who have graduated to enter the workforce. Other technology transfer programs at universities are known to contribute to industrial innovation and catalyse economic growth through licensing, sponsored research and venture agreements (Dumova, 2015:57). Beyond encouraging innovation and stimulating local economic activity, higher education institutions can be involved in the dissemination of knowledge or technology transfer into the market place, which includes engineering technology, physical science technology, nanotechnology, medical technology and other specialised technologies geared to meet societal needs.

As new socio-economic problems continue to emerge and permeate the well-being of communities, greater engagement through the use of a quadruple framework, is critical to understanding university-community partnerships and how new innovations nurtured through this can ensure societal well-being. The participatory nature of community engagement therefore makes it conducive for bottom-up initiatives in the areas of innovation and sustainability, technology transfer and local or global connectivity (Dumova, 2015:66).

5. CONCLUSION

The study identified several key values and principles that cohered and formed inseparable synergies within the data. Thus instead of being discrete entities they overlapped and holistically form a solid pathway to guiding successful community engagement. Much of what was identified by the engaged sample resonated with those values and principles that are emerging within the scholarly literature abroad. More importantly these values and principles converge with participatory action learning and action research (PALAR) which is underpinned by the values of “participation, collaboration, communication, community of practice, networking and synergy” (Zuber-Skerritt, 2015:6). The concept of PALAR has been extended to other concepts such as “lifelong,” action learning which has been defined as “collaborative, shared leadership” and is guided by democratic, ethical human values and universal principles” (Zuber-Skerritt, 2011:222). Community based participatory research which is premised on “equitable partnerships resulting in long-term commitments from researchers and communities” and co-learning which fosters capacity building and development for sustainability (Smith *et al.*, 2015:2), may therefore form an important paradigm to guide engagement together with the values and principles identified. Whilst those detailed in the paper do not represent a final blueprint for engagement, those aspiring to undertake community engagement should embrace these values and principles together with participatory research to facilitate their scholarly and civic missions.

REFERENCES

Adamuti-Trache, M. & Hyle, A. E. 2015. Building university-community partnerships. In W J. Jacob, S E. Sutin, J C. Weidman and J L. Yeager (Eds.). *Community engagement in Higher Education: Policy reforms and practice.* Boston: Sense Publishers, 73-88.

Adebayo, O.W., Salerno, J.P., Francillon, V. & Williams, J.R. 2018. A systematic review of components of community-based organisation engagement. *Health & social care in the community*, 28: e474-e480.

Agbo, S.A. 2010. The University-based researcher in Indigenous communities: Participatory research as a dialogue for redefining the "Other" in university-community relations. In P. Inman and H. Schuetze (Eds.). *Community engagement and service mission of universities*. Leicester: NIACE Publications, 181-196.

Ahmed, S. M. & Palermo, A. G. 2010. Community engagement research: Frameworks for education and peer review. *American journal of public health,* 100(8): 1380-1387. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2901283/pdf/1380.pdf (Accessed 18 October 2016).

Albertyn, R. & Daniels, P. 2009. Research within the context of community engagement. In E. Bitzer (Ed.). *Higher education in South Africa: A scholarly look behind the scenes*. Stellenbosch: Sun Media, 409-428.

Bartkowiak-Theron, I. & Anderson, K. 2014. Knowledge in action: first steps to systematizing community engagement. In I. Bartkowiak-Theron and K. Anderson (Eds.). *Knowledge in Action: University-Community Engagement in Australia*. UK: Cambridge Scholars Publishing, 1-15.

Beere, C. A., Votruba,J. C. & Wells, G. W. 2011. *Becoming an engaged campus: A practical guide for institutionalising public engagement*. San Francisco: Jossey-Bass.

Benneworth, P. 2013. Towards the idea of the engaged university. In P. Benneworth (Ed.). *University engagement with socially excluded communities*. New York: Springer, 1-31.

Bhagwan, R. 2017. Towards a conceptual understanding of community engagement in higher education in South Africa. *Perspectives in Education,* 35(1): 171-185.

Bridger, J. C. & Alter, T. R. 2006. The engaged university, community development and public scholarship. *Journal of Higher Education outreach and engagement,* 11(1): 163-178. Available: http://openjournals.libs.uga.edu/index.php/jheoe/article/download/481/413 (Accessed 24 October 2016).

Bringle, R. G. & Hatcher, J. A. 2002. Campus-community partnerships: The terms of engagement. *Journal of social issues* 58: 503-516. Available: https://www.ncsu.edu/ncsu/extension/news/documents/7195858.pdf (Accessed 18 October 2016).

Centre for Higher Education Transformation. 2003. *CHET policy/ change dialogue report: Terms of engagement: renewing the role of the university as an urban institution*. Cape Town: Centre for Higher Education Transformation. Available: www.chet.org.za/files/CHET%202003%20Terms_engagement.pdf (Accessed 18 October 2016).

Cunningham, J.A., Menter, M. and O'Kane, C. 2018. Value creation in the quadruple helix: a micro level conceptual model of principal investigators as value creators. *R&D Management*, 48(1): 136 147.

Department of Higher Education and Training. 2014. White paper for post-school education and training: Building on expanded, effective and integrated post-school education system. *Government Gazette number 37229*, 15 January. Pretoria: Department of Education. Available: http://www.gov.za/sites/www.gov.za/files/37229_gon11.pdf (Accessed 18 October 2016)

Duke, C. 2009. Please, No More 'Business as Usual': What the harsh new world means for adult and higher education. *Adult education and development,* 72: 171-184. Available: https://www.dvv-international.de/index.php?id=621&L=1 (Accessed 18 October 2016).

Dumova, T. 2015. Engaging technology in University-community partnerships. In W J. Jacob, S E. Sutin, J C. Weidman and J L. Yeagar (Eds.). *Community engagement in higher education: policy reforms and practice.* The Netherlands: Sense Publishers, 51-71.

Etzkowitz, H. & Leydesdroff, L. 2000. The dynamics of innovation: from National Systems and 'Mode 2' to a Triple helix of university-industry-government relations. *Research Policy,* 29: 109-124.

Fellin, P. 2001. *The Community and the Social worker*. Belmont, CA: Brooks Cole Publishing Company.

Felin, T. & Zenger, T.R. 2013. Closed or open innovation? Problem solving and the governance choice. *Research policy,* 43: 914-925.

Franz, N. 2010. A holistic model of engaged scholarship: Telling the story across higher education's missions. *Journal of Higher Education Outreach and Engagement,* 13(4): 31-50. Available: https://scholar.google.com/citations?view_op=view_citation&hl=en&user=HhYEz5IAAAAJ&citation_for_view=HhYEz5IAAAAJ:Y0pCki6q_DkC (Accessed 18 October 2016).

Gustafsson, R. & Jarvenpaa, S. 2018. Extending community management to industry-university-government organizations. *R&D Management*, 48(1): 121-135.

Hall, B. & Bèrubè, L. 2010. Towards a new architecture of knowledge: The office of community-based research at the university of Victoria. In P. Inman and H. Schuetze (Eds.). *Community engagement and service mission of universities*. Leicester: NIACE Publications, 270-298.

Healey, M., Flint, A. & Harrington, K. 2016. Students as partners: Reflections on a conceptual model. *Teaching and learning inquiry,* 4(2): 1-13. Available: https://scholar.google.co.za/citations?user=mfA7lBwAAAAJ&hl=en&oi=sra (Accessed 18 October 2016).

Higher Education Academy. 2015. Framework for flexible learning in Higher Education. *The Higher Education Academy framework series.* Available: https://www.heacademy.ac.uk/system/files/downloads/flexible-learning-in-HE.pdf (Accessed 19 October 2016).

Holland, B. A. 2005. Reflections on community-campus partnerships: What has been learned? What are the next challenges? In P A. Pasque, R E. Smerek, B. Dwyer, N. Bowman and B L. Mallory. *Higher Education collaboratives for community engagement and improvement*. Ann Arbor: National forum on Higher Education for public good, 10-17. Available: http://thenationalforum.org/wp-content/uploads/2012/10/Wingspread_05_Final_Monograph.pdf#page=10 (Accessed 18 October 2016).

Holzer, J. K., Ellis, L. & Merritt, M. W. 2014. Why do we need community engagement in medical research? *Journal of investigative medicine,* 62(6): 851-855. Available: http://search.proquest.com.dutlib.dut.ac.za/central/docview/1786924268/fulltextPDF/1E599283773641F4PQ/1?accountid=10612 (Accessed 18 October 2016).

Inman, P. & Schuetze, H.G. 2010. The community engagement and service mission of universities. In P. Inman and H.G. Schuetze (Eds.). *The community engagement and service mission of universities. England: NIACE*, 1-9.

Lazarus, S., Bulbulia, S., Taliep, N. & Naidoo, A. V. 2015. Community-based participatory research as a critical enactment of community psychology. *Journal of community psychology,* 43(1): 87-98. Available: http://onlinelibrary.wiley.com/doi/10.1002/jcop.21689/epdf?r3_referer=wol&tracking_action=preview_click&show_checkout=1&purchase_referrer=www.google.co.za&purchase_site_license=LICENSE_DENIED (Accessed 18 October 2016).

Marullo, S. & Edwards, B. 2000. From Charity to Justice: The potential of university-community collaboration for social change. *The American behavioural scientist,* 43(5): 895-912. Available: http://search.proquest.com.dutlib.dut.ac.za/central/docview/214764927/F9249A270F654271PQ/3?accountid=10612 (24 October 2016).

Maxwell, J.A. 2005. *Qualitative Research Design : an interactive approach, 2nd ed.* Thousand Oaks, CA : Sage.

Miles, M.B. & Huberman, A.M. 1994. *Qualitative data analysis : an expanded sourcebook*, 2nd ed. Thousand Oaks, CA : Sage.

Mtawa, N. N., Fongwa, S. N. & Wangenge-Ouma, G. 2016. The scholarship of university-community engagement: Interrogating Boyer's model. *International journal of educational development,* 49(1): 126-133. Available: https://www.researchgate.net/profile/Sam_Fongwa/publication/299601418_The_scholarship_of_university-community_engagement_Interrogating_Boyer's_model/links/570265f008ae47378f664dc4.pdf (Accessed 18 October 2016).

Ncubu, L. B. 2010. Ubuntu: A transformative leadership philosophy. *Journal of leadership studies,* 4 (3): 77-82. Available: http://web.a.ebscohost.com.dutlib.dut.ac.za/ehost/pdfviewer/pdfviewer?vid=3&sid=b957b338-a037-4ac8-b229-5de67f3b4a84%40sessionmgr4010&hid=4114 (18 October 2016).

O'Mahony, S. 2007. The governance of open source initiatives: what does it mean to be community managed? *Journal of Management and Governance,* 11: 139-150.

Plummer, C. A., Allen, P & Lemieux, C. M. 2011. Transformation in action: Service- learning to promote social justice, empowerment and advocacy. In J. Birkenmaier, E. Burkemper, R J. Wilson, A. Cruce, J. Curley and J J. Stretch (Eds.). *Educating for social justice*. Chicago: Lyceum Books inc, 267-285.

Romose, M.B. 2002. The philosophy of Ubuntu and Ubuntu as a philosophy. In P H. Coetzee and A P J. Roux (Eds.). *The African philosophy reader*. New York: Routledge, 230-238.

Sandmann, L. R. 2008. Conceptualisation of the scholarship pf engagement in higher education: A strategic review 1996-2006. *Journal of Higher Education outreach and engagement,* 12(1): 91-104. Available: http://ce.educ.ubc.ca/files/2013/04/sandmann-conceptualization-of-scholarship.pdf (Accessed 19 October 2016).

Sandmann, L. R., Furco, A. and Adams, K. R. 2016. Building the field of Higher Education: A 20-year retrospective. *Journal of higher education outreach and engagement,* 20(2): 1-14. Available: http://openjournals.libs.uga.edu/index.php/jheoe/article/view/1588/907 (Accessed 18 October 2016).

Shanyanana, R. N. & Waghid, Y. 2016. Reconceptualising Ubuntu as inclusion in African Higher Education: Towards equalisation of voice. *Knowledge cultures,* 4(4): 104-120. Available: https://scholar.sun.ac.za/bitstream/.../**shanyanana_reconceptualizing_2016**.pdf (Accessed 28 October 2016).

Smith, S. A., Whitehead, M. S., Sheats, J. Q., Ansa, B. E., Coughlin, S. S. & Blumenthal, D. S. 2015. Community based participatory research principles for the African American community. *Journal of the Georgia public health association,* 5(1): 52-56. Available: https://www.ncbi.nlm.nih.gov/pubmed/26336653 (Accessed 18 October 2016).

Tindana, P.O., Singh, J.A., Tracy, C.S., Upshur, R.E., Daar, A.S., Singer, P.A., Frohlich, J. & Lavery, J.V. 2007. Grand challenges in global health: community engagement in research in developing countries. *Plos medicine, 4*(9), 1451-1455.

Weerts, D. J. & Sandmann, L. R. 2008. Building a two-way street: Challenges and opportunities for community engagement at research universities. *Rev. Higher Education,* 32(1): 73-106. Available: https://morgridge.wisc.edu/documents/building-a-two-way-street-challenges-and-opportunities-for-community-engagment-at-research-universities.pdf (Accessed 18 October 2016).

Wood, L. 2016. Community development in higher education: How do academics ensure their community-based research makes a difference? *Community development in higher education,* 1-17. Available: https://www.researchgate.net/profile/Lesley_Wood/publication/291554890_Community_development_in_higher_education_how_do_academics_ensure_their_community-based_research_makes_a_difference/links/56a618af08ae2c689d39d2c2.pdf (Accessed 18 October 2016).

Wood, L. & Zuber-Skerritt, O. 2013. PALAR as a methodology for community engagement by faculties of education. *South African journal of education,* 33(4): 1-15. Available: http://www.scielo.org.za/pdf/saje/v33n4/03.pdf (Accessed 18 October 2016).

Zuber-Skerritt, O. 2011. *Action leadership: Towards a participatory paradigm*. The Netherlands: Springer.

Zuber-Skerritt, O. 2012. Introduction. In O. Zuber-Skerritt (Ed.). *Action research for sustainable development in a turbulent world*. Bingley: Emerald Books, 3-27.

Zuber-Skerritt, O. 2015. Participatory action learning and action research (PALAR) for community engagement: A theoretical framework. *Educational research for social change*, 4(1): 5-25. Available: http://search.proquest.com/docview/1690648483/fulltextPDF/C0600C62E404447PQ/1?accountid=10612 (Accessed 18 October 2016).

TOWARDS THE INDIGENISATION OF MODE 3 KNOWLEDGE PRODUCTION: AN ENGAGED RESEARCH SCHEMA

CJ BURMAN & SS SEMENYA
UNIVERSITY OF LIMPOPO

Abstract

This article describes the rationale for the development of an engaged, Mode 3 research schema that aims to contribute to reducing the unintended consequences associated with medical pluralism in rural Limpopo Province, South Africa. The research schema re-frames medical pluralism from the perspective of resilience thinking, placing emphasis on resilience investment. The article critiques current efforts to reduce the unintended consequences of medical pluralism for being based on an imbalanced investment strategy. The imbalance is that current efforts to reduce the unintended consequences of medical pluralism typically focus on either 'structure' (healthcare systems) or 'agency' (health seeking practices) which tends to produce sub-optimal health-related outcomes. The research schema seeks to overcome this imbalance by reconceptualising the pluralistic healthcare environment in a way that is inclusive of both 'structure' and 'agency' — using indigenous decision making as the referential axis of enquiry. The research schema uses the Mauri Model decision making framework and intentionality as guiding heuristics which are activated using a research method called 'AART (abduction, abstraction, retroduction and testing)'.

Keywords: complex adaptive systems thinking; epistemic justice; medical pluralism; resilience investment; SenseMaker®

1. INTRODUCTION

The article provides the rationale that underpins efforts to develop an indigenised form of a Mode 3 knowledge production research schema. The research schema is designed to develop the prototype ideas and strategies that have been co-produced in Waterberg District, Limpopo Province by a community-university partnership into implementable innovations. The focus of the action-oriented partnership has focused on reducing the unintended consequences of medical pluralism on the HIV and AIDS epidemic — with medical pluralism referring to the "employment [by people] of more than one medical system or the use of both conventional and complementary and alternative medicine (CAM) for health and illness" (Wade *et al*., 2008:829). Whilst the partnership has co-produced beneficent, self-sustaining outputs (Burman & Aphane, 2019), it is still the case that Limpopo Province has poor levels of adherence to antiretroviral therapy (ART) "due to the use of alternative or traditional medicines" (SANAC, 2016:77). However, efforts that were made to expand the approach developed in Waterberg District to other areas were frustrated by two constraints.

The first constraint relates to the partnership being situated at the periphery of mainstream thinking with regard to reducing the unintended consequences of medical pluralism. For just over fifteen years the World Health Organization (WHO, 2002; WHO, 2013) has advocated for increased structural integration of the traditional and biomedical health sectors in order to produce "greater coordination between the two systems and an ultimate improvement in patient care" (Audet, Ngobeni & Wagner, 2017:5). In the context of HIV and AIDS, most research aimed at reducing the unintended consequences of medical pluralism on the HIV and AIDS epidemic in southern Africa follows within the structural paradigm promoted by the WHO and has consequently focused on improving the integration of, and/or collaboration between, the traditional and biomedical healthcare systems — for examples see Kisangau *et al*. (2011, Tanzania) and Kayombo *et al*. (2007); Furin (2011, Lesotho) and Leclerc-Mandlala and Hallin (2016, Mozambique & South Africa). These efforts to improve the structural relationships between the two healthcare systems have delivered variable beneficent results, but, on the whole, these efforts have been "short-lived" (Leclerc-Madlala *et al*., 2016:186; also see Mendu & Ross, 2019).

The current consensus that 'structure' (healthcare systems) should be the entry point for reducing the unintended consequences associated with medical pluralism places the findings of the community-university partnership at the periphery of mainstream thinking because the beneficent impacts have occurred though grassroots 'agency' (health seeking practices) — without recourse to either the traditional or biomedical healthcare systems. This makes it difficult for the partnership to make a

convincing argument that the strategies that have been developed are coherent and worthy of further support.

The second constraint is pragmatic. Whilst there is convincing evidence that the unintended consequences of medical pluralism on the HIV and AIDS epidemic is a local (Shirindi & Makofane, 2015; Nemutandani, Hendricks & Mulaudzi, 2016), national (Pantelic *et al*., 2015) and regional (Moshabela *et al*., 2017) issue that is associated with delays in HIV testing and adherence to ART, there have been few interventions designed in partnership with affected communities to alter this trend (Leclerc-Madlala *et al*., 2016). Despite encouraging indicators that the community-university partnership in Waterberg District has co-produced both beneficent and self-sustaining outputs (Burman & Aphane, 2019); the ameliorative strategies are limited to a relatively small area which diminishes the credibility of the strategies to be applied elsewhere. The partnership consequently decided that an innovative approach was required to overcome the constraints described above.

In order to begin the process of overcoming the constraints described above, the partnership invited stakeholders from civil society, the private sector, government representatives and academia to a two day knowledge sharing workshop in the last quarter of 2016. At the workshop the partnership findings and strategies that had been developed to reduce the unintended consequences of medical pluralism were shared. After problematising the partnership's exclusive focus on agency (health seeking practices) and contextualising the approach within the structural (health care systems) paradigm, it was agreed that an alternative approach should be considered. The discussions that followed at the workshop focused on the possibility that the exclusive focus on either 'structure' (health care systems) or 'agency' (health seeking practices) was not reaching the full potentials that could be achieved by undertaking action-oriented research that simultaneously combines both 'structure' and 'agency'. It was subsequently decided that it may be possible to exit the current sub-optimal 'either/or' situation by re-framing the medical pluralism challenge using resilience thinking that is inclusive of both 'structure' and 'agency' as the conceptual basis of enquiry and that the approach should be piloted using the research schema that is described below.

The article reflects on the research schema that was subsequently designed, paying particular attention to situating indigenous perspectives within a Mode 3 knowledge production process. In order to describe the rationale behind the research schema design the following information is provided: (1) theory relating to modes of knowledge production processes; (2) insights into resilience thinking and resilience investment; (3) a brief summary of indigenous research in sub-Saharan Africa, and (4) relevant aspects of the community-university partnership experiences that motivated the initiative. This is followed by the theory that underpins the research schema and the data collection instrument that will be applied to catalyse the recontextualisation of medical pluralism using indigenous decision making as the referential axis of enquiry. The discussion aims to pull this seemingly eclectic bundle into a coherent statement which argues that recontextualising medical pluralism using resilience investment as a guiding heuristic could enable a qualitatively different perspective for re-imagining ways to reduce the impact of the unintended consequences associated with medical pluralism on the HIV and AIDS epidemic in Limpopo Province — and possibly beyond.

2. BACKGROUND INFORMATION

2.1 'Modes' of knowledge production in an engaged context

The current landscape of engaged research in South Africa is influenced by local discourses reflecting knowledge production debates about 'who to learn with, what to learn about and how to learn' (Roux *et al*., 2017). At a global level the South African perspectives have similarities with conceptual debates relating to 'modes' of knowledge production. Just over two decades ago Gibbons *et al*. (1994) argued that there had been a shift from conventional forms of knowledge production associated with academe as the 'ivory tower' producing knowledge for the sake of knowledge generation, towards fragmented pockets of what they described as Mode 2 knowledge production.

Mode 2 knowledge production is associated with temporary formations of transdisciplinary expertise which is inclusive of community perspectives dedicated to the pursuit of democratising the co-production of 'socially robust' knowledge (Nowotny, 2003). Despite multiple critiques (for one example see, Bernstein, 2015), the principles of the Mode 2 school of thought continue to influence multiple spheres of knowledge production (for examples, see Temper & Del Bene, 2016 with regard to

environmental sciences; Thoren & Breian, 2016, with regard to sustainability science; Zapp & Powell, 2017, with regard to policy making and Soofi, 2018, with regard to the health sciences).

From the Mode 1 and Mode 2 debates, emerged a third category, Mode 3 knowledge production, which is associated with distributed, multi-modal systems of innovation that connect and activate the collaborative potentials held within diverse knowledge clusters (Carayannis & Campbell, 2006). Mode 3 — sometimes labelled the 'Mode 3 Innovation Ecosystem', or the 'Quadruple Helix' of knowledge production — represents the context of knowledge production which accelerates "innovation across scientific and technological disciplines, public and private sectors (government, university, industry and non-governmental knowledge production, utilisation and renewal entities) and in a top-down, policy-driven as well as bottom-up, entrepreneurship-empowered fashion" (Carayannis & Campbell, 2009:203).

The Mode 3 Innovation Ecosystem is inclusive of both Mode 1 and 2 knowledge production techniques and emphasises the benefits of drawing diverse knowledge systems and the associated contextual enabling layers together in order to activate innovation processes (Tengo *et al*., 2014). This position reflects a conceptualisation of the research to innovation process as being an interconnected "form of knowledge production (knowledge creation) and innovation as a form of knowledge application (knowledge use), within a more general framework and design of knowledge (a knowledge architecture)" (parenthesis in original, Carayannis, Campbell & Rehman, 2016:17).

2.2 Resilience thinking

Resilient systems are considered to be systems that have the ability to bounce back to their original condition following a disruption because of the complex systemic relationships that sustain them (Rickles, Hawe & Shiell, 2007). In the context of health, the WHO argue that the ability of resilient systems to recover from shocks is because they are relatively unpredictable complex systems which are "resistant to change" and caution that change efforts must be mindful that it is often the case that "seemingly obvious solutions sometimes worsen a [complex] problem" (WHO, 2009:19). Resilience can be defined from both abstract and pragmatic perspectives.

At the level of abstraction, the term resilience can be used in either a descriptive or normative way. From the descriptive perspective, resilience refers to the persistence of both system functioning and system identity, regardless of exogenous shocks — such as deliberate efforts to change them (Dahlberg, 2015). The normative application of the expression resilience is now associated with efforts to manage resilient systems — which are, by default, complex — by amplifying positive feedback within the system as a mechanism to coach the system towards desired, ameliorative outcomes, rather than try and engineer a predetermined change in mechanical ways (Seville, Van Opstal & Vargo, 2015).

At a pragmatic level resilience thinking distinguishes between two types of resilience: specified and general (O'Connell, Walker, Abel & Grigg, 2015). Specified resilience — sometimes referred to as Level 1 resilience (Allenby & Sarewitz, 2011) — refers to the robustness of a particular *part* of a system to absorb shocks, or disruptions, without losing systemic functionality or identity. The characteristics of specified resilience are known linear, cause-effect interactions between parts within a *complicated* system. Managing this type of mechanical, or technical, system requires problem-solving, reductionist methodological techniques associated with the Cartesian-Newtonian paradigm that are well suited to analysing which components of the system are vulnerable to established threats (Carpenter, Walker, Anderies & Abel, 2014).

General resilience — sometimes referred to as Level 2 resilience (Allenby & Sarewitz, 2011) — refers to the *holistic* capacity of the system to recover from a shock. The characteristics of general resilience include some non-linear interactions between the components of the system which means that a *complexity* perspective is required. Managing this type of system requires a shift in mind-set towards complex adaptive systems thinking (Sturmberg, O'Halloran & Martin, 2012) — whilst being mindful that complex adaptive thinking entails being aware that complex systems are susceptible to "minor changes [which may] produce disproportionately major consequences" due to the non-linear interactions of system parts (Snowden & Boone, 2007:70). Managing complex adaptive systems requires on-going engagement with the problem and reflexive adaptation because, as the WHO (2009:19, see above) cautioned, apparent solutions may unintentionally catalyse new problems to

emerge (Poli, 2013). For an overview of the characteristics of specified and general resilience see Table 2 in Van der Merwe, Biggs & Preiser (2018:4).

Despite the categorisation of specified resilience and general resilience as separate typologies, most anthropogenic systems, such as healthcare systems, are an interdependent combination of the two. Consequently, it is generally agreed that resilience investments need to prioritise the interdependences between both resilience typology requirements (Folke *et al*., 2010). This is because *complicated*, specified (Level 1) resilience systems are invariably situated within *complex* anthropogenic, general resilience systems (Level 2) — meaning that even the most robust forms of specified resilience can collapse if critical threshold levels of general resilience are exceeded (Van der Merwe *et al*., 2018).

2.3 Indigenous research in a sub-Saharan context

Indigenising research in sub-Saharan Africa has been influenced by — and in turn has influenced — a diverse coalescence of global perspectives relating to, *inter alia*: imperialism and culture (Said, 1993), subaltern critique (Spivak, 1988), feminist theory (Hooks, 1994), pedagogical method (Freire, 1974/2005), international development (Chambers, 1997), pragmatism (Chilisa & Tsheko, 2014) and unequal power relations between academe and indigenous and local knowledge/s (ILK) (Ocholla, 2007). Indigenising research problematises the hegemony of the dominant form of knowledge production — research methodologies derived through Euro-Western frames — because it values and incorporates transdisciplinary participation of indigenous knowledge holders, community voices and academics throughout the research process. By default this represents a multi-perspective form of research that prioritises the democratisation of the knowledge production process in terms of problem and research methodology definition, as well as dissemination strategies (Johnson *et al*., 2015; Chilisa, Major & Khudu-Peterson, 2017; Berger-Gonzalez *et al*., 2016).

Despite efforts to address issues relating to ‘epistemic [in]-justice’ (Maistry & Lortan, 2017; Paphitis, 2018) and the ‘decolonisation of knowledge’ (Brock-Utne, 2017; Roy & Nilsen, 2016), indigenous research tends to be situated at the periphery of mainstream educational practices (Chilisa, 2017). It has been argued that this marginalisation is sustained because, for example, ILK is often excluded from research agendas (Brandt *et al*., 2013) and invariably research validation tends to be framed through Euro-Western scientific norms (Sillitoe, 2010) — despite reported inconsistencies within those schemas (Sturmberg, 2019; Ross & Mitchell, 2018). It has also been argued that the combination of these types of biases towards Euro-Western conventions implicitly contributes towards the on-going “othering” of indigenous perspectives which are often “central to the [sub-Saharan African research] story” (Mkhwanazi, 2016:7; also see, Pryor *et al*., 2009). In the context of the focus of the action-oriented research schema and medical pluralism that is being reported on, it is, by default, necessary to indigenise the research process.

2.4 The community-university partnership and indigenous decision making

2.4.1 The engaged partnership

The engaged partnership represents a Mode 2 knowledge production collaboration between the Community Engagement Unit, University of Limpopo, and the Waterberg Welfare Society (WWS) that focused on agency (health seeking practices), rather than structure (healthcare systems). WWS is a not for profit organisation that focuses primarily on wellness in the context of the HIV and AIDS epidemic in the rural Waterberg District, Limpopo Province, South Africa (WWS, 2017). The partnership has focused on developing resilience to localised bio-social challenges which the community partner identified relating to HIV and AIDS and has produced both practical and strategic outputs. The practical output is a low cost, self-sustaining strategy to improve adherence to ART and a reduction in internalised stigma among traditionalists living with HIV (Burman & Aphane, 2019) — both of which have been listed as priority areas in the current South African National Strategic Plan for HIV, TB and STIs 2017-2022 (NSP) (SANAC, 2017). The strategic output is a nascent engaged research methodology called the Taming Wicked Problems Framework (Burman, Aphane & Mollel, 2017).

The Taming Wicked Problems Framework, Figure 1, was designed to be an engaged research methodology that necessarily requires active participation — thus indigenous perspectives — from multiple spheres within the community-university partnership.

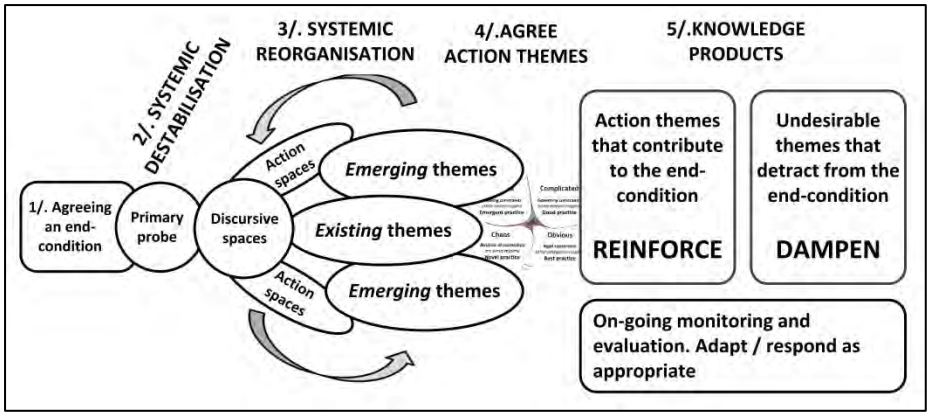


Figure 1: The Taming Wicked Problems Framework. *Source:* adapted from Burman (2018b:6)

The Taming Wicked Problems Framework was designed to incorporate both *complicated* (Level 1) and *complex* (Level 2) dynamics that are associated with anthropogenic systems. The full details of the Taming Wicked Problems Framework have been described elsewhere (Burman, 2018b, Burman *et al*., 2017) so only a summarised version is provided emphasising decision making (Column 3), Table 1.

Table 1: A summary of the main phases in the Taming Wicked Problems Framework

Phases		Description	Decision making
1/. Agreeing an end-condition		The first step is for the partnership to agree and co-define the broad parameters of the project. This statement does not seek to define what will be achieved, but rather, the conceptual boundaries of the ambition of the partnership. It is not a definitive statement because action oriented processes invariably involve indeterminate forms of praxis that may require that the project ambition be altered.	Partnership (full participation)
2/. Systemic destabilisation	Primary probe	The primary probe represents a deliberate shock to the anthropogenic system that is designed to destabilise the system because destabilised systems are more prone to adaptive changes (Pincus & Metten, 2010) than systems that are stable — or in a state of "stuckness" (Bishop & Dzidic, 2014:14).	Partnership leadership (limited participation)
3/. Systemic reorganisation	Discursive and action spaces	If the 'primary probe' is effective (i.e., it destabilises the anthropogenic system) there will be a period of indeterminate re-orientation, or praxis, as the system — influenced by the shock — re-organises itself. The re-organisation process is primarily driven by both collective and individual sense making (Dervin, 1998, Weick, 1995) regarding the utility of the 'primary probe'.	The community partner (limited participation)
	Existing and emerging themes	As the systemic re-organisation begins to re-stabilise the identity and functioning of the system alters slightly. In order to capture these changes existing and emerging themes that contribute to the 'end condition' are identified using qualitative research methods.	The community partner identified the themes and the university analysed the narratives
4/. Agreeing action themes		The partnership then decides which themes are critical themes to focus on. This is a pragmatic course of action because in this type of resource scarce environment, it is not cost effective to focus on every emergent theme.	The partnership — but biased towards the community
5/. Knowledge products		The purpose of this phase it to determine if the action themes can be developed into robust 'knowledge products' that can be applied as intervention tools and/or — perhaps — be developed into third stream income generation opportunities.	The partnership (full participation)

Table 1 provides a summarised version of the different phases in the Taming Wicked Problems Framework (for full details of the systemic logic of this process, see Burman & Aphane, 2016). Two

reflections from the development and application of the Taming Wicked Problems Framework experience have influenced the research schema that is reported on below. The first reflection relates to the importance of decision making that is inclusive of indigenous voices and the second is the challenge of developing 'knowledge products' into robust entities (Table 1).

2.4.2 Indigenising partnership decision making

During the development of the Taming Wicked Problems Framework participation was deliberately problematised, rather than assuming that full participation would necessarily contribute to the project goals. In order to achieve optimal participatory impact, the partnership focused on *who*, or *which components* within the partnership, held the appropriate experience and/or expertise in particular knowledge domains to inform different phases of the project. This negotiated process enabled indigenous perspectives that emerged from WWS' experiential, local knowledge to co-influence the project outputs, alongside the theoretical knowledge held by the university team. One example of the utility of the approach is the identification and subsequent focus on one 'emerging theme' which was labelled the 'origins of HIV' (Table 1). When the community partner emphasised the importance of the 'origins of HIV', the university representatives could make no sense of the relevance of the theme. However, a subsequent literature review revealed that the influence of 'disease causation' on health seeking practices has been documented for over 50 years (Dubois, 1961) and continues to influence debates relating to pluralistic healthcare environments (Ibeneme, Eni, Ezuma & Fortwengel, 2017).

2.4.3 Developing robust knowledge products

Although the partnership has been able to develop a low cost, self-sustaining programme to increase adherence and reduce internalised stigma among traditionalists living with HIV, the efforts to develop innovative 'knowledge products' (Table 1) from these findings has been frustrating. Whilst acknowledging that the findings are localised, it is believed that the primary impediment to beginning the ambition of developing 'knowledge products' is hampered by the absence of a suitable network of potential collaborators. This motivated the partnership to problematise the knowledge product challenge with a broader, Mode 3 network of collaborators at the knowledge sharing workshop in 2016 which catalysed the research schema that is introduced below.

3. THE RESEARCH SCHEMA

The following sections contain an abridged overview of the conceptualisation of the project design, the research schema and the data collection instrument that will be used in Phase One of the project in order to begin the process of reconceptualising medical pluralism using indigenous decision making as the referential axis of enquiry (for the detailed systemic logic behind the research schema, see Burman, 2018a).

3.1 The project design

As far as the authors are aware, most — if not all — of the previous research associated with medical pluralism has been conceptualised using conventional Euro-Western academic frames (i.e., the Cartesian method is applied and the subsequent results are descriptions of the impact of medical pluralism in localised settings). Implicitly, this type of research design assumes that the pluralistic healthcare system is a *complicated*, Level 1, system within which cause-effect interactions explain health seeking practices. However, as with most anthropogenic systems, the likelihood is that the pluralistic healthcare environment contains some *complexity* (i.e., represents both a Level 1 and 2 system). From a resilience investment perspective, exclusively relying on a Cartesian approach — which is suited to Level 1 analyses — may represent an epistemological weakness within the context of action-oriented research relating to medical pluralism because the pluralistic healthcare system reflects the characteristics of both specified (Level 1) and general (Level 2) resilience.

Not only does the Euro-Western frame represent a potential epistemological weakness, it may also represent an ontological bias that 'others' indigenous perspectives. It has been claimed that this bias implicitly "ignores, marginalizes and suppresses other [indigenous] knowledge systems and ways of knowing" which, from an action-oriented research perspective, represents an incomplete methodological stance (Chilisa, 2005:659). In order to attempt to overcome both the epistemological and ontological concerns, the research schema was designed to focus on both Level 1 and 2

influences within the pluralistic healthcare environment using indigenous decision making as the referential axis of enquiry.

3.2. The conceptual design of the research schema

The design of the research schema was influenced by three factors: indigenous decision making, intentionality (Level 2 influences) and exploiting the existing bodies of knowledge relating to medical pluralism in eastern and southern Africa (primarily Level 1 influences).

3.2.1 Indigenising decision making

The decision to focus on indigenous decision making was influenced by experiences during the application of the Taming Wicked Problems Framework in Waterberg District and theoretical insights associated with the Mauri Model decision making framework. The Mauri Model decision making framework is a "template within which indigenous values are explicitly empowered alongside scientific data" that was developed in New Zealand (Morgan & Fa`aui, 2017:4). The Mauri Model decision making framework represents a historical shift in New Zealand which endorses and integrates indigenous values within a government-led strategy to mitigate the impact of a national environmental disaster (Faaui, Morgan & Hikuroa, 2017). The utility of the Mauri Model decision making framework was such that it has subsequently been incorporated into other action-oriented projects (Oetzel *et al*., 2017).

What makes the Mauri Model decision making framework relevant to the eastern and southern African context is that approximately 17.5% of the New Zealand population are of Māori dissent (Statistics New Zealand, 2013). The Māori also constitute a historically marginalised group, yet their values were uniquely incorporated into the planning and implementation of a national environmental disaster mitigation strategy. In contradistinction, in eastern and southern Africa, the majority of the population that are affected by medical pluralism are of African dissent, yet — as suggested by Ntseane and Chilisa (2012) — their value systems may have been inadequately represented in the past. Consequently, the Mauri Model decision making framework is used as a guiding metaphor for the research schema that relates to the epistemic necessity of developing "nuanced, context-sensitive" insights from the perspectives of the intentional, indigenous actors who have experience of negotiating pluralistic healthcare environments (Hernandez *et al*., 2017:5).

3.2.2 Intentionality

Intentionality is used as a conceptual guide for the research schema from both descriptive and metaphorical perspectives. The descriptor refers to empirical evidence that some people within the pluralistic healthcare environment in sub-Saharan Africa "straddle [and utilise] two health-worlds simultaneously" (Moshabela *et al*., 2017:4), opting to pay for traditional services rather than biomedical services that are freely available at public health facilities (Audet *et al*., 2017). The metaphor relates to Husserl's phenomenological conceptualisation of intentionality as an act that "depends not just on which object the act represents but on a certain conception of the object represented" (McIntyre & Smith, 1989:154). Simply stated, the descriptor — medical pluralism — as a standalone entity may mask the discrete indigenous sense making processes that influence the pluralistic patterns of health seeking practices in eastern and southern Africa — thus the metaphor is used to reinforce the necessity of investigating the 'whys' that make the pluralistic healthcare environment so resilient to change efforts. The focus on both indigenous decision making and intentionality are activated through a research method associated with critical realism.

3.2.3 Critical realism and 'AART'

The research schema applies a research method developed by Decoteau (2017:58) called "AART (abduction, abstraction, retroduction, testing)". Decoteau developed the 'AART' method using theories associated with critical realism to challenge her own seemingly contradictory findings relating to medical pluralism in South Africa. The phases of the 'AART' method include:

1. Abduction, which requires recontextualising the object of enquiry; identifying the contextual social relations and structures that influence actions and then identifying — wherever possible — the relationships the object of enquiry has with the influential social relations and/or structures that affect actions. The overall objective of this phase is to enable novel "hypothesis-generation for

innovative theorizing" about the object of research (Decoteau, 2017:72) which are used to shape the subsequent phases of the research method;
2. Abstraction, which requires using the recontextualised findings to consider new theoretical perspectives about the object of enquiry;
3. Retroduction, which requires constructing new models that could explain how the emergent abstraction would operate in practice;
4. Testing, which involves undertaking empirical research to determine the utility of the proposed models in real-world settings (Decoteau, 2017:71-73).

The recontextualisation is not exclusively framed by indigenous decision making, but represents "a dialectical interrogation of one's own familiar position, other stances [i.e., Level 2, indigenous stances], and the domain of literature targeted for assumption challenging [Level 1]" using indigenous decision making as the referential axis of enquiry (Alvesson & Sandberg, 2011:252). In this application of the 'AART' model the 'literature targeted for assumption challenging' is the body of knowledge relating to medical pluralism using a comprehensive set of localised findings relating to traditional medicine use by Stanifer *et al*. (2015) and factors that influence linking and retaining people living with HIV in care using a global meta-synthesis by Flores, Leblanc & Barroso (2016). The purpose of this phase is to recontextualise ('abduction') the existing Euro-Western bodies of knowledge — using indigenous decision making as the referential axis of enquiry — in order to identify any 'assumptions' that can be beneficently challenged and built on during the 'abstraction, retroduction and testing' phases.

3.3 The data collection instrument: SenseMaker®

The abductive purpose of Phase One of the action-oriented research is to reconceptualise medical pluralism from the perspective of indigenous decision makers (the first 'A' in 'AART'). The data collection instrument that will be applied to catalyse the recontextualisation is proprietary software licenced by Cognitive Edge called SenseMaker® (Van der Merwe *et al*., 2019). As far as the authors are aware, SenseMaker® has not been used in the context of medical pluralism, but has been applied in other contexts including child, early and forced marriage in Syria (Bakhache *et al*., 2017); gender relations in sub-Saharan (DFID, 2014) and climate change in Australia (Lynam & Fletcher, 2015). The decision to use SenseMaker® was primarily influenced by the opportunity for the respondents to self-signify their own stories from the perspective of both structure (healthcare systems) and agency (health seeking practices) and to use polymorphic triads because the combination represents a first step towards indigenising the research process.

3.3.1 Self-signification

Self-signification means that the respondent self-codes their own story against environmental factors that could have influenced decision making and/or actions represented in their story. The benefit of this approach is that it begins the process of indigenising the research process because the "power of interpretation is at the level of the subject; it is the respondent who provides the data and signifies what it means, rather than the data being mediated [coded] by experts" thereby reducing Euro-Western, or other expert-informed, analytical bias/es (Mausch *et al*., 2018:3).

3.3.2 Triads

Triads enable the respondents to self-signify their story against three environmental co-factors that could have influenced their story. For example, if the story prompt related to an event in the last three days, one triad might include the following environmental factors: Sleeping, Relaxing and Working. The respondents are requested to situate their story in a position within the triad that best reflects the context from which the story emerged. As each story is loaded on to the server, the aggregate database is developed and during the analysis phase both the patterns relating to the aggregate database, as well as individual stories are available, Figure 2.

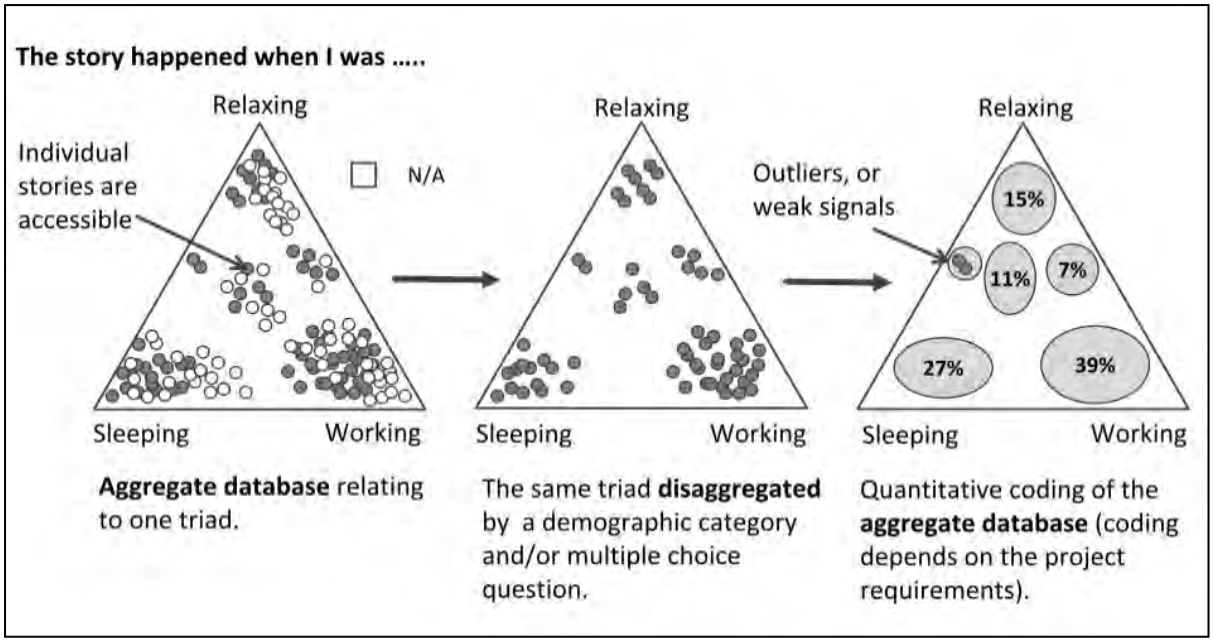


Figure 2. An imagined triad with a representation of a complete data set and a basic analysis

Each circle on the screen represents one respondent's story. By clicking on one story, or selecting a cluster of stories, the contents of the narrative is available for in depth qualitative analysis. Basic statistical analyses, such as correlations, t-tests and three dimensional modelling is enabled by the functionality of the SenseMaker® software (Lynam & Fletcher, 2015).

It is also possible to undertake more sophisticated analyses by exporting the data to Tableau V.10.1.5, SPSS (IBM SPSS Statistics V.24.0.0.0) and R scripts (R V.3.4.0) depending on the specific project requirements (Bartels *et al*., 2018).

3.3.3 Polymorphic triads

In this instance, the application of the SenseMaker® instrument has been enabled through a partnership with the Cynefin Centre, University of Bangor. The Cynefin Centre has initiated a global project called the Making of Meaning (The Cynefin Centre, 2018). Local project partners are supplied with a list of anthropogenic polymorphic triads which are subsequently adapted to the partner's project focus.

The Mode 3 partnership extended the polymorphic concept to include the findings of Stanifer *et al*. (2015) and Flores *et al*. (2016), Figure 3.

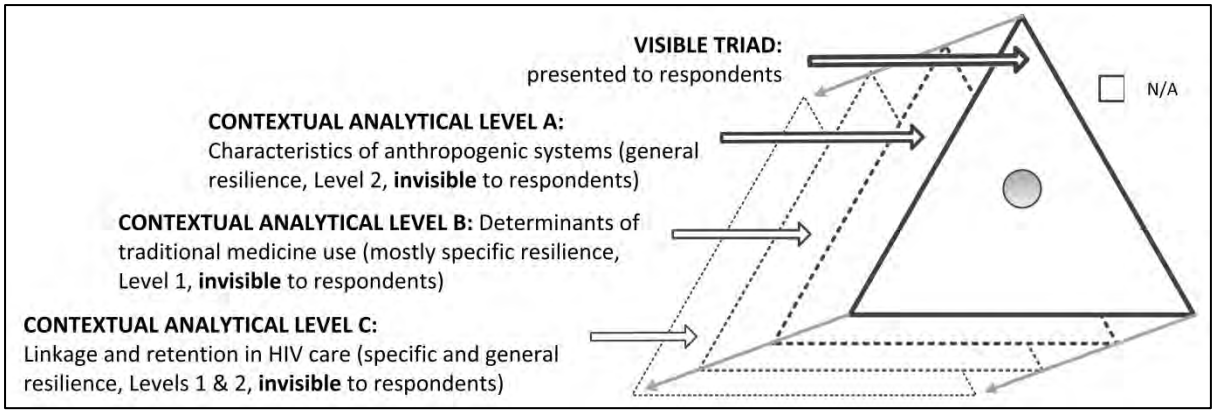


Figure 3. A polymorphic triad with the three levels of analysis. *Source*: adapted from Burman (2018a)

The purpose of the polymorphic design is to begin the 'AART' research process. The design enables an analytical recontextualisation of the pluralistic healthcare environment which is inclusive of both specific (Level 1) and general (Level 2) resilience using indigenous decision making as the referential axis of enquiry.

The analytical recontextualisation is not — and cannot be — a precise methodological, or analytical, process because the boundaries between Levels 1 and 2 are necessarily blurry due to the interdependencies between specified and general resistance. Nevertheless, the approach is pragmatic because it enables the first 'A' in 'AART' to be activated in preparation for the subsequent phases. In the pilot data collection instrument — which is available on request — there are six polymorphic triads which relate to all of the findings reported on by Stanifer *et al*. (2015) and Flores *et al*. (2016).

These findings are applied in the triads because they are inclusive of structural factors (healthcare systems) and health seeking practices of affected individuals (agency) — as well as the broader socio-cultural "systems that patients navigate" (Flores *et al*., 2016:126).

Table 2 provides a summary of data collection instrument that will be applied.

Table 2: An overview of the SenseMaker® instrument. For full details see Burman (2018a)

Tools Data collection	Description	Details / purpose
Story prompt	The respondent is requested to provide a story they have first-hand experience of relating to the object of research.	▪ An open-ended and ambiguous story prompt is used to reduce social desirability bias (Bartels *et al*., 2018); ▪ The process of recalling a story that the respondent has first-hand experience of triggers memories relating to the contextual field within which the story was situated that can be applied when answering the requests that follow (Mausch *et al*., 2018).
Polymorphic triads	See Figure 3.	▪ To enable multiple "dialectical interrogation[s] of one's own familiar position, other stances [i.e., indigenous stances], and the domain of literature targeted for assumption challenging" (Alvesson & Sandberg, 2011:252).
Dyads	A polarity along which the respondents are asked to situate their story.	▪ Using the principle of Aristotle's Golden Mean, with one polarity being an excess and the other a deficiency, the dyads can be used to challenge perceived wisdoms relating to the object of research as well as to test new hypotheses (The Cynefin Centre, 2018).
Multiple choice questions	Questions relating to the object of research that are derived from previous research and/or intuition.	▪ To enable the aggregate database to be disaggregated into niche research areas for in depth analysis.
Change stories	The participants are requested to share stories relating to change strategies, or factors, that catalysed different types of health seeking practices	▪ To generate 'Most Significant Change Stories' (Dart, 2003) relating to the types of changes that respondents made whilst negotiating their pluralistic healthcare environment.
Demographic material	The demographic categories corresponded with the last South African National HIV Prevalence, Incidence and Behaviour Survey, 2012 (Shisana *et al*., 2014).	▪ To enable the aggregate database to be disaggregated into relevant variables, or influential factors (such as age, gender, etc.) during the analysis phase; ▪ To enable comparisons between the data collected and previous research by Shisana *et al.* (2014).
Data analysis		
Online data retrieval	Data is retrieved from the server.	▪ Real-time data retrieval (UNDP, 2013)
Spatial analysis of qualitative patterns	See Figure 2.	▪ Visual analysis represents the first step of the analysis in order to identify patterns of responses that correspond with previous research findings, contradict previous findings or represent novel patterns.
Quantitative analysis	Basic quantitative analytical functionality is built into the software.	▪ To undertake basic statistical analyses, such as correlations, t-tests and three dimensional modelling (Lynam & Fletcher, 2015).
Exporting data option	To expand the analytical statistical options.	▪ To enable more sophisticated quantitative analyses, using Tableau V.10.1.5, SPSS (IBM SPSS Statistics V.24.0.0.0) and R scripts (R V.3.4.0) depending on the specific project requirements (Bartels *et al*., 2018).

4. DISCUSSION

From the perspective of the engaged, Mode 3 research schema, it is believed that resilience thinking offers an emergent opportunity to open novel spaces with which to critically contribute to the current efforts to improve the management of the pluralistic healthcare environment in Limpopo — and possibly beyond.

4.1 Descriptive resilience in the context of medical pluralism

In a descriptive sense, medical pluralism demonstrates the hallmarks of a resilient system because — despite efforts to reduce the unintended consequences — the pluralistic healthcare system has tended to continuously bounce back to its original condition. From a normative perspective, the attempts to manage the resilient, pluralistic healthcare environment has followed the WHO's recommendations of improving the structural relationships between the traditional and biomedical systems. These efforts to increase integration of, or collaboration between, the two healthcare systems have produced some beneficent result,(for examples, see Mbeh *et al*., 2010, Audet *et al*., 2013); yet, typically, these results have been 'short-lived' — which is, most likely, attributable to the ability of complex systems to 'bounce back' to their original condition.

4.2 Normative resilience in the context of medical pluralism

The mainstream focus on the structural relationships between the traditional and biomedical healthcare sectors represents a coherent contribution to building resilience to the unintended, health-related consequences associated with medical pluralism. However, from a resilience investment perspective, the exclusive focus on the structural relationships may represent an imbalanced strategy. The reason for this is that the structural focus represents a Level 1, specified form of management that only focuses on *complicated* aspects of the pluralistic healthcare environment. Typically, a balanced resilience investment strategy needs to appropriately consider both Level 1 and 2 requirements if optimal outcomes are to be achieved. Level 2 management strategies require an on-going, adaptive engagement strategy in order to build resilience within *complex*, anthropogenic systems. Overlooking the influence of Level 2 investment requirements risks a collapse in the Level 1 efforts if critical Level 2 thresholds are exceeded.

In this instance, there is no evidence to indicate that the Level 1 efforts are at risk of collapse, but it is suggested that only applying Level 1 strategies may be producing sub-optimal results — which is emphasised by the Department of Health representatives in 2016 who indicated that the poor levels adherence to ART in Limpopo Province persist 'due to the use of alternative or traditional medicines'. From the perspective of resilience thinking, it is logical to reinforce the Level 1 efforts with Level 2 strategies. It is believed that the community-university partnership that has been reported on in Waterberg District — despite the frustrations described above — represents a nascent strategy that has enabled action-oriented, Level 2 spaces to be opened. However, that Level 2 strategy also produced sub-optimal outputs. Consequently, the research schema that has been reported on attempts to begin the process of devising complementary Level 1 and 2 strategies that can contribute to reducing the unintended consequences of medical pluralism on the HIV and AIDS epidemic.

4.3 The rationale for the research schema: combining both Level 1 and 2 entry points

The 'AART' research model has been framed by the following factors:

1. The pluralistic healthcare environment in eastern and southern Africa has been reframed in a descriptive sense as a resilient system because it has a tendency to bounce back to its initial condition after efforts have been made to alter it;
2. Both the WHO's recommended 'structural' (healthcare systems), Level 1, strategy to reduce the unintended consequences of medical pluralism and the focus on 'agency' (health seeking practices), Level 2, by the community-university partnership have produced some beneficent impacts;
3. However, for different reasons, both are considered to be reaching sub-optimal potentials;
4. It is plausible, that by combining both Level 1 and 2 resilience strategies could open novel spaces to increase the potentials for reducing the unintended consequences of medical pluralism on the HIV and AIDS epidemic.

It is believed that the research schema that has been described above represents an innovation that could contribute to the Level 1 and 2 focus. The research schema is influenced by the Mauri Model decision making framework that aims to 'empower decision making alongside scientific knowledge' — which, in this instance, could also enable Level 1, scientific knowledge to be empowered alongside Level 2, indigenous decision making. The Mauri Model decision making framework is also employed as a heuristic to ensure that the research schema avoids 'othering' indigenous perspectives which are often 'central to the [sub-Saharan African research] story'.

The research schema is also influenced by 'intentionality', with intentionality emphasising both 'agency' and indigenous sense making. The research schema is activated through a critical realist research method called 'AART' using the SenseMaker® data collection instrument. It is hope that the application of the SenseMaker® instrument to reconceptualise medical pluralism using indigenous decision making as the referential axis of enquiry will enable sufficient spaces — that are inclusive of both Levels 1 and 2 resilience factors, influenced by affected communities' self-signification from the perspectives of both structure (health care systems), agency (health seeking practices) and the socio-cultural 'systems that patients navigate' — to be opened to justify the subsequent 'abduction, retroduction and testing' in the 'AART' method. However, only empirical data will determine that possibility.

4.4 From Mode 2 towards Mode 3 knowledge production

Concomitant with the development of the research schema, the Mode 2 partnership has deliberately expanded the 'knowledge architecture' towards a Mode 3 combination of 'scientific and technological disciplines, public and private sectors (government, university, industry and non-governmental organizations)' in order to increase the potential sustainability of any beneficent findings that emerge. However, at this stage the agreements that were made at the knowledge sharing workshop in 2016 have yet to be fully activated. Only time will tell how the agreements materialise in practice.

5 Conclusion

The motivation for the development of the research schema emerged through the frustrations that were experienced whilst attempting to increase the reach and impact of the outputs from an indigenised Mode 2 knowledge production partnership in Waterberg District, Limpopo Province, South Africa. The underlying rationale for the research schema is that managing resilient systems requires employing both specified, Level 1 and general, Level 2 strategies. As far as the authors are aware, the majority of the interventions designed to reduce the unintended consequences of medical pluralism represent specified, Level 1 strategies that are designed to improve the structural relationships between the traditional and biomedical healthcare systems. This represents a resilience investment strategy that primarily — if not exclusively — invests in Level 1 management strategies at the expense of Level 2. On the other hand, the community-university partnership over-invested in Level 2, at the expense of Level 1. Whilst both resilience strategies have brought beneficent impacts, it is plausible that the full potentials of both can be improved by developing a resilience investment strategy that is inclusive of both Levels 1 and 2. The knowledge architecture that is, most likely, best placed to achieve the dual mandate requires moving beyond Mode 2 knowledge generation towards Mode 3. In this instance the Mode 3 knowledge production process will use indigenous making as the referential axis of enquiry. The potentials of the research schema within the Mode 3 knowledge production process to reduce the unintended consequences of medical pluralism on the HIV and AIDS epidemic will, ultimately, require validating in the field.

REFERENCES

Allenby, B. R. & Sarewitz, D. 2011. *The techno-human condition*. Cambridge, Massachusetts (USA): MIT press.

Alvesson, M. & Sandberg, J. 2011. Generating Research Questions through Problematization. *Academy of Management Review*, 36(2): 247-271.

Audet, C. M. Ngobeni, S. & Wagner, R. G. 2017. Traditional healer treatment of HIV persists in the era of ART: a mixed methods study from rural South Africa. *BMC Complementary and Alternative Medicine* [Online], 17(1). Available from: https://www.ncbi.nlm.nih.gov/pubmed/28854905. [Accessed 30 August 2018].

Audet, C. M. Salato, J. Blevins, M. Amsalem, D. Vermund, S. H. & Gaspar, F. 2013. Educational intervention increased referrals to allopathic care by traditional healers in three high HIV-prevalence rural districts in Mozambique. *PloS One* [Online], 8(8). Available from: https://www.ncbi.nlm.nih.gov/pubmed/23936407. [Accessed 14 September 2015].

Bakhache, N. Michael, S. Roupetz, S. Garbern, S. Bergquist, H. Davison, C. & Bartels, S. 2017. Implementation of a SenseMaker(R) research project among Syrian refugees in Lebanon. *Global Health Action* [Online], 10(1). Available from: https://www.ncbi.nlm.nih.gov/pubmed/28857014. [Accessed 08 January 2018].

Bartels, S. A. Michael, S. Roupetz, S. Garbern, S. Kilzar, L. Bergquist, H. Bakhache, N. Davison, C. & Bunting, A. 2018. Making sense of child, early and forced marriage among Syrian refugee girls: a mixed methods study in Lebanon. *BMJ Global Health* [Online], 3(1). Available from: http://gh.bmj.com/. [Accessed 19 January 2018].

Berger-Gonzalez, M. Stauffacher, M. Zinsstag, J. Edwards, P. & Krutli, P. 2016. Transdisciplinary Research on Cancer-Healing Systems Between Biomedicine and the Maya of Guatemala: A Tool for Reciprocal Reflexivity in a Multi-Epistemological Setting. *Qualitative Health Research*, 26(1): 77-91.

Bernstein, J. H. 2015. Transdisciplinarity: A review of its origins, development, and current issues. *Journal of Research Practice* [Online], 11 (1). Available from: http://jrp.icaap.org/index.php/jrp/article/view/510/412. [Accessed 14 July 2017].

Bishop, B. J. & Dzidic, P. L. 2014. Dealing with wicked problems: conducting a causal layered analysis of complex social psychological issues. *American Journal of Community Psychology*, 53(1-2): 13-24.

Brandt, P. Ernst, A. Gralla, F. Luederitz, C. Lang, D. J. Newig, J. Reinert, F. Abson, D. J. & von Wehrden, H. 2013. A review of transdisciplinary research in sustainability science. *Ecological Economics*, 92(1): 1-15.

Brock-Utne, B. 2017. *Decolonisation of knowledge in the African university*. In*:* Cross, M. & Ndofirepi, A. (eds.) Knowledge and Change in African Universities. African Higher Education: Developments and Perspectives. Rotterdam (Netherlands): SensePublishers.

Burman, C. J. 2018a. Re-contextualizing medical pluralism in South Africa: a research schema for indigenous decision making. *Systemic Practice and Action Research*, 32(4): 379–402.

Burman, C. J. 2018b. The Taming Wicked Problems Framework: A plausible biosocial contribution to 'ending AIDS by 2030'. *The Journal for Transdisciplinary Research in Southern Africa* [Online], 14(1). Available from: https://td-sa.net/index.php/td/article/view/401. [Accessed 22 November 2018].

Burman, C. J. & Aphane, M. 2016. Community viral load management: can 'attractors' contribute to developing an improved bio-social response to HIV risk-reduction? *Nonlinear Dynamics, Psychology, and Life Sciences*, 20(1): 81-116.

Burman, C. & Aphane, M. 2019. Improved adherence to antiretroviral therapy among traditionalists: reflections from rural South Africa. *African Health Sciences*, 19(1): 1422-1432.

Burman, C. J. Aphane, M. & Mollel, N. 2017. The Taming Wicked Problems Framework: reflections in the making. *Journal for New Generation Sciences*, 15(1): 51-73.

Carayannis, E. G. & Campbell, D. F. 2006. *'Mode 3': meaning and implications from a knowledge systems perspective*. In*:* Elias, G. & Campbell, D. (eds.) Knowledge creation, diffusion, and use in innovation networks and knowledge clusters. A comparative systems approach across the United States, Europe and Asia. Westport, Connecticut (USA): Praeger.

Carayannis, E. G. & Campbell, D. F. 2009. 'Mode 3'and'Quadruple Helix': toward a 21st century fractal innovation ecosystem. *International Journal of Technology Management*, 46(3-4): 201-234.

Carayannis, E. G. Campbell, D. F. J. & Rehman, S. S. 2016. Mode 3 knowledge production: systems and systems theory, clusters and networks. *Journal of Innovation and Entrepreneurship* [Online], 5 (1). Available from: https://innovation-entrepreneurship.springeropen.com/articles/10.1186/s13731-016-0045-9. [Accessed 22 March 2017].

Carpenter, S. Walker, B. Anderies, J. M. & Abel, N. 2014. From Metaphor to Measurement: Resilience of What to What? *Ecosystems*, 4(8): 765-781.

Chambers, R. 1997. *Whose reality counts? Putting the first last*. London (UK): Combat Poverty Agency.

Chilisa, B. 2005. Educational research within postcolonial Africa: A critique of HIV/AIDS research in Botswana. *International journal of qualitative studies in education*, 18(6): 659-684.

Chilisa, B. 2017. Decolonising transdisciplinary research approaches: an African perspective for enhancing knowledge integration in sustainability science. *Sustainability Science*, 12(5): 813-827.

Chilisa, B. Major, T. E. & Khudu-Petersen, K. 2017. Community engagement with a postcolonial, African-based relational paradigm. *Qualitative Research*, 17(3): 326-339.

Chilisa, B. & Tsheko, G. N. 2014. Mixed methods in indigenous research: Building relationships for sustainable intervention outcomes. *Journal of Mixed Methods Research*, 8(3): 222-233.

Dahlberg, R. 2015. Resilience and Complexity: Conjoining the Discourses of Two Contested Concepts. *Culture Unbound: Journal of Current Cultural Research*, 7(3): 541-557.

Dart, J. 2003. A Dialogical, Story-Based Evaluation Tool: The Most Significant Change Technique. *The American Journal of Evaluation*, 24(2): 137-155.

Decoteau, C. L. 2017. The AART of Ethnography: A Critical Realist Explanatory Research Model. *Journal for the Theory of Social Behaviour*, 47(1): 58-82.

Dervin, B. 1998. Sense making theory and practice: an overview of user interests in knowledge seeking and use. *Journal of Knowledge Management*, 2(2): 36-46.

DFID. 2014. *Using SenseMaker to Understand Girls' Lives: Lessons Learnt*. London (UK): The UK Department for International Development. Available from: http://www.girleffect.org/media?id=3211. [Accessed 22 December 2014].

Dubois, R. 1961. *The Mirage of Health: Utopias, Progress and Biological Change*. New York (USA): Anchor Books.

Faaui, T. N. Morgan, T. K. K. B. & Hikuroa, D. C. H. 2017. Ensuring objectivity by applying the Mauri Model to assess the post-disaster affected environments of the 2011 MV Rena disaster in the Bay of Plenty, New Zealand. *Ecological Indicators* [Online], 79 (1). Available from: https://www.sciencedirect.com/science/article/pii/S1470160X17301735. [Accessed 29 April 2018].

Flores, D. Leblanc, N. & Barroso, J. 2016. Enroling and retaining human immunodeficiency virus (HIV) patients in their care: A metasynthesis of qualitative studies. *International Journal of Nursing Studies*, 62(1): 126-136.

Folke, C. Carpenter, S. R. Walker, B. Scheffer, M. Chapin, T. & Rockström, J. 2010. Resilience Thinking: Integrating Resilience, Adaptability and Transformability. *Ecology and Society* [Online], 15 (4). Available from: https://www.ecologyandsociety.org/vol15/iss4/art20/. [Accessed 17 July 2017].

Freire, P. 1974/2005. *Education for Critical Consciousness*. London (UK): Continuum International Publishing Group.

Furin, J. 2011. The role of traditional healers in community-based HIV care in rural Lesotho. *Journal of Community Health*, 36(5): 849-856.

Gibbons, M. Limoges, C. Nowotny, H. Schwartzman, S. Scott, P. & Trow, M. 1994. *The new production of knowledge: The dynamics of science and research in contemporary societies*. London (UK): Sage.

Hernandez, A. Ruano, A. L. Marchal, B. San Sebastian, M. & Flores, W. 2017. Engaging with complexity to improve the health of indigenous people: a call for the use of systems thinking to tackle health inequity. *International Journal for Equity in Health* [Online], 16(1). Available from: https://www.ncbi.nlm.nih.gov/pubmed/28219429. [Accessed 14 December 2017].

Hooks, B. 1994. *Teaching to transgress. Education as the practice of freedom*. London (UK) and New York (USA): Routledge.

Ibeneme, S. Eni, G. Ezuma, A. & Fortwengel, G. 2017. Roads to Health in Developing Countries: Understanding the Intersection of Culture and Healing. *Current Therapeutic Research, Clinical and Experimental* [Online], 86 Available from: https://www.ncbi.nlm.nih.gov/pubmed/29234482. [Accessed 22 January 2018].

Johnson, J. T. Howitt, R. Cajete, G. Berkes, F. Louis, R. P. & Kliskey, A. 2015. Weaving indigenous and sustainability sciences to diversify our methods. *Sustainability Science*, 11(1): 1-11.

Kayombo, E. J. Uiso, F. C. Mbwambo, Z. H. Mahunnah, R. L. Moshi, M. J. & Mgonda, Y. H. 2007. Experience of initiating collaboration of traditional healers in managing HIV and AIDS in Tanzania. *Journal of Ethnobiology and Ethnomedicine* [Online], 3(1). Available from: https://www.ncbi.nlm.nih.gov/pubmed/17257409. [Accessed 26 January 2015].

Kisangau, D. P. Herrmann, T. M. Lyaru, H. Hosea, K. Joseph, C. Mbwambo, Z. & Masimba, P. 2011. Traditional Knowledge, Use Practices and Conservation of Medicinal Plants for HIV/AIDS Care in Rural Tanzania. *Ethnobotany Research and Applications*, 9(1): 43-57.

Leclerc-Madlala, S. Green, E. & Hallin, M. 2016. Traditional healers and the "Fast-Track" HIV response: is success possible without them? *African Journal of AIDS Research*, 15(2): 185-193.

Lynam, T. & Fletcher, C. 2015. Sensemaking: a complexity perspective. *Ecology and Society* [Online], 20 (1). Available from: http://www.ecologyandsociety.org/vol20/iss1/art65/. [Accessed 5 July 2017].

Maistry, S. & Lortan, D. 2017. Lessons from the global South: knowledge democracy and epistemic justice in higher education institutions in South Africa. *Journal for New Generation Sciences*, 15(1): 123-139.

Mausch, K. Harris, D. Heather, E. Jones, E. Yim, J. & Hauser, M. 2018. Households' aspirations for rural development through agriculture. *Outlook on Agriculture*, 47(2): 108-115.

Mbeh, G. N. Edwards, R. Ngufor, G. Assah, F. Fezeu, L. & Mbanya, J. C. 2010. Traditional healers and diabetes: results from a pilot project to train traditional healers to provide health education and appropriate health care practices for diabetes patients in Cameroon. *Global Health Promotion*, 17(2 Suppl): 17-26.

McIntyre, R. & Smith, D. W. 1989. *Theory of intentionality*. In*:* Mohanty, J. & McKenna, W. R. (eds.) Husserl's Phenomenology: A Textbook. Washington, DC (USA): Center for Advanced Research in Phenomenology.

Mendu, E. & Ross, E. 2019. Biomedical healthcare and African traditional healing in the management of HIV and AIDS: complimentary or competing cosmologies? *African Journal of AIDS Research*, 18(2): 104-114.

Mkhwanazi, N. 2016. Medical Anthropology in Africa: The Trouble with a Single Story. *Medical Anthropology*, 35(2): 193-202.

Morgan, T. K. K. B. & Fa`aui, T. N. 2017. Empowering indigenous voices in disaster response: Applying the Mauri Model to New Zealand's worst environmental maritime disaster. *European Journal of Operational Research* [Online], Available from: https://www.sciencedirect.com/science/article/abs/pii/S0377221717304587. [Accessed 5 January 2018].

Moshabela, M. Bukenya, D. Darong, G. Wamoyi, J. McLean, E. Skovdal, M. Ddaaki, W. Ondeng'e, K. Bonnington, O. Seeley, J. Hosegood, V. & Wringe, A. 2017. Traditional healers, faith healers and medical practitioners: the contribution of medical pluralism to bottlenecks along the cascade of care for HIV/AIDS in Eastern and Southern Africa. *Sexually Transmitted Infections* [Online], 93 (Suppl 3). Available from: https://www.ncbi.nlm.nih.gov/pubmed/28736393. [Accessed 24 August 2018].

Nemutandani, S. M. Hendricks, S. J. & Mulaudzi, M. F. 2016. Perceptions and experiences of allopathic health practitioners on collaboration with traditional health practitioners in post-apartheid South Africa. *African Journal of Primary Health Care & Family Medicine*, 8(2): e1-8.

Nowotny, H. 2003. Democratising expertise and socially robust knowledge. *Science and Public Policy*, 30(3): 151-156.

Ntseane, P. G. & Chilisa, B. 2012. *Indigenous knowledge, HIV, and AIDS education and research: Implications for health educators*. In*:* English, L. (ed.) Adult education and health. Toronto (Canada): University of Toronto.

O'Connell, D. Walker, B. Abel, N. & Grigg, N. 2015. *The resilience, adaptation and transformation assessment framework: from theory to application*. Canberra (Australia): CSIRO. Available from: http://www.stapgef.org/sites/default/files/documents/CSIROSTAP-Resilience-Adaptation-Transformation-Assessment-Framework-Report.pdf. [Accessed 28 April 2017].

Ocholla, D. 2007. Marginalized knowledge: An agenda for indigenous knowledge development and integration with other forms of knowledge. *International review of information ethics*, 7(9): 236-245.

Oetzel, J. Scott, N. Hudson, M. Masters-Awatere, B. Rarere, M. Foote, J. Beaton, A. & Ehau, T. 2017. Implementation framework for chronic disease intervention effectiveness in Maori and other indigenous communities. *Globalization of Health* [Online], 13(1). Available from: https://www.ncbi.nlm.nih.gov/pubmed/28870225. [Accessed 5 September 2018].

Pantelic, M. Cluver, L. Boyes, M. Toska, E. Kuo, C. & Moshabela, M. 2015. Medical pluralism predicts non-ART use among parents in need of ART: a community survey in KwaZulu-Natal, South Africa. *AIDS and Behavior*, 19(1): 137-144.

Paphitis, S. A. 2018. The possibility of addressing epistemic injustice through engaged research practice: reflections on a menstruation related critical health education project in South Africa. *Critical Public Health*, 28(3): 363-372.

Pincus, D. & Metten, A. 2010. Nonlinear dynamics in biopsychosocial resilience. *Nonlinear Dynamics, Psychology, and Life Sciences*, 14(4): 353-380.

Poli, R. 2013. A note on the difference between complicated and complex social systems. *Cadum* [Online], 2(1). Available from: http://cadmusjournal.org/article/volume-2/issue-1-part-3/note-differencebetween-complicated-and-complex-social-systems. [Accessed 12 January 2019].
Pryor, J. Kuupole, A. Kutor, N. Dunne, M. & Adu-Yeboah, C. 2009. Exploring the fault lines of cross-cultural collaborative research. *Compare: A Journal of Comparative and International Education*, 39(6): 769-782.

Rickles, D. Hawe, P. & Shiell, A. 2007. A simple guide to chaos and complexity. *Journal of Epidemiology and Community Health*, 61(11): 933-937.

Ross, K. & Mitchell, C. 2018. *Transforming transdisciplinarity: An expansion of strong transdisciplinarity and its centrality in enabling effective collaboration*. In*:* Fam, D. Neuhauser, L. & Gibbs, P. (eds.) Transdisciplinary Theory, Practice and Education: The art of collaborative research and collective learning. Geneva (Switzerland): Springer International.

Roux, D. J. Nel, J. L. Cundill, G. O'Farrell, P. & Fabricius, C. 2017. Transdisciplinary research for systemic change: who to learn with, what to learn about and how to learn. *Sustainability Science*, 12(5): 711-726.

Roy, S. & Nilsen, A. G. 2016. Globalizing Sociology: an introduction. *International Journal of Politics, Culture, and Society*, 29(3): 225-232.

Said, E. W. 1993. *Culture and Imperialism*. London (UK): Vintage.

SANAC. 2016. *Enhanced Progress Report: National Strategic Plan on HIV, STIs and TB (2012-2016)*. Pretoria (South Africa): South African National AIDS Council. Available from: http://sanac.org.za/wp-content/uploads/2016/07/EPR-SANAC-NEW-DOC-latest-update3.pdf. [Accessed 14 November 2018].

SANAC. 2017. *The South African National Strategic Plan for HIV, TB and STIs 2017-2022*. Pretoria (South Africa): South African National AIDS Council. Available from: http://sanac.org.za/wp-content/uploads/2017/05/NSP_FullDocument_FINAL.pdf. [Accessed 27 January 2018].

Seville, E. Van Opstal, D. & Vargo, J. 2015. A Primer in Resiliency: Seven Principles for Managing the Unexpected. *Global Business and Organizational Excellence*, 34(3): 6-18.

Shirindi, M. & Makofane, M. 2015. Ritual impurities: perspectives of women living with HIV and AIDS. *African Journal for Physical, Health Education, Recreation and Dance*, 21(3:2): 941-952.

Shisana, O. Rehle, T. Simbayi, L. Zuma, K. Jooste, S. Zungu, N. Labadarios, D. Onoya, D. David, A. Ramlagan, S. Mbelle, N. Van Zyl , J. & Wabiri, N. 2014. *South African National HIV Prevalence, Incidence and Behaviour Survey, 2012*. Cape Town (South Africa): HSRC Press.

Sillitoe, P. 2010. Trust in development: some implications of knowing in indigenous knowledge. *Journal of the Royal Anthropological Institute*, 16(1): 12-30.

Snowden, D. J. & Boone, M. E. 2007. A leader's framework for decision making. *Harvard Business Review*, 85(11): 68-76.

Soofi, H. 2018. Mode 2 Knowledge Production in the Context of Medical Research: A Call for Further Clarifications. *Journal of bioethical enquiry*, 15(1): 23-27.

Spivak, G. C. 1988. *Can the subaltern speak?* In*:* Cary, N. & Grossberg, L. (eds.) Marxism and the interpretation of culture. University of Illinois Press (USA): Urbana, IL.

Stanifer, J. W. Patel, U. D. Karia, F. Thielman, N. Maro, V. Shimbi, D. Kilaweh, H. Lazaro, M. Matemu, O. Omolo, J. & Boyd, D. 2015. The determinants of traditional medicine use in Northern Tanzania: a mixed-methods study. *PloS One* [Online], 10(4). Available from: https://www.ncbi.nlm.nih.gov/pubmed/25848762. [Accessed 7 September 2017].

Statistics New Zealand. 2013. *Census QuickStats about Māori*. Wellington (New Zealand): Statistics New Zealand. Available from: http://archive.stats.govt.nz/Census/2013-census/profile-and-summary-reports/quickstats-about-maori-english.aspx [Accessed 29 January 2018].

Sturmberg, J. P. 2019. Evidence-based medicine-Not a panacea for the problems of a complex adaptive world. *Journal of Evaluation in Clinical Practice* [Online]. Available from: https://www.ncbi.nlm.nih.gov/pubmed/30887648. [Accessed 30 March 2019].

Sturmberg, J. P. O'Halloran, D. M. & Martin, C. M. 2012. Understanding health system reform - a complex adaptive systems perspective. *Journal of Evaluation in Clinical Practice*, 18(1): 202-208.

Temper, L. & Del Bene, D. 2016. Transforming knowledge creation for environmental and epistemic justice. *Current Opinion in Environmental Sustainability*, 20(1): 41-49.

Tengo, M. Brondizio, E. S. Elmqvist, T. Malmer, P. & Spierenburg, M. 2014. Connecting diverse knowledge systems for enhanced ecosystem governance: The Multiple Evidence Base Approach. *Ambio*, 43(5): 579-91.

The Cynefin Centre. 2018. *The Making of Meaning* [Online]. Wales: Bangor University. Available from: www.emergentmeaning.com. [Accessed 25 March 2018].

Thoren, H. & Breian, L. 2016. Stepping stone or stumbling block? Mode 2 knowledge production in sustainability science. *Studies in History and Philosophy of Biological and Biomedical Sciences*, 56(1): 71-81.

UNDP. 2013. *Discussion Paper. Innovation in Monitoring and Evaluation*. New York (USA): United Nations Development Programme. Available from: http://www.undp.org/content/dam/undp/library/capacity-development/English/Discussion%20Paper-%20Innovations%20in%20Monitoring%20&%20Evaluating%20Results%20%20(5).pdf. [Accessed 16 July 2017].

Van der Merwe, S. E. Biggs, R. & Preiser, R. 2018. A framework for conceptualizing and assessing the resilience of essential services produced by socio-technical systems. *Ecology and Society* [Online], 23(2). Available from: https://www.ecologyandsociety.org/vol23/iss2/art12/. [Accessed 19 December 2018].

Van der Merwe, S. E. Biggs, R. Preiser, R. Cunningham, C. Snowden, D. J. O'Brien, K. Jenal, M. Vosloo, M. Blignaut, S. & Goh, Z. 2019. Making Sense of Complexity: Using SenseMaker as a Research Tool. *Systems*, 7(2): 1-25.

Wade, C. Chao, M. Kronenberg, F. Cushman, L. & Kalmuss, D. 2008. Medical pluralism among American women: results of a national survey. *Journal of Women's Health*, 17(5): 829-840.

Weick, K. 1995. *Sensemaking in Organizations*. Thousand Oaks (USA): Sage Publications.

WHO. 2002. *Traditional Medicine Strategy 2002-2005* [Online]. Geneva (Switzerland): World Health Organization. Available from: http://www.wpro.who.int/health_technology/book_who_traditional_medicine_strategy_2002_2005.pdf. [Accessed 22 August 2017].

WHO. 2009. *Systems thinking for health systems strengthening*. Geneva (Switzerland): World Health Organization. Available from: http://apps.who.int/iris/bitstream/10665/44204/1/9789241563895_eng.pdf. [Accessed 18 March 2018].

WHO. 2013. *Traditional Medicine Strategy 2014–2023*. Geneva (Switzerland): World Health Organization. Available from: http://apps.who.int/iris/bitstream/10665/92455/1/9789241506090_eng.pdf?ua=1. [Accessed 27 September 2017].

WWS. 2017. *Waterberg Welfare Society* [Online]. Vaalwater (South Africa): Waterberg Welfare Society. Available from: http://www.waterbergwelfaresociety.org.za/. [Accessed 22 January 2018].

Zapp, M. & Powell, J. J. W. 2017. Moving towards Mode 2? Evidence-based policy-making and the changing conditions for educational research in Germany. *Science and Public Policy*, 44(5): 645-655.

SUPPLY CHAIN CONSTRAINTS IN THE SOUTH AFRICAN CONSTRUCTION INDUSTRY – PERSPECTIVES FROM SUPPLY CHAIN PRACTITIONERS

RID POOE* & P PILLAY**
*UNIVERSITY OF JOHANNESBURG
**VAAL UNIVERSITY OF TECHNOLOGY

Abstract

In the face of slowing economies globally, the construction industry faces many challenges such as socio-economic stress, resource shortages, institutional weaknesses and a general inability to respond to key issues. These have intensified and become more severe in recent years. Empirical research in supply chain management points to barriers that limit construction industries in developing countries such as South Africa. This paper aims to explore supply chain constraints in the South African construction industry. Relevant literature was reviewed and insights from 15 experienced supply chain practitioners were elicited by means of semi-structured interviews. Content analysis was employed using the ATLAS.ti (version 7) software to analyse qualitative data. Six themes emerged from the interviews, which include lack of investment in supply chains, lack of supply chain innovation process constraints, supply chain change management, supply chain collaboration, supply chain leadership, and time management. It is recommended that construction companies adopt supply chain management systems, integrated solutions, and collaborative project management tools and technologies.

Keywords: construction industry; construction projects; supply chain constraints; supply chain management

1. INTRODUCTION AND BACKGROUND

Notwithstanding the fact that the construction industry has been in a slump since 2009 in South Africa construction remains one of its largest industries contributing significantly to employment and growth, (Haupt & Harinarain 2016:80). According to Brooks and Spillane (2015:1220), the impact of the recent global recession on the construction industry has been particularly pronounced. However, in many countries the construction industry contributes a significant percentage to gross domestic product (GDP), with some estimating the contribution to between 6% and 9% of the GDP in developing countries (Lopes, Oliveira & Abreu, 2017:658; Mojtahedi & Kabirifar 2019:1). Between 2008 and 2016 the construction industry accounted for around 8% of total formal employment and around 9, 6% on average of GDP in South Africa, employing some 1.4 million people (Construction Industry Development Board (CIDB), 2017; Durdyev, Zavadskas, Thurnell & Ihtiyar 2018:2). Yet, according to Saidu and Shakantu (2017), the construction industry remains characterised by fragmentation, inefficiency, cost and time overruns, among other problems. In the face of slowing economies globally, the construction industry faces a number of challenges such as socio-economic stress, resource shortages, institutional weaknesses and a general inability to respond to key issues, with the recent years seeing these challenges intensifying and becoming more severe (Al Ahbabi, 2014:15).

Not surprisingly, policy makers and researchers alike have sought to gain a deeper understanding of the barriers and constraints facing the construction industry, both at the macro-economic and institutional levels. In this regard, Reinaldo, Fernando, Alves and Moellmann (2012:2) observed that scientific research remains an important avenue for the generation of new perspectives. Since supply chain performance is often positively associated with business performance (Chinomona & Pooe 2013:3), an understanding of the constraints behind its related challenges is necessary if the performance of the industry is to be improved. Alaloul, Liew and Zawawi (2016:2690) observed that many problems encountered on large construction projects are associated with the lack of a proper coordination practice within supply chains and between supply chain partners.

More often than not, project delays, cost overruns and non-conformance to quality that lead to poor performance and dissatisfied customers are common problems in the construction industry (Enshassi, Sundermeier & Abo Zeiter, 2017:12; Mojtahedi & Kabirifar, 2019:1). Furthermore, there is a perception that the project delivery process in construction management is highly inefficient compared with other sectors such as manufacturing and retail. Mojtahedi and Kabirifar (2019:2) noted that the significance of these inefficiencies within the industry is accentuated by cost and time overruns.

Removing these inefficiencies requires the application of supply chain management. Although there are a number of studies from different countries that have investigated various areas within the supply chain management arena in the construction industry in the recent past (e.g. Emuze & Smallwood, 2013:513-522; Moneke & Echeme, 2016:233-249); Papadopoulos, Zamer, Gayialis & Tatsiopoulos 2016:528-534; Owen, Morgan & Killip, 2017:613-622; Kadangwe & Emuze, 2017:56-67), there have been relatively few studies that investigated supply chain constraints in the construction industry (Amade, Akpan, Ubani & Amaeshi, 2016:1-19; Pillay & Mafini, 2017).

According to Ofori (2015), scientific research focusing on the construction industry remains an important avenue for the generation of such new perspectives. Hence, the current study was both relevant and significant in that it is intended to identify constraints existing in the construction industry supply chain with a view to proposing innovative ways of minimising them, thereby contributing to the better performance of that industry. The remainder of this paper is organised as follows: First, relevant literature on the characterisation of the South African construction industry and supply chain management is reviewed. This is followed by the description of the research methodology employed. Research findings are then discussed followed by recommendations.

2. LITERATURE REVIEW

Supply chain management integrates key business processes and activities into synchronised processes to satisfy the customer's needs (Pakurár *et al.*, 2019:2). These include initial raw material extraction to the end customer, including intermediate processing, transportation and storage activities as well as final sale to the end customer (Shahriarpour & Tabriz, 2017:266). According to Du Toit and Vlok (2014:26), supply chains vary in size, length, and level of complexity; and that a firm producing multiple types of products is bound to be part of multiple supply chains, depending on the materials and services used to make and distribute the products. The essence of supply chain management is that it is strategic in nature and that customer value creation remains a core driver of the entire supply chain operation (Min, Zacharia & Smith, 2019:49). Appreciating this fact often requires a significant shift in the mind-set of the participants toward collaboration, teamwork and mutual benefits. It is hardly surprising that only few sophisticated applications have been reported in the construction industry (Van Weele & Arjan, 2012:24).

In this regard, Pal, Wang and Lian (2017:1227) have observed that, more than ever before, construction projects seem to pursue collaborative relationships between main contractors, sub-contractors and suppliers, albeit at a slow pace. For example, according to Boyce, Mano and Kent (2016:2), collaborative relationship in procurement is still not yet widely embraced, where firms can benefit mutually by reducing costs and inventory, and where the customer consequentlyt receives the best value for money. Since there is no single procurement strategy that works best for all situations in construction, a careful analysis of client needs is required before implementing any procurement strategy. In this regard, Al Ahbabi (2014:20) posits that good procurement practices are required in order to reduce the overall cost of projects, the overall economic efficiency of the construction industry and to ensure that when complete, projects are fit for purpose. Procurement is one area where the greatest opportunities for cost reduction and enhancing value of the whole supply chain exist (Boyce *et al.*, 2016:2).

Mbhele (2014:214) states that value of optimisation in the total supply chain cannot be materialised without the necessary processes associated with the upstream, midstream and downstream flow of information, physical goods and services from multiple channels to the end consumers. Since managing the dynamic interrelationships and interactions that exist among suppliers can become complex, this would require effective integration of project activities into the larger framework of supply chain management. For instance, given the crucial role of sub-contractors in construction projects, any improvement in overall performance requires recognising the fact that the main contractor has to depend on the reliability of sub-contractors to complete the project successfully (Patel & Patel, 2017:1228). Hence, Vilasini, Neitzert, Rotimi and Windapo (2012:31) hold that subcontractor involvement and integration requires early procurement by subcontractors whose selection should be based on criteria such as innovation, ability to collaborate and the alignment of strategic objectives with key performance indicators identified for the project, and not just on the lowest price.

In project management, the logistics function becomes rather more complex as huge quantities of materials, components, equipment and services are required for the construction. According to Steyn and Lourens (2017:3), all materials converge on the construction site where the facility is assembled from incoming materials and projects requiring made-to-order supply chains, with every project creating a new facility. This requires a thorough understanding of client requirements and includes the elimination of waste throughout the supply chain with a view to reducing costs and ensuring timely completion and delivery of projects. The importance of logistics is underscored by Fadiya (2012:4) who contends that little attention has been paid to supply chain management (SCM) or logistics, where the construction industry only recognises the final leg of materials' delivery as being important. Fadiya (2012:7) also argues that while there has been developments in terms of ICT systems, limited work has been done on their systematic evaluation prior to implementation. This denotes that the optimisation of the usage of transport vehicles can significantly improve construction efficiency.

In addition, effective and efficient inventory management is key for successful construction projects since materials account for about 55%-60% of the total construction cost (Kumar, Priya, Kumar & Ravekumar, 2018:900). The improper handling and storage of materials in the construction site has made it difficult to track and locate materials as and when they are needed (Abhilin & Vishak, 2015:910). A timely flow of materials is an important concern of material management (Smita & Pataskar 2013:96). Again, poor handling and management of construction materials affects the overall performance of construction projects in terms of time, budget (cost), quality and productivity (Patel & Patel, 2017:147). Materials wastage in construction projects could results in huge financial setbacks, as well as have a detrimental effect on the health and general environment (Chaudhari & Mata, 2016:64). The lack of or incomplete up-to-date information regarding on-site stock is one problem associated with inventory management for construction projects, and according to Liwan (2015:24), the implementation of technology such as bar coding for material tracing and tracking in construction projects can only facilitate and improve existing materials management practices.

The temporary project-based nature of construction projects seems to hinder the integration of construction supply chains (Blowfield, 2013:19; Yadav & Ray, 2015). In addition, Heng, Wang and He (2013:157) observed that since construction supply chains are highly dynamic in that organisational structures as well as project teams change frequently, it is unlikely that the participants who work together on a project have enough time to build sufficient trust and to share information willingly. Yet according to Sharma, Garg and Agarwal (2012:193), firms depend on their supply chains to survive and thrive since every firm forms part of one or more supply chains. In this regard, Kapustina, Chovancová and Klapita (2017:56) posit that while it is important to understand the current functional state and interrelationship of the various elements of the supply chain system it is also necessary to address the optimisation of individual production processes within the supply chain. To this end, Kapustina *et al*. (2017:57) suggest the need to identify the main causes of constraints or barriers in the context of supply issues.

3. RESEARCH DESIGN AND METHODOLOGY

3.1 Research approach

This study adopted an exploratory qualitative research design, which enables an in-depth understanding of a situation (Sutton & Austin, 2015:226) and which, according to Creswell (2010:84), is used when a researcher examines a new interest or when the subject of study is itself relatively new and unstudied. Purposive sampling was used in this study to select participants. According to Creswell and Plano Clark (2011:35), purposive sampling which involves identifying and selecting individuals whose knowledge or experience about a phenomenon under investigation, was used in this study. The researcher's knowledge and experience of the South African construction industry enabled and facilitated relatively easy access to senior managers and high profile people, including chief procurement officers, who participated in the study. The participants were senior managers drawn from firms in the construction industry. Fifteen (15) participants were thus selected from construction companies. Semi-structured interviews were conducted. Table 1 shows the profile of the participants.

Participant code	Position occupied	Number of years in construction industry	Province
P1	Logistics manager	14	Gauteng
P2	Procurement analyst	12	Kwa Zulu-Natal
P3	Commodity manager	13	North West
P4	Senior buyer	10	Western Cape
P5	Head of procurement	14	Gauteng
P6	Procurement analyst	12	Mpumalanga
P7	Regional buyer	12	Easter Cape
P8	Chief Procurement officer	23	Gauteng
P9	Commodity manager	12	Easter Cape
P10	Chief Procurement officer	27	Limpopo
P11	Operations manager	16	Limpopo
P12	Head of Sourcing	15	Western Cape
P13	Head of procurement	19	Free State
P14	Senior buyer	11	Gauteng
P15	Plant and assets executive	22	Mpumalanga

Table 1 - The profile of the participants

Source: Own compilation

According to Lee and Lings (2008:228), semi-structured interviews describe a range of different forms of interviewing whose defining characteristic is that they have a flexible and fluid structure. Interviews were recorded using a digital voice recorder. The transcription process involved the close observation of data through repeated careful listening (and watching), and formed an important first step in data analysis. As an interpretive act rather than simply a technical procedure, transcribing can lead to noticing unanticipated phenomena (Myers, 2008:38). According to Gunawan (2015:4), trustworthiness entails validity and credibility of information provided to an enquirer and consists of four elements: credibility, conformability, transferability and dependability. In the current study, credibility was ascertained through the triangulation method. Triangulation is a way of enhancing validity by looking at the issue from different angles – for instance, types of method or different analysis techniques. It can also be used to enhance the richness of the data set (Lee & Lings, 2008:239). Member-checking was applied when the researcher interacted with the participants during the interview planning stage and after interviews in order to gather any additional material from written feedback and complements (Corbin & Strauss, 2008:292). To achieve confirmability, an audit trail was completed for all interviews by ensuring that participants were given the chance to go through their individual interview transcripts (Lincoln, Lynham & Guba, 2011:38).

3.2 Data treatment

Content analysis was employed using the ATLAS.ti (version 7) software used for analysing qualitative data, especially involving large sections of textual, visual and audio data. The use of ATLAS.ti was appropriate for this study considering the amount of textual data generated by the interviews (Paulus & Lester 2016:410). In using this software, a three-step process suggested by Sinkovics and Alfoldi (2012:829) was followed. The first step was to identify the recurrent categories that gave meaning to the data. Next was the development of the coding system which involved the attachment of labels to sections in the data on the basis of meanings that the researcher deduced from the data (Braun & Clarke, 2014:23). Then, when all the data had been organised and coded, phrases that appeared similar were then grouped into their identical themes. Themes emerging from the coding were documented by the interviewer. This procedure was repeated until a point of saturation was reached, which is the point at which the themes began to appear repeatedly, indicating that no further analyses were necessary (Sutton & Austin, 2012:229). The extracted themes represented the main findings of the study.

4. RESULTS AND DISCUSSION OF THE RESEARCH FINDINGS

The present study identified a few challenges that the industry needs to overcome. These include lack of investment in supply chains, lack of supply chain innovation process constraints, supply chain change management, supply chain collaboration, supply chain leadership, and time management.

Theme 1: Lack of investment in supply chain systems

The first theme emerging from the study was labelled as above since participants' sentiments suggested the general lack of investment in supply chain management systems. As to whether the firm has any system in place to identify and manage the supply chain constraints, the following responses were elicited from participants, denoted by a letter P:

> 'Our company has no proper system in place. They did contract for a world class supply chain system, implemented it partially and then cancelled the contract before realising any of the benefits of the systems. **(Participant 1 (P1))'.**

In this regard, a commodity manager and a senior buyer respectively expressed themselves as follows:

> 'We use Buildsmart which I am told is a world class system. I saw a report from head office which says it is a project management tool and not for procurement. I just use the system as it is and I don't know who does what to the system. **(Participant 3 (P3)**; we have a buying system and across the company, we have about eight (8) systems. We tend to pull procurement data into one central reporting system but it is problematic as all we have is supplier spend, not item spend **(P4)**'.

These responses show that construction firms have been reluctant to invest in or even take full advantage of supply chain management systems that would enable them to streamline processes with a view to saving time and cost. The lack of investment in supply management systems reflects the fact that construction firms still do not have a strategic view of supply chain management as it would seem that in general there is no sense of how supply chain strategies can positively affect a company's performance and profitability. In some cases, it also appears that even the buying function does not enjoy a strategic presence within some organisations, therefore procurement systems remain substandard. Ibem and Laryea (2015:377) observed that compared to other industries, the construction industry in South Africa is fairly slow when it comes to the adoption of supply chain management systems and other forms of best practice. Without an effective supply chain management system, critical areas such as spend analysis and strategic sourcing will always be hamstrung. The adoption of best practice will require construction firms to realise that they need to embrace the supply chain management philosophy and practice.

Theme 2: Lack of supply chain innovation process constraints

The second theme emerging from the study was labelled 'lack of a supply chain innovation process'. This theme emerged from the following responses were elicited from participants.

A procurement analyst noted:

> 'My view is that this industry is trapped in a time warp, that have not adopted world class business practices and principles and that they continue to do the same thing over and over and expect different results. I joined at the height of the collusion drama. It was clear that the 'free lunches and high margins were over' yet the company failed to tighten its belt and focus on the core cost drivers to allow the company to effectively compete **(P2)**'.

> He went on to say:

> 'The industry is characterised by the same key staff moving from one company to the next- new blood, hence new thinking is not happening on a regular basis'.

Finally, the commodity manager retorted:

> 'Nothing has fundamentally changed over the past 10 odd years of my experience. They keep doing the same things over and over **(P4)**'.

Without a sense of how supply chain strategies can positively affect a company's performance and profitability, the sector will not invest in expensive supply chain systems. Until such time that construction realises that supply chains encompass more than just the buying function, they will find it hard to migrate to world class best practice. Given that even the buying function does not enjoy a strategic presence within some organisations, procurement systems remain substandard (Chong & Greece, 2014:16). Koutsogiannis (2017:online) has also observed the unwillingness of the construction industry to direct its resources, both financial and time related, towards innovation. He asserts that if construction firms would take innovation seriously, this would instantly boost the whole project management process and it would lead to the creation of a more skilful and productive labour force.

Theme 3: Supply chain change management

The third theme emerging from the study was labelled 'lack or supply chain change management'. This theme emerged from the following responses were elicited from participants:

> 'Some of these projects were aimed at making the entire supply chain report to a centre led structure, implementing new systems (contracts cancelled) and further implementing world class processes through all operational functions. This also failed as it required system and process changes and whilst the company spent money to determine the problems that existed in its current processes, it refused to spend money to correct same **(P6)**'.

> 'Construction is immature in terms of business skills, business processes, business experience outside of construction and the ability to embrace new concepts **(P13)**'.

Change management within the sector is clearly a problem area and resistance to change is rife in some organisations. This stems from historical practices and management practices which the sector refuses to change. Again, given the lack of exposure by entrenched and long serving managers to world class management principles and practices, including advancements in supply chain over the past decades, these new practices will remain foreign to most long serving personnel.

Traditional change management methodologies have been deliberately set up to fail or resisted until they are dropped. Therefore a more stringent manner to enforce change is required in the sector and in some organisations. However, it also important to note that while change is good, given the magnitude of the constraints observed, if not managed properly through a formalised change management process, it will have considerable impact as it disrupts work and affects its orderly sequence, adversely impacting on productivity and causing schedule delays and cost overruns. Hence, change management remains ineffective because most of these process are seemingly absent. While Hao, Shen, Neelamkavil and Thomas (2008:392) acknowledge that developing an effective construction change management process is a challenging task because it requires an integrated solution, they do posit that an integrated change management system requires technical support from different technologies, including collaborative project management tools and technologies.

Theme 4: Supply chain collaboration

The fourth theme emerging from the study was labelled 'lack or absence of supply chain collaboration'. This theme emerged from the following responses, elicited from the regional buyer and chief procurement officer respectively:

> 'There are three distinct supply chain/ procurement structures in our company- the first is the strategic sourcing division made up of highly qualified strategic sourcing specialists and commodity managers reporting to corporate as a support function to the entire group. The second is the operational buyers reporting to each business unit that is more administrative in nature. They are made up of poorly qualified or trained individuals with an average of 10 to 20 years of service. They are generally clerks that 'became buyers'. The third are the engineers, quantity surveyors, site agents, commercial and contracts managers that appoint sub-contractors and decide the suppliers for high value bulk items. This tends to cloud the

> supply chain as policies, processes, actions, orders as well as suppliers are not visible due to poor systems **(P7)**'.
>
> 'Problematic as there is a constant war between operations, buyers and strategic sourcing. Without a firm structure anything we do is hitting a brick wall. I think half of strategic sourcing's efforts are wasted as buyers ignore recommendations **(P10)**'.

Some respondents observed a reluctance to collaborate and share information with their peers. One specific issue mentioned by the participants was that working collaboratively to pre-qualify existing supply chains may potentially reduce the aggregate time necessary to assess the capabilities of suppliers and sub-contractors. In doing so the procurement community will be able to focus most of their efforts on the formal tendering process and procuring the best value. Notably within South Africa, as the construction industry gains significant growth, there should ideally be more time available to spend on advanced supply chain management, developing long-term relationships, sharing risk and opportunity and unlocking innovation to provide the best solutions for clients and stakeholders.

Wu and Weng (2010:392) further noted that within a supply chain, inter-organisational trust is important in maintaining a competitive advantage. If trust is developed through contacts between parties, it then becomes a bond or a tie that brings partners together. Bonding can take two forms: structural and social (Van Weele, 2010:121). Structural bonds are those economic and strategic ties that link buyers and sellers, such as legal contracts and agreements. Zhang and Chen (2009:21) explained further that as flawed as the individual entities of a construction supply chain may be, they are even more troublesome because a new supply chain or operations component must be developed each time a new project begins. The reality is that the learning that takes place in manufacturing is circumvented in construction by the changes that occur from one project to the next.

Theme 5: Supply chain leadership

The fifth theme emerging from the study was labelled 'lack or supply chain leadership'. This theme emerged from the following responses were elicited from participants:

> 'Leadership and providing visible support for supply chain initiatives and also visibly dealing with non-compliance **(P1)'.**
>
> 'A lack of buy in and management understanding of what we do. Irrespective of how qualified or experienced an individual is in this company, we are considered second class citizens in that only contracts' managers, QS's, engineers etc. are respected. Titles mean a lot in this company **(P5)'**.

Furthermore, participants observed that top management of firms involved in a project rarely commit themselves to mutual objectives. It was observed that problems are not constantly resolved at their level of occurrence and open book costing is not used by project parties. The participants noted that 'reinventing' the wheel of past mistakes is not avoided and lessons learnt are not implemented. Performance measures on projects are not consistent, while performance reviews are not conducted, either formally or informally. An established competitive advantage means little if the construction firm is not able to sustain it from project to project, thus construction industry leaders must retain a fundamental spirit of anticipation (instead of reaction) to changes and problems (Wu & Weng, 2010:92). Realising that most major advances result from small changes over time, the construction industry must create an environment of continuous project and process (work method) improvement. This requires employee training and empowerment as these small changes will more effectively come from the quality of the work force. It is also clear from the findings that the implementation of management based solutions has not had a justifiable positive impact on the construction industry and may not be an efficient solution when dealing with supply chains. Mabin *et al.* (2010:169) indicated that management based thinking may even be repelling the transformation into a performance based environment. The research also conjectures that leadership based solutions may be more successful. Leadership based solutions also include information based solutions where decision making, management and external control are lessened but supervision, independence and support increases

Theme 6: Time management

The sixth and final theme emerging from the study was labelled ‘time’. This theme emerged from the following responses were elicited from participants:

> 'Time is an issue that’s not always there because as soon as you get a project there are a lot of things that needs to happen before you actually do the start-up. So time is an issue but if you have your processes and your data in place already then there is no reason for it to not work better **(P2)**'.

> 'There is not enough time for the estimators or estimating team to put the tender enquiry documents together properly. So when you eventually as the QS receive the subcontractor documentation, you have to have discussions with the subcontractors or engage with them in order to conclude a contract **(P5)**'.

> 'So I think the time required to put a proper bid or RFQ together is usually too short. So that is from handover from tender to execution? See I think from an execution point of view we generally get led by who is the cheapest **(P9)**'.

Effective time management is vitally important for construction project (Chin & Hamid, 2015:34). Gligor and Holcomb (2012:17) add that delays are costly and are specifically addressed in contract documents in anticipation of liquidated and other damages. Pricing in construction can be lump sum, cost plus, negotiated, or unit price. According to Gligor and Holcomb (2012:17), all pricing in construction depends on the time that the contractor determines it will take to complete a job. Barring any circumstances caused by the project owner and outside of the control of the contractor, the contractor must meet the time set by the project owner or lose money. Time factors are even more complicated in construction because the working environment may be outside for part or all of a project, which means that progress, is influenced by weather conditions.

5. CONCLUSIONS AND RECOMMENDATIONS

This study focused on the constraints within the supply chains in the South African construction industry. Since empirical research in this area remains scant, especially in South Africa, this study hopefully provided some basis upon which further local research can be conducted for the improvement of supply chain management and project performance in the construction industry. While the discourse based on empirical research on the topic of supply chain constraints is still largely focused on manufacturing and production environments, the discourse on construction remains largely at a theoretical level.

This study investigated the constraints within the supply chains in the South African construction industry. It reflected on the vital contribution that the construction industry makes to the South African economy as a whole in a number of ways such as building the needed infrastructure for private and commercial use, contribution to GDP and employment, both formally and informally. Literature was reviewed on the nature of the construction industry in the country as well as the importance of supply chain management for individual firms and the industry as a whole. The article also outlined the qualitative research methodology approach employed for the study, after which the empirical findings were reported. The analysis of the primary data collected yielded six major themes emerging from the data. The findings were analysed against the relevant published literature to see whether the findings of the present study are in congruence with the relevant published literature. Direction for future research was therefore suggested and recommended.

In light of the foregoing, the study makes the following recommendations. First, it is important for the construction industry to take innovation seriously and adopt supply chain management systems and other forms of best practice. Investing in effective systems in the areas of procurement and materials management for the firm is imperative if the firm and the industry are to optimise their supply chains. This would help improve the project management process and result in a more productive workforce. Second, and related to the first recommendation is that construction companies need to look at developing effective construction change management processes, which require an integrated solution, and collaborative project management tools and technologies. Such technologies will go a long way in deepening collaboration with other supply chain partners, including sub-contractors. Third, it is imperative that construction companies develop a culture of continuous improvement. This will

surely require employee training, development and empowerment. Fourth, since the work of construction companies may be affected by factors outside their control, such as inclement weather, it is vital that they have effective time management.

6. IMPLICATIONS FOR RESEARCH AND PRACTICE

Reflecting on the key findings of the study as discussed above, the following can be implicated for research, practice and society as a whole. Further research is needed to investigate potential improvements in the implementation of project management systems in the construction industry. There is a need to focus on the importance of managing the supply chain outside of the immediate construction site. Future research in this area would be helpful in providing essential guidance and expert advice for construction and logistics managers. Such studies would explore a broad range of strategic and operational responses to the challenges facing the construction industry today, especially the key issues relevant to the management of supply chains within the industry. This study could be extended to other industrial sectors that are critical to the South African economy, such as transport, manufacturing and production.

Insofar as the implications for practice is concerned, the following would be worth considering. First, without a sense of how supply chain strategies can positively affect a company's performance and profitability, the sector will not invest in expensive supply chain systems. Until such time that construction realises that supply chains encompass more than just the buying function, they will not migrate to world class best practice. Second, construction companies appear to have ignored the development in supply chain, resulting in poor overall knowledge and skills within their organisations. Most major players have only commenced with the process of introducing strategic sourcing into their organisations in the past decade. Without a management paradigm shift, strategic sourcing will continue to fail. Third, change management within the construction sector is clearly a problem area and resistance to change is rife in some organisations. This stems from historical practices and management practices which the sector refuses to change.

REFERENCES

Abhilin, G.B. & Vishak, M.S. 2015. Effective material logistics in construction industries. *International Journal of Science and Researc,* 6(3), 910-913.

Al Ahbabi M.S. 2014. *Process protocol for the implementation of integrated project delivery in the UAE: a client perspective*. PhD thesis. Stanford: University of Stanford.

Alaloul, W.S, Liew, M.S. & Zawawi N.A.W. 2016. Identification of coordination factors affecting building projects performance. *Alexandria Engineering Journal,* 55: 2689–2698.

Anderson, D. 2016. Digital transformation: saving money in the construction industry. *Digital Supply Networks*. [Internet: http://www.digitalistmag.com/; downloaded on 2017-06-13.]

Belay, M.D., Tekeste, E.A. & Ambo, S.A. 2017. Investigation of major success factors on building construction projects management system in Addis Ababa, Ethiopia. *American Journal of Civil Engineering,* 5(3): 155-163.

Blaževska-Stoilkovska, B., Hanák, T. & Žileska-Pančovska, V. 2015. Materials supply management in construction projects and satisfaction with the quality of structures. *Tehnički Vjesnik,* 22(3): 721-727.

Blowfield, M.E. 2013. Going global: how to identify and manage societal expectations in supply chains and the consequences of failure. *Corporate Governance,* 5(3): 19-28.

Boyce, W.S., Mano, H. & Kent, J.L. 2016. The influence of collaboration in procurement relationships. *International Journal of Managing Value and Supply Chains,* 7(3): 1-18.

Braun, V. & Clarke, V. 2014. Using thematic analysis in psychology. *Qualitative Research in Psychology,* 3(2): 77-101.

Brooks, T & Spillane, JP. 2015. The impact of the recent economic recession on the NEC contract in Northern Ireland: a preliminary study. In: *Raidén AB and Aboagye-Nimo E (Eds) Procs 31st Annual ARCOM Conference*, 7-9 September 2015, Lincoln, UK, Association of Researchers in Construction Management, 1219-1228.

Chaudhari, M.P. & Mata, M. 2016. Inventory Control Technique. *IJLTEMAS*, 5(2), 64-66.

Chin, L.S. & Hamid, A.R.A. 2015. The practice of time management on construction project. The 5th International Conference of Euro Asia Civil Engineering Forum (EACEF-5). *Procedia Engineering*, 125: 32-39.

Chinomona, R. & Pooe, RID. 2013. The influence of logistics integration on information sharing and business performance: the case of small and medium enterprises in South Africa. *Journal of Transport and Supply Chain Management,* 7(1): 1-9.

Chong, H & Preece, C.N. 2014. Improving construction procurement systems using organizational strategies. *Acta Polytechnica Hungarica,* 11(1): 5-20.

CIDB (See Construction Industry Development Board)

Construction Industry Development Board**.** 2015. *Labour & work conditions in the South African construction industry – status and recommendations*. [Internet: http://www.cidb.org.za/publications; downloaded on 12/12/17]

Construction Industry Development Board (CIDB). 2017. *Construction Monitor – Employment*. [Internet: http://www.cidb.org.za; downloaded on 2018-05-04.]

Corbin J & Strauss A. 2008. *Basics of qualitative research*. (3rd ed.). Thousand Oaks, California: Sage.

Crampton, N. 2016. *Swot analysis of the construction sector in South Africa*. [Internet: http://www.thhp.co.za/industry-updates; downloaded on 2017-10-01.]

Creswell, J.W. 2010. *Research design: qualitative and quantitative approaches*. California: Sage.

Cresswell, J.W. & Plano Clark, V.L. 2011. *Designing and conducting mixed method research*. (2nd ed.). Thousand Oaks, California: Sage.

Durdyev, S., Zavadskas, E.K., Thurnell, D., Banaitis, A. & Ihtiyar, A. 2018. Sustainable Construction Industry in Cambodia: Awareness, Drivers and Barriers. *Sustainability*, 10: 1-19.

Du Toit, D. & Vlok, P.J. 2014. Supply chain management: A Framework of Understanding. *South African Journal of Industrial Engineering,* 25(3): 25-38.

Enshassi A, Sundermeier, M & Abo Zeiter M. 2017. Factors contributing to rework and their impact on construction projects performance. *International Journal of Sustainable Construction Engineering & Technology,* 8(1): 12-33.

Emuze, F.A. 2009. *The impact of construction supply chain management on value on projects*. Port Elizabeth. Master's thesis. Nelson Mandela Metropolitan University.

Emuze, F. & Smallwood J. 2013. How can supply chain management proliferate in South African construction? In: Smith, S.D and Ahiaga-Dagbui, D.D (Eds) *Procs 29th Annual ARCOM Conference*, 2-4 September 2013, Reading, UK, Association of Researchers in Construction Management, 513-522.

Fadiya, O.O. 2012. *Development of an integrated decision analysis framework for selecting ICT-based logistics systems in the construction industry*. PhD thesis. West Midlands: University of Wolverhampton.

Gunawan, J. 2015. Ensuring trustworthiness in qualitative research. *Belitung Nursing Journal,* 1(1): 10-11.

Haupt, T. & Harinarain, N. 2016. The image of the construction industry and its employment attractiveness. *Acta Structilia,* 23(2): 79-108.

Hao, Q, Shen, W., Neelamkavil, J. & Thomas, R. 2008. Change management in construction projects. Proceedings of the CIB W78 *25th International Conference on Information Technology: Improving the Management of Construction Projects Through IT Adoption*, Santiago, Chile, July 15-17, 2008, 387-396.

Heng, M.S.H., Wang, Y.C. & He X. 2013. Supply chain management and business cycles. *Supply Chain Management: An International Journal,* 19(3): 157-161.

Ibem, E.O. & Laryea, S. 2015. E-procurement use in the South African construction industry. *Journal of Information Technology in Construction,* 20: 364-384.

Kadangwe, S. & Emuze, F. 2017. Value creation and inherent constraints in the Malawian construction industry. *International Journal of Construction Supply Chain Management,* 7(2): 56-67) doi 10.14424/ijcscm702017-56-67

Kapustina, L.M., Chovancová, M. & Klapita, V. 2017. Application of specific theory of constraints technique for the Identification of main causes of negative consequences within procurement logistics. *Scientific Journal on Transport and Logistics,* 8(1): 56-63.

Koutsogiannis, A. 2017. *Modernise or die: the need for change in construction*. [Internet: www.geniebelt.com/blog/modernise-or-die/; downloaded on 2017-12-13.]

Kumar, V.R., Priya, K.L., Kumar, P. & Ravekumar, I.C. 2018. Construction material management through inventory control techniques. *International Journal of Engineering & Technology*, 7(12): 899 - 903.

Lee, N & Lings, I. 2008. *Doing business research: a guide to theory and practice*. Thousand Oaks, California: Sage.

Liwan, S.R.B. 2015. *The framework of improving on-site materials tracking for inventory management process in construction projects*. M.Tech thesis. Universiti Tun Hussein Onn Malaysia.

Lopes, J.; Oliveira, R.& Abreu, M.I.J.P.E. 2017. The sustainability of the construction industry in Sub-Saharan Africa: Some new evidence from recent data. *Procedia Engineering*, 172: 657–664.

Mbhele, T.P. 2014. *Electronic supply chain management systems in managing the bullwhip effect on selected fast moving consumer goods*. PhD thesis. University of Kwa Zulu Natal.

Min, S., Zacharia, Z.G & Smith, C.D. 2019. Defining supply chain management: in the past, present, and future. *Journal of Business Logistics*, 40(1): 44–55

Mojtahedi, K. & Kabirifar, M. 2019. The impact of Engineering, Procurement and Construction (EPC) Phases on project performance: a case of large-scale residential construction project. *Buildings*, 9 (15): 1-15.

Moneke, U.U. & Echeme, I.I. 2016. Assessment of supply chain management in Nigerian construction industry for effective project delivery in Imo state, Nigeria. *International Journal of Development and Management Review*, 11: 233-249.

Myers, D 2008. *Qualitative research in business and management.* Thomas Oaks, California: Sage.

Muhwezi, L., Acai, J. & Otim, G. 2014. An assessment of the factors causing delays on building construction projects in Uganda. *International Journal of Construction Engineering and Management,* 3(1): 13-23.

Ofori, G. 2015. Nature of the construction industry, its needs and its development: a review of four decades of research, *Journal of Construction in Developing Countries*, 20(2): 115–135.

Owen, A, Morgan, E. & Killip, G. 2017. Supply chain dynamics in the UK construction industry and their impact on energy consumption in homes. In ECEEE Summer Study Proceedings 2017. *ECEEE 2017 Summer Study on energy efficiency: Consumption, efficiency and limits*, 29 May - 03 Jun 2017, Toulon–Hyères, France. European Council for an Energy Efficient Economy, 613-622. ISBN 978-91-983878-1-0

Pakurár, M., Haddad, H., Nagy, J., Popp, J. & Oláh, J. 2019. The impact of supply chain integration and internal control on financial performance in the Jordanian banking sector. *Sustainability,* 11: 1-20; doi: 10.3390/su11051248.

Pal, R., Wang, P. & Lian, X. 2017. The critical factors in managing relationships in international engineering, procurement, and construction (IEPC) projects of Chinese organizations. *International Journal of Project Management*, 35: 1225-1237.

Papadopoulos, G.A., Zamer, N.Z., Gayialis, S.P. & Tatsiopoulos, I.P. 2016. Supply *Chain Improvement in Construction Indus*try. *Universal Journal of Management,* 4(10): 528-534.

Patel, U. & Patel, A. (2017). Application of inventory material management techniques in construction project- case study. *Journal of Emerging Technologies and Innovative Research*, 4(5): 141-147.

Paulus, T & Lester, J. 2016. ATLAS.ti for conversation and discourse analysis. *International Journal of Social Research Methodology,* 19(4): 405-428.

Pillay, P. & Mafini, C. 2017. Supply chain bottlenecks in the South African construction industry: Qualitative insights. *Journal of Transport and Supply Chain Management,* 11(0): 307. https://doi.org/10.4102/jtscm.v11i0.307

Rajmane, H.R., Gupta, A.K. & Desai D.B. 2017. To identify the various constraints for delays in construction work and suggesting remedial measures for the same. *Imperial Journal of Interdisciplinary Research,* 3(8): 333-339.

Reinaldo, F., Fernando, A, Alves, J.M. & Moellmann, A. 2012. A real application of the theory of constraints to supply chain management in Brazil. *Brazilian Journal of Operations & Production Management,* 7(2): 81-100.

Saidu, I. & Shakantu, M.W. 2017. An investigation into cost overruns for ongoing building projects in Abuja, Nigeria. *Acta Structilia,* 24(1): 53-72.

Shahriarpour, M. & Tabriz, A.A. 2017. The Importance of Green Supply Chain Management and Its Role in Marketing Management. *International Journal of Economics and Financial Issues*, 7(3): 265-269.

Sharma, A, Garg, D. & Agarwal, A. 2012. Quality management in supply chains: the literature review. *International Journal for Quality Research,* 6(3): 193-206.

Sinkovics, R.R. & Alfoldi, E.A. 2012. Progressive focusing and trustworthiness in qualitative research: the enabling role of computer-assisted qualitative data analysis software (CAQDAS). *Management International Review,* 52(6): 817-845.

Smita, A.R. & Pataskar, S.V. 2013. Analyzing material management techniques on construction project, *International Journal of Engineering and Innovative Technology*, 3(4): 96-100.

Steyn, J. & Lourens, D. 2017. *An Introduction to Project Logistics Management*. Accessed from http://www.ownerteamconsult.com/an-introduction-to-project-logistics-management/ on 19/07/2019.

Sutton, J. & Austin J. 2015. Qualitative research: data collection, analysis, and management. *Canadian Journal of Hospital Pharmacy,* 68(3): 226-231.

Van Weele, A.J**.** 2010. *Purchasing and Supply Chain Management: Analysis, Strategy, Planning and Practice*. (4th ed.). Melbourne, Australia: Thomson Learning.

Vilasini, N., Neitzert, T.R., Rotimi, J.O.B. & Windapo, A.O. 2012. A framework for subcontractor integration in alliance contracts. *International Journal of Construction Supply Chain Management,* 2(1): 17-33.

Wu M.Y. & Weng, Y.C**.** 2010**.** A study of supplier selection factors for high-tech industries in the supply chain. *Total Quality Management,* 21(4): 391-413.

Yadav, S.Y. & Ray, G.S. 2015, Supply Chain Management in Flyover Projects in India. *Journal of Construction in Developing Countries*, 20(1): 25–47.

Zhang, X. & Chen, R. 2009. Forecast-driven or customer-order-driven? an empirical analysis of the Chinese automotive industry. *International Journal of Operations and Production Management*, 26(6): 668-688.

AN OBSERVATIONAL CHECKLIST OF HEALTH DIALOGUE ELEMENTS: DEVELOPMENT AND EVIDENCE OF RELIABILITY

M REID, A JOUBERT & P NEL
UNIVERSITY OF THE FREE STATE

Abstract

Various tools assess health communication skills as exhibited in health dialogues between healthcare providers and patients. This paper explains the phased process used to develop an Observational Checklist of Health Dialogue Elements (OCHDE), and discusses evidence of its reliability. Grounded in a participatory paradigm this two-way health communication skills tool reflects the values of respect, humility and trust, and avoids a one-way approach to communication by the healthcare provider. A concept analysis enabled the identification of elements of health dialogue, namely, characteristics, antecedents, empirical referents and consequences. Each empirical referent measured a characteristic and thereby enabled assessment of the heart of health dialogue. The equality inherent in a participatory paradigm required the simultaneous observation, guided by the OCHDE, of patients and healthcare providers. Though reliability test results of other communication skills assessment tools are not readily available, the conclusion is that the OCHDE is as reliable as other communication skills assessment tools. The OCHDE offers assessment in a real life clinical setting, particularly those involving patients with chronic conditions, but is also suitable as a tool to train and assess health communication skills or to conduct research.

Keywords: Health communication, observation, checklist, assessment tool, dialogue

1. INTRODUCTION

The complexity of a two-way dialogue when communicating with patients is often a challenge for healthcare providers. Acknowledging the complexity of health dialogue, the Kalamazoo consensus statement (KCS) created an initial platform for communication skills assessment tools for healthcare providers (Participants in the Bayer-Fetzer Conference on Physician-Patient Communication in Medical Education, 2001, Han, Papireddy, Hingle, Ferguson, Koschman & Sandstrom 2017: online). The Common Ground Rating Form, Macy Model Checklist and Rochester Communication Rating Scale are examples of tools rated according to the seven essential elements of physician-patient communication according to the KSC (Schirmer, Mauksch, Lang, Marvel, Zoppi, Epstein, Brock & Pryzbylski, 2005:185).

Apart from being rated according to the KSC, communication skills assessment tools vary in format, content, aim, practicality and ease of use (Schirmer *et al*., 2005:185). The Communication Assessment Tool (CAT) packaged as a 14-item checklist, measure patients' perceptions of health workers communication skills (Pagano, O'Shea, Campbell, Currie, Chamberlain & Pates, 2015:402; Newcomb, Trickey, Lita & Dort, 2017:613). Various adaptions of the CAT is found. The Health Communication Assessment Tool (HCAT), a checklist, enhances relationships between nurses and their patients, empowers nurses and develops power-sharing skills. The tool is used with ease in a simulated environment (Campbell, Pagano, O'Shea, Connery & Caron; Pagano *et al*. 2015: 402). The Kinyarwanda version of the CAT (K-CAT) also allowed patients perceptions to be measured (Cubaka, Schriver, Vedsted, Makoul & Kallestrup, 2018:1601).

The ComOn-Coaching-Checklist provides the opportunity for physicians to self-evaluate communication competence as well as evaluate consultations by both physicians and patients (De Figueiredo, Rodolph, Bylund, Goelz, Heusser, Sattel, Fritzsche & Wuensch, 2015:online). Another standardised communication skills checklist by Green, Gongaza, Cohen and Spagnoletti (2014) proved to be useful after health communication training, assisting in establishing the knowledge, attitudes and skills of medical residents regarding health literacy (Green *et al*., 2014).

Health communication assessment tools serve as a lens to assess communication skills (Han *et al*., 2017:online). Freire (2002), conceptualized dialogue as a two-way, interactive and participatory process, clearly embedded in a participatory paradigm (Tomaselli, 2011:17). The participatory

paradigm thus provides a rational lens to structure these tools. Respect, humility and trust are grounded within this paradigm (Rule, 2011:929). Therefore, communication skills assessment tools rooted in this paradigm need to depict these values, especially when entering into health dialogue with patients having chronic conditions.

The values mentioned are endorsed in a concept analysis of health dialogue already reported by Reid (2015). This concept analysis resulted in identifying health dialogue elements. For the purposes of this paper a brief discussion of the elements serves as a background to the development of the health communication assessment tool (Reid, 2019:2).

The established elements of health dialogue include *"…an equal, symbiotic health relationship between the patient and the healthcare provider, and reciprocal health communication towards reaching an identified health goal via a health message. Antecedents include both patient and healthcare provider presenting with a positive attitude towards health dialogue, display sensitivity towards cultural, contextual and societal factors, and receive training on health matters and communication skills. The consequence is an improved health outcome. Empirical referents comprise sharing an understanding of responsibility/decision-making, establishing a health plan, applying context-sensitive health communication strategies, and declaring mutual benefits received from the health relationship"* (Reid, 2015).

Elements of health dialogue are embedded in the participatory paradigm, placing the patient and healthcare provider on equal footing during health communication. Therefore failure to operationalise these elements of health dialogue, confines the transdisciplinary application to a theoretical exercise. Operationalisation creates the opportunity not to be stuck in the "ivory tower" of academia but to respond to the need of healthcare providers to simplify health dialogue with patients.

Insight into the development and evidence of reliability of the OCHDE could provide a possible platform for a generic communication skills assessment tool to be used by healthcare providers entering into health dialogue with patients with any chronic condition.

The two-fold aim of the paper were to describe the phased process followed to develop the Observational Checklist of Health Dialogue Elements (OCHDE), and how evidence of reliability of the checklist was established.

2. METHODS

A concept analysis and quantitative design directed the development of the OCHDE (Phase 1) and evidence of reliability of the checklist (Phase 2). Ethical clearance was obtained (ECUFS 39/2013) and the study complied with the Belmont Report and Singapore Statement on Research Integrity (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979; Singapore Statement on Research Integrity, 2010).

Phase 1: Development of the checklist

The concept analysis of health dialogue guided by a stepwise analysis process of Walker and Avant (2014:166) formed the theoretical foundation for the development of the OCHDE. Elements identified through this concept analysis include antecedents, characteristics, empirical referents and consequences of health dialogue. Refer to Reid 2015. Defining the characteristics of a concept is the heart of the concept analysis (Walker & Avant, 2014:168). Antecedents clarify the social context in which health dialogue takes place, whereas empirical referents create the platform to measure the characteristics (Walker & Avant, 2014:174). Refer to Figure 1.

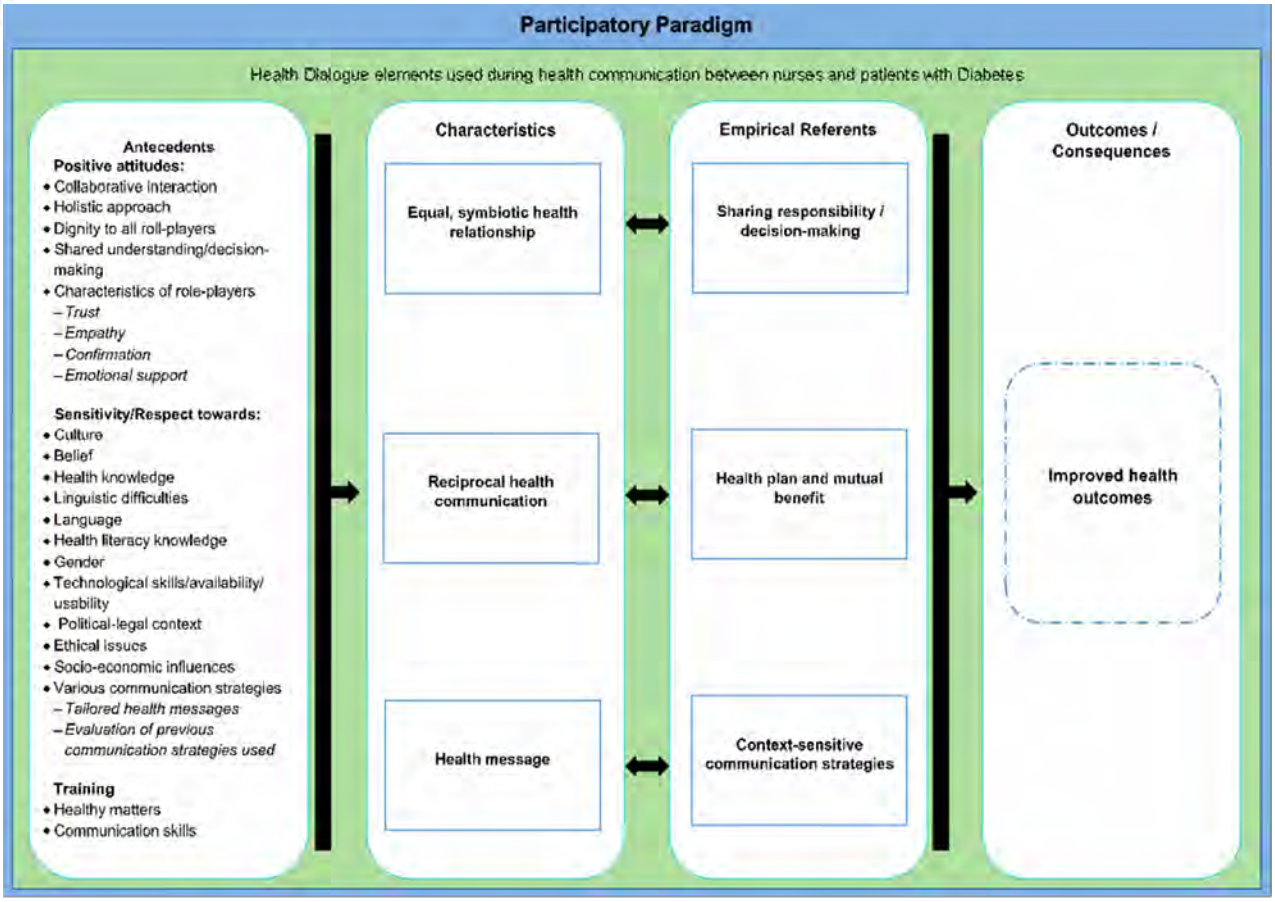


Figure 1: Elements identified through a concept analysis of Health Dialogue (Reid, 2015).

Two of the four elements namely, antecedents and empirical referents were operationalised in the development of the OCHDE. Characteristics are implicitly part of empirical referents and were therefore not included in the OCHDE. Outcomes depicted in Figure 1 can only be assessed post dialogue after a period of time has lapsed.

Each empirical referent measured a characteristic and consequently allowed the heart of health dialogue to be assessed. A sensitivity towards antecedents from both healthcare provider and patient facilitate health dialogue within a participatory paradigm. The structure of the OCHDE aligns to this paradigm by simultaneously focusing on both the healthcare provider and patient during health dialogue. Refer to Figure 2.

Extract of OCHDE observations

Rating Scale: *Where applicable use the following scale when rating elements. The healthcare provider and patient should be observed simultaneously.*

1 None of the specified elements observed, implying either not applicable or required
2 Element observed, but not consistently displayed/responded to
3 Element consistently displayed/responded to

Characteristics of role players

Healthcare provider					Patient			
Q23	Trust	1	2	3	Trust	1	2	3
Q24	Empathy	1	2	3	Empathy	1	2	3
Q25	Verification of meaning	1	2	3	Verification of meaning	1	2	3
Q26	Emotional support	1	2	3	Emotional support	1	2	3

Figure 2: Extract of OCHDE observations

A guideline enhancing consistent observations of health communication between healthcare providers and patients supports the OCHDE. Definitions and examples of antecedents are provided to enhance reliability of the communication skills assessment tool. Refer to Figure 3.

Extract of OCHDE guideline

Question	Antecedents	Guideline
Q 23	Trust	Expression/establishment of trust in a verbal or non-verbal manner e.g. expression of trust in nurse/patient adhering to expected responsibilities/actions.
Q 24	Empathy	Display empathy throughout consultation whenever appropriate e.g. reflection on patient's emotions/sharing understanding.
Q 25	Verification of meaning	Verify meaning of words/gestures throughout consultation whenever appropriate e.g. possible inconsistency between verbal or non-verbal responses.
Q 26	Emotional support	Display emotional support throughout consultation whenever appropriate e.g. acting compassionately.

Figure 3: Extract of OCHDE guideline

The strong theoretical foundation established through meticulous conceptualisation of the concept health dialogue and operationalisation of identified elements contributed to rigour in the developed OCHDE.

Phase 2: Reliability Testing

The reliability testing of the OCHDE required a quantitative research design. The population (N=45) consisted of academics within a Faculty of Health Sciences and a Faculty of Humanities, having a focused interest in health communication between patients and healthcare providers. A convenient sample (n=21) participated in the study. Prior to the pilot study respondents (n=5) received training on the guideline and completion of the checklist. Respondents then observed a videotaped simulated health dialogue between a patient and a healthcare provider. This created the opportunity to identify possible areas of improvement related to the checklist and the guideline. Apart from a few linguistic changes, the rating scale was simplified.

Preceding the main study, respondents (n=21) also received training on the guideline and completion of the checklist. During the main study, respondents individually and simultaneously viewed the videotaped simulation on personal computers and completed the checklist aided by the guideline. The responses of the respondents on observations in the OCHDE were analyzed using the SPSS version 23 to establish evidence of reliability of the checklist.

Rigour was upheld through the selection of respondents with a specific interest in health communication; piloting and refining of OCHDE and guideline and completion of the OCHDE aided by a guideline and SPSS program.

3. RESULTS

Results are also presented in a phased approach.

Phase 1: Development of the checklist

The OCHDE, as a communication skills assessment tool, consists of parts, elements, sub-elements, and observations aligned to the identified antecedents and empirical referents of health dialogue. Part 1 includes a healthcare provider and patient profile and consists of 12 observations per group. Part 2 includes antecedents and two sub-elements. The sub-element positive attitude consists of 15 observations of healthcare providers and 14 observations of patients. The sub-element sensitivity and respect consist of 12 observations per group. Part 3 includes empirical referents. The sub-element shared responsibility/decision making consists of 4 observations per group. Refer to Table 1.

Table 1: OCHDE parts, elements, sub-elements and observations

Parts	Elements	Sub-elements	Number of observations: Healthcare provider	Number of observations: Patients
Part 1	Healthcare provider and patient profile		12	12
Part 2*	Antecedents	2.1 Positive attitude 2.2 Sensitivity/respect	15 12 27**	14 12 26**
Part 3	Empirical referents	3.1 Shared responsibility/ decision making	4	4

**Reliability testing only performed on Part 2*
***The reliability of elements consisting of a single observation cannot be determined.*

Phase 2: Reliability Testing

Reliability testing was only performed on antecedents. Empirical referents, consisting of four open-ended questions, could not be observed by means of a videotaped simulated health dialogue since it included post dialogue responses. The antecedents allowed for 27 observations of healthcare providers and 26 of patients.

Cronbach's alpha, measuring internal consistency, was used to determine the reliability of the OCHDE antecedents. It is important to note that if an element consists of a single observation the reliability of that element cannot be determined. In Table 2 N/A indicates single observations. However, the overall reliability of the OCHDE antecedents including the sub-elements can be determined. It is evident from Table 2 that, the OCHDE antecedents provides a reliable measure for health communication skills related to both healthcare providers (α = .779) and patients (α = .830). Refer to Table 2.

Table 2: Reliability results of OCHDE

Element: Antecedent	**Healthcare provider**		**Patient**	
	Cronbach's alpha	Number of Observations	Cronbach's alpha	Number of Observations
Positive Attitude	**.730**	**15**	**.789**	**14**
Collaborative interaction	N/A	1	N/A	1
Holistic Approach	.513	4	.643	4
Dignity	.205	2	N/A	1
Shared Understanding	.590	4	.663	4
Characteristic of Role Player	.734	4	.694	4
Sensitivity/Respect	**.775**	**12**	**.701**	**12**
Gender sensitivity	N/A	1	N/A	1
Language/linguistic difficulties	N/A	1	N/A	1
Culture/beliefs	N/A	1	N/A	1
Sensitivity towards health knowledge	.286	2	.528	2
Health Literacy	.649	2	.647	2
Technology	N/A	1	N/A	1
Political context	N/A	1	N/A	1
Ethical issued	N/A	1	N/A	1
Socio-Economic Influences	.261	2	.242	2
Total Scale/Checklist (Antecedents)	**.779**	**27**	**.830**	**26**

Focusing on the reliabilities associated with observations measuring **healthcare providers' communication skills**, it is clear that both positive attitude (α = .730) and sensitivity/respect (α = .775) sub-elements are reliable. More specifically, two of the elements have acceptable reliabilities (α = .6 and higher). The elements being *Characteristics of the Role Player* (α =.734) and *Health Literacy* (α =.649). However, observations related to the elements of *Dignity* (α = .205), *Sensitivity towards Health Knowledge* (α = .286), and *Socio-Economic Influences* (α = .261) are of concern.

In contrast, the majority of elements related to **patients' communication skills** have reliability estimates of .6 and higher. It is clear that both the positive attitude (α = .789) and sensitivity/respect (α = .701) subscales are reliable. Only the elements related to *Socio-Economic Influences* (α = .242) and *Sensitivity towards Health* Knowledge (α = .528) do not constitute reliable measures.

4. DISCUSSION

The discussion follows a phased approach, firstly describing the development of the OCHDE in relation to other communication skills assessment tools and secondly, the reliability of the OCHDE and other tools. This discussion should be viewed against the background that no agreement exists on an ideal assessment tool (Schirmer *et al*., 2005:185) and no universal set of communication skills is available (Lang, McCord, Harvill & Anderson, 2004:189).

4.1 Development of communication skills assessment tools

The theoretical foundation and aspects related to the format, completion and various influences on usability of these tools are relevant.

4.2 Theoretical foundation

The OCHDE is theoretically founded on a rigorous concept analysis of health dialogue (Reid 2015). Elements identified during the concept analysis guided the operationalisation of these elements within the OCHDE. Refer to Figure 1.

The theoretical foundation of other communication skills assessment tools differs. Previous empirical work guided the Four Habits Model (Frankel & Stein, 1999:79). The Common Ground Instrument (Lang *et al*., 2004:189) is embedded in the Toronto and Kalamazoo Consensus Statements. Additionally, modification of own work and literature reviews created the foundation for the development of the Calgary-Cambridge Guide (Kurtz, Silverman, Benson & Draper, 2003:802), Health Literacy Communication Skills Checklist (Green *et al*., 2014:76) and Macy Model (Kalet, Pugneaire, Cole-Kelly, Kanicik, Ferrara, Schwartz, Lipkin Jr & Lazare, 2004:511).

4.3 Formats

The OCHDE distinguishes itself from similar tools by concurrently observing the two-way dialogue between healthcare provider and patient. An observer completes the descriptive 3 - point Likert rating scale, aided by a comprehensive guideline. Refer to Figure 2.

Many tools use checklists rather than rating scales (Schirmer *et al*., 2005:186). Examples include the Mercy Model (Kalet *et al*., 2004:511) and Maastricht History-Taking and Advice Checklist (MAAS) (Van Thiel, Kraan & Van der Vleuten 1991:224). However, various formats of checklists do exist. The Calgary-Cambridge guide (Kurtz *et al*., 2003:802) uses a checklist with comments to respond. Whereas the HCAT (Campbell *et al*., 2013:e546) is structured according to dichotomous responses and closed items. Examples of tools combining checklists and rating scales are the ComOn Coaching (De Figuierede *et al*., 2015:online) and Roschester (Epstein, Dannefer, Nofziger, Hansen, Schultz, Jospe, Connard, Meldrum & Henson, 2004:186).

4.4 Usability

The OCHDE is developed for a real life clinical setting, but is also suitable as a tool to train and assess health communication skills or to conduct research. Usability of the OCHDE is dependent on training of observers. A simplified guideline combined with a video-taped scenario supports training. However, using the OCHDE in a real life clinical setting can pose challenges to even a trained observer. Complexities inherent to real life settings and that of observing two-way dialogue being some of these challenges. The OCHDE used a simple response scale as a strategy to address identified challenges.

The Roschester Communication Rating scale (Epstein *et al*., 2004:186, 190) facilitates comprehensive assessment of professional competencies. Training of observers assist in obtaining acceptable interclass correlation, increasing the usability of the ComOn Coaching (De Figueiredo *et al*. 2015: online). Usability is further enhanced by clearly worded items, detailed coding, a simple response scale leading to easy administration (Makoul, 2001:24; Campbell *et al*., 2013:e546).

4.5 Reliability of communication skills assessment tools

Reliability test results of communication skills assessment tools are not readily available. If available, these results reflect the various components of specific tools. Components vary from tool to tool. Most tools further focus on healthcare providers only, whereas data reflecting patients' perceptions are often obtained through pre-or post-healthcare provider/patient interviews (De Figueiredo *et al*., 2015: online; Epstein *et al*., 2004:186). Adding to the complexity of reliability testing of these tools, the OCHDE requires concurrent observation of healthcare provider and patient.

The sub-elements of the OCHDE consisted of positive attitude and sensitivity/respect. Positive attitude of healthcare providers (.73) and patients (.79) as well as sensitivity/respect of healthcare providers (.78) and patients (.70) constituted the total checklist results. The OCHDE is a reliable tool to simultaneously observe health dialogue between healthcare providers (.78) and patients (.83). Refer to Table 2.

Evidently, the MAAS-R assesses nine important communication skills of an effective doctor when interviewing a patient. These skills focused on aspects such as entry, overall orientation, diagnostic planning and management planning. The MAAS was further classified into two dimensions: medical content and basic skills (Van Thiel *et al*., 1991:226). They found fairly low interrater reliabilities associated with both the total scale (.47) and medical content (.35). However, the basic skills component had a reliability of .63.

Stewart, Brown, Donner, McWhinney, Oates, Weston and Jordan (2000:297) developed an assessment tool of patient-centered communication. The physician-component of their instrument measures three dimensions: exploring the disease and the illness experience, understanding the whole person and finding common ground. They reported an interrater reliability of .73 among the 20 raters. Unfortunately, Stewart *et al*. (2000:799) did not calculate any reliability estimates for the patient-component of their instrument.

The Rochester Communication Rating Scale (RCS) consists of 19 items and is classified into four factors important to patient-centered communication, namely physician interest in the patient, understanding patients' experience of illness, attention to context and participation in care. Epstein *et al*. (2004:190) reported a very high internal consistency of their scale (.91).

The Health Communication Assessment Tool (HCAT) developed by Campbell *et al*. (2013:e543-e550) assesses six communication factors. Rapport, empathy and avoiding miscommunication are examples of these factors. The factors were further classified into three dimensions: relationship building, education/empowerment and power sharing. The researchers found fairly good levels of internal consistency on relationship building (.87); power sharing (.91) and education/empowerment (.88). However, the authors acknowledged poor inter rater reliability among various researchers.

5. CONCLUSION

The OCHDE is as reliable as other communication skills assessment tools. The two-fold aim of the present paper were to describe the phased process followed to develop the OCHDE, and to establish evidence of reliability of the checklist. Therefore, the researchers built on evidence that this instrument provides an accurate measure of the theoretical construct. The construct health dialogue originated from a concept analysis. The researchers acknowledge that the tentative nature of a concept analysis merits some critique.

Embedded in a participatory paradigm this construct requires respect, humility and trust of all partners. The simultaneous observation of both the patient and healthcare provider in the OCHDE evolved from the equal partnership inherent to a participatory paradigm. In reality, healthcare providers when communicating with their patients often follow a top-down approach. An unequal relationship, not supported in a participatory paradigm, therefore pose a challenge to both patient and healthcare provider.

Should this identified challenge be overcome, the OCHDE provides a possible platform for a generic communication skills assessment tool to be used by healthcare providers entering into health dialogue with patients with any chronic condition. The nature of the OCHDE lends itself to be used within a training or research environment. Future research could investigate a “golden standard” for health communication assessment tools.

Author’s participation in preparing the manuscript

Dr M Reid: Corresponding author. Development and evidence of reliability of OCHDE
Prof A Joubert: Co-author. Development and evidence of reliability of OCHDE
Dr P Nel: Co-author. Analysis and interpretation of data

ACKNOWLEDGEMENTS

The School of Nursing at the University of the Free State and the National Research Foundation funded this work.

REFERENCES

Campbell, S.H., Pagano, M.P., O'Shea, E.R., Connery, C. & Caron, C. 2013. Development of the health communication assessment tool: enhancing relationships, empowerment and power-sharing skills. *Clinical Simulation in Nursing,* 9: e543-e550.

Cubaka, V.K., Schriver, M., Vedsted, P., Makoul, G.& Kallestrup, P. 2018. Measuring patient-provider communication skills in Rwanda: Selection, adaption and assessment of psychometric properties of the Communication Assessment Tool. *Patient Education and Counselling*, 101: 1601-1610.

De Figueiredo, M.N., Rodolph, B., Bylund, C.L., Goelz, T., Heusser, P., Sattel, H., Fritzsche, K. & Wuensch, A. 2015. ComOn Coaching: Study protocol of a randomized controlled trial to assess the effect of a varied number of coaching sessions on transfer into clinical practice following communication skills training. *BMC Cancer*, 15:503. DOI 10.1186/s12885-015-1454-z

Epstein, R.M., Dannefer, E.F., Nofziger, A.C., Hansen, J.T., Schultz, S.H., Jospe, N., Connard, L.W., Meldrum, S.C. & Henson, L.C. 2004. Comprehensive assessment of professional competence: The Rochester experiment. *Teaching and Learning in Medicine,* 16(2): 186-196.

Freire, P. 2002. *Pedagogy of the oppressed*. London: Penguin.

Green, J.A., Gongaza, A.M., Cohen, E.D. & Spagnoletti, C.L. 2014. Addressing health literacy through clear communication: a training program for internal medicine residents. *Patient Education and Counseling*, 95: 76-82.

Han, H., Papireddy, M.R., Hingle, S.T., Ferguson, J.A., Koschman, T. & Sandstrom, S. 2017. The most common feedback themes in communication skills training in an internal medicine residency program: lessons from the resident audio-recording project. *Health Communication*,3(May): 1-7. DOI: 10.1080/10410236.2017.1314872

Kalet, A., Pugneaire, M.P., Cole-Kelly, C., Kanicik, R., Ferrara, E., Schwartz, M. D., Lipkin Jr, M. & Lazare, A. 2004. Teaching Communication in Clinical Clerkships: Models from the Macy Initiative in Health Communications. *Academic Medicine,* 79(6): 511-520.

Kurtz, S., Silverman, J., Benson, J. & Draper, J. 2003. Marrying Content and Process in Clinical Method Teaching: Enhancing the Calgary–Cambridge Guides. *Academic Medicine*, 78: 802-809.

Lang, F., McCord, R., Harvill, L. & Anderson, D.S. 2004. Communication assessment using the Common Ground Instrument: Psychometric properties. *Family Medicine,* 36(3): 189-198.

Makoul, G. 2001. The SEGUE Framework for teaching and assessing communication skills. *Patient Education and Counseling,* 45: 23-34.

National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research 1979. *Belmont Report*. [Online].Available: https://www.hhs.gov/ohrp/regulations-and-policy/belmont-report/index.html [Viewed 1 September 2017].

Newcomb, A., Trickey, A.W., Lita, E., Dort, J. 2017. Evaluating surgical residents' patient-centred communication skills: practical alternatives to the "Apprenticeship Model". *Journal of Surgical Education*.https://doi.org/10.1016/j.jsurg.2017.09.011.

Pagano, M. P., O'Shea, E.R., Campbell, S.H., Currie, L.M., Chamberlain, E.& Pates, C.A. 2015. Validating the Health Communication Assessment Tool (HCAT). *Clinical Simulation in Nursing*, 11: 402-410.

Participants in the Bayer-Fetzer Conference on Physician-Patient Communication in Medical Education 2001. Essential elements of communication in medical encounters: The Kalamazoo Consensus Statement. *Academic Medicine*, 76(4): 390-393.

Reid, M. 2015. Health Dialogue: A concept analysis. Paper presented at the Royal College of Nursing International Nursing Research Conference, London, 20-22 April. https://www.ufs.ac.za/docs/librariesprovider25/school-of-nursing-documents/all-documents/health-dialogue-a-concept-analysis-m-reid-20-april-2015.pdf?sfvrsn=da9bb321_0

Reid, M. 2019. Health Dialogue: A concept analysis. *Communitas,* (24):1-20. https://dx.doi.org/10.18820/24150525/Comm.v24.1

Rule, P. 2011. Bakhtin and Freire: Dialogue, dialectic and boundary learning. *Educational Philosophy and Theory,* 43(9): 924-942.

Schirmer, J.M., Mauksch, L., Lang, F., Marvel, M.K., Zoppi, K., Epstein, R.M., Brock, D. & Pryzbylski, M. 2005. Assessing communication competence: a review of current tools. *Family Medicine*, 37(3): 184-192.

Singapore Statement on Research Integrity. *2nd World Conference on Research Integrity 21-24 July 2010 Singapore* [Online]. Available: http://www.singaporestatement.org/ [Viewed 12 September 2017].

Stewart, M., Brown, J.B., Donner, A., McWhinney, I.R., Oates, J., Weston, W.W. & Jordan, J. 2000. The impact of patient-centered care on outcomes. *The Journal of Family Practice,* 49: 796-804.

Tomaselli, K. 2011. Paradigm interaction: Some notes on development and communication. In Tomaselli, K. & Chasi, C. (Eds.), *Development and public health communication,* 1-17. Cape Town: Pearson Education.

Van Thiel, J., Kraan, H.F. & Van der Vleuten, C.P.M. 1991. Reliability and feasibility of measuring medical interviewing skills: The revised Maastricht History-taking and Advice Checklist. *Medical Education,* 25: 224-229.

Walker, L. O. & Avant, K. C. 2014. *Strategies for theory construction in nursing*. 5th *ed*. Boston: Pearson.

DOES AGE INFLUENCE BILTONG HUNTERS' BEHAVIOUR AND SPENDING?

P VAN DER MERWE & M SAAYMAN
NORTH-WEST UNIVERSITY

Abstract

Hunting is one of South Africa's core wildlife tourism products, and the key market, based on size and economic contribution, is local biltong hunters. However, South African hunters' frequency of hunting trips is decreasing due to the tough economic situation that is currently experienced in the country. Therefore, for hunting businesses, it has become challenging to compete for the same market. One method to position product owners better in the market is through well-developed marketing strategies. This research aims to determine whether the demographic variable, 'age', as the dependent variable, impacts hunters' behaviour. The questionnaire administration took place by posting a link on the website of the South African Hunters and Game Conservation Association (SA Hunters) and Pot-Shot, a hunting newsletter in South Africa, whereby 493 (n) usable questionnaires were obtained. The research found that age does have an impact on hunters' behaviour and, in this case, on their motives for hunting and spending behaviour. The main contribution of this research is that product owners will become aware of the most lucrative hunting market, and that the primary motives that can be used in marketing strategies have been identified.

Keywords: behaviour, biltong hunters, hunting, travel motives, wildlife tourism

1. DOES AGE INFLUENCE BILTONG HUNTERS' BEHAVIOUR AND SPENDING?

Wildlife-based tourism involves encounters with non-domesticated animals, either in their natural environment or in captivity. It includes activities such as bird-watching, whale-watching, general wildlife viewing, visiting zoos and aquaria, hunting and recreational fishing. These activities can be classified as consumptive (hunting/fishing) and non-consumptive (bird watching/game viewing) activities (Higginbottom, 2004:2; Page & Dowling, 2002:82). Eighty percent (80%) of the tourism products on offer in South Africa include some form of wildlife-based tourism that takes place on government-owned land (national parks, provincial parks etc.), privately-owned land (game farms, game reserves etc.) and community-owned land (game reserves, conservancies' etc.). It is, therefore, clear that vehement competition exists for selling wildlife-based products.

The consumptive side (hunting) of wildlife tourism in South Africa contributes more than R10 billion to the local economy, making it a considerable contribution to wildlife tourism (Van der Merwe, 2014). The consumptive market (hunting) in South Africa is based on two submarkets, namely trophy and biltong hunting. Trophy hunters are mainly foreign hunters who hunt for trophy purposes (for example horns and skin), whereas biltong hunters are predominantly South Africans who hunt for biltong (dried meat, similar to jerky) and processed game meat (Van der Merwe & Saayman, 2004). The largest market (with reference to some hunters and the economic contribution of the two markets) is the biltong hunting market. Therefore, the focus of this research falls on this market. Biltong hunting is defined as a cultural activity in which wildlife is hunted using a rifle, bow or similar weapon for the use of a variety of meat (game meat) products such as biltong, dried sausages and salami (Van der Merwe & Du Plessis, 2013).

During the last couple of years, the consumptive side of wildlife tourism has been under immense pressure, not only in South Africa, but worldwide, due to anti-hunting organisations, the political climate in South Africa, weak economic conditions or economic pressure, legislation and bad publicity for the industry (Van der Merwe & Saayman, 2017b). Research by Van der Merwe and Saayman (2017a) indicates that South African hunters' frequency of hunting trips is also decreasing, complementing the current economic crisis experienced in the country, mainly because it is becoming too expensive to hunt. Therefore, for product owners of hunting establishments, it is becoming challenging to compete for the same market. One method to position product owners better in the market is through well-developed marketing strategies (Kolter, Bowen & Makens, 2003; Kim, Park, Gazzoli & Sheng, 2011). In numerous studies (Andereck & Nyaupane, 2011; Nerg, Uusivuori, Mikkola, Neuvonen & Sievanen, 2012; Oliveira

& Pereira, 2010; Cini & Saayman, 2014), marketing strategies of tourism products are based on demographic (age, gender, language and marital status) and behavioural aspects (travel motives and spending) (Jönsson & Devonish, 2008:398; Kattiyapornpong & Miller, 2009:81). Therefore, this research aims to use the demographic variable, 'age', as the dependent variable to determine hunters' behaviour. Henderson (2016:37) states that more research is needed to explore the relationships between age and hunting participation. The findings of this research will assist product owners in identifying the highest spenders and motives for hunting, based on age segmentation. This information can help product owners to generate a higher income from the selected market and to develop better marketing strategies.

2. STUDY AREA

Tourism (hunting) marketing can be defined as the effective process of developing and promoting a tourism product. In essence, marketing is about attracting tourists (hunters) to products and/or destinations (Baker & Hart, 2016). Marketing further implies all business activities that determine the scope and nature of a potential market and the steps taken to ensure that a suitable strategy is proposed and implemented to satisfy the need for profit, attract more tourists and maintain a sustainable market share (Foster, 1989). Molina, Gómez, González-Diaz and Esteban (2015) indicated that consumer behaviour is a cornerstone of any marketing strategy found in the tourism industry, including conceptual dimensions such as decision-making, values, motivations, self-concept and personality, expectations, attitudes, perceptions, satisfaction, trust and loyalty.

Market segmentation is defined by Pizam and Reichel (1979) and Simkin (2016) as the division of the market into smaller groups of consumers with different needs (Sarabia & Munuera, 1994). Simkin (2016) further states that consumers do not have similar taste preferences, and therefore segmentation of markets is exceptionally useful, because different tourists (hunters) have different needs (Dolnicar, 2002). It is an essential tool in any marketing strategy of tourism-related businesses that aid in the understanding of tourists (hunters) (Dolnicar, 2004). Simkin (2016) adds that market segmentation is a means of defining and targeting a specific segment or market within the broader market (hunters). This process can drive a market (hunters) into a specific group of buyers who require different products.

When conducting market segmentation, the hunting destination or specific product gains a competitive advantage, because 1) competition can be reduced; 2) the hunting product is improved in a specific manner rather than trying to provide all things to all hunters; 3) marketing efforts will be focused on developing the most efficient method for the targeted segment (for example, offering different experiences); and 4) hunters (tourists), experiencing a hunting trip at a hunting destination that suits their particular hunters' needs, are likely to be more satisfied with their hunting experience and, consequently, revisit and advertise the hunting destination among like-minded hunters (Dolnicar, 2008).

The task of identifying a segment can be difficult, partly because various bases can be used for segmentation, namely demographic, psychographic, geographic and behavioural segmentation. Demographic segmentation includes aspects such as age, gender, marital status, income, gender, ethnic background and family lifecycle. Psychographic segmentation focuses on personality profiles and lifestyle profiles. Geographic segmentation uses climate, the density of populations, market size, and different cities or provinces to segment tourism markets. Behavioural segmentation is based on the tourists' attitude toward use and motive, or their response to a tourism product. The latter segmentation includes behavioural variables such as occasions, benefits, user status, usage rate, buyer-readiness stage, loyalty status and attitude (Larsen, 2010). Larsen (2010) argues that, when designing marketing strategies, the demographic and behavioural segmentations are the most important ones.

Marketing strategies may use one of the segmentation bases or a combination of them to segment a market (Fulgoni, 2018). In this research, the demographic (age) and behavioural (travel motives) approaches are used for segmentation of the South African biltong hunter market.

The only work conducted in the past that made use of behavioural segmentation, specifically focusing on the travel motives of hunters, includes the research of Arthur and Wilson (1979); Decker, Brown and Cutiérrez (1980); More (1984); Decker and Connelly (1989); Floyd and Gramann (1997); Mulder

(2011); Vermeulen (1994); as well as Van der Merwe and Saayman (2013). Although most of the references used are old, they are to the knowledge of the researchers the only done in this regard. As hunting markets cannot be assumed to be the same as other tourism markets, one needs to consider the work of these authors. The literature revealed that travel motives of hunters could be broadly summarised as 'companionship/social life/ being with the family', 'experiencing nature/ getting outdoors', 'viewing and knowing animals', 'using appropriate equipment' and 'developing skills'. Decker *et al*. (1980) noted that the motives for hunting to which the highest rankings were accorded, were 'getting outdoors' and 'seeing some animals or signs', followed by 'relaxation and getting away from routine', whereas 'taking shots at game' received a lower ranking.

The results of Radder's (2005) research revealed that the motive with the highest ranking for trophy hunters was 'spiritual' (being in nature, reconnecting with land, recommitting to life), 'emotional' ('your heart rate doubles', 'just the thought excites you'), and 'exploration' (experiencing new places and searching for adventure). The work of Mulder (2011), also based on trophy hunters, identified 'personal values' ('hunting is in my blood and part of my heritage'), 'excitement/challenge/skills' ('hunting is an exciting adventure, a thrill and I enjoy the challenge') and 'social interaction' ('meeting new people', 'being with like-minded people') as important travel motives.

Vermeulen's (1994) *The needs and preferences of hunters in the Transvaal* (prior to 1994, South Africa consisted of four provinces; today, the old Transvaal province has been divided into four different provinces, namely Mpumalanga, Gauteng, North West and Limpopo) is one of the first studies that focused on why local (biltong) hunters hunt. However, the research (conducted in the early 1990s) touches only lightly on travel motives. During 2013, Van der Merwe and Saayman (2013) conducted a national biltong hunters' survey and found that the three primary reasons for hunting are education, excitement/experience and game meat products.

Previous research that is based on the age of hunters includes the work of Lu-Li, Zinn, Barro and Manfredo (2003); Radder (2013); Saayman, Van der Merwe and Pienaar (2008) and Winkler and Warnke (2012). A hunter's age has the potential to influence participation in hunting activities and reflects both the hunter's physical abilities and the experiences one typically encounters at specific points in one's life. Winkler and Warnke (2012) found that hunters are recruited as young teenagers, but that hunting activities decline when they leave for college. However, participation starts to increase again during their late 20s and remains highest among hunters in their 30s and 40s. A slight increase in participation rates is experienced after retirement, followed by a sharp decline after turning 70, as the physical effects of ageing start to restrict the activities that one is capable of participating in. People between 18 and 25 years of age (young adulthood) are often at the beginning of their careers and experience major life changes, for example getting married, starting a family, and becoming financially independent. Middle-aged people's (hunters') lives are more stable, and outdoor activities can be practiced more frequently. During this time, one tends to see an increase in hunting activities.

Mulder (2011) found that respondents in the 70- to 89-year age group tend to pursue hunting for personal reasons (travel motives) such as heritage, the ability to contribute to wildlife conservation, exercise, to escape from the stress of daily routine, and for opportunities to share experiences with their loved ones. Hunters in the 40- to 49-year age group indicated that reasons to travel to South Africa to hunt would be to fulfil a truly unique experience and would be 'a dream (come) true'.

Lu-Li *et al*. (2003) studied outdoor recreation patterns among older hunting license holders in Pennsylvania and Colorado to better understand outdoor recreation preferences, behaviour, and management priorities. Firstly, their research was consistent with other studies (Winkler & Warnke, 2012) suggesting that as they age, older hunters tend to participate in fewer activities. Secondly, the research indicated a pattern of disengagement that is natural and healthy, or it may reflect a pattern of growing vulnerability to leisure constraints among ageing individuals.

Radder, Mulder and Han (2013) conducted research on safari hunters (trophy hunters) to South Africa. Part of the research was to determine how the activity- and destination-related motivations differed, based on hunters' personal characteristics such as age, income, level of education, childhood and current home environments, country of residence, and level of hunting experience. Analysis of variance (ANOVA) and Tukey's post-hoc tests indicated that none of the activity-related motives differed by childhood home environment, age, income, or level of education. Therefore, Radder's (2013) research contradicts research by Henderson (2016); Lu-Li *et al.* (2003); Mulder (2011); as well as Winkler and Warnke (2012).

3. METHODS

Quantitative research was conducted using a questionnaire to achieve this study's aims. The questionnaire administration took place by websites of South African Hunters and Game Conservation Association (SA Hunters) and on Pot-Shot, a hunting newsletter in South Africa, where members and readers could complete the questionnaire. Respondents had the opportunity to complete this questionnaire between July and August 2015, during which, 493 (n) usable questionnaires were obtained.

The questionnaire was based on work carried out by Van der Merwe, Scholtz and Saayman (2011) and Vermeulen (1994), determining the profile of biltong hunters, and the work of Radder (2005) regarding the travel motives of hunters. The questionnaire consists of three sections: Section A: socio-demographic information (age, province of residence and gender); Section B: economic impact (travel and accommodation costs, group sizes and length of stay); and Section C: hunting details (travel motives, members' status and preferred animals to hunt).

Wright (2005) contends that if the researcher made use of a membership email list (web-based), a sample frame could be established if each participant were to receive a unique code number. This is the approach that was subsequently adopted. An incentive was used in the form of a sponsored hunt to entice respondents to complete the questionnaire.

The data obtained from the survey were captured in Microsoft Excel and subsequently analysed statistically. The data analysis consisted of three steps: In the first phase of the results, the data analysis analysed the descriptive results (such as age, gender, home language and place of residence), which revealed the profile (demographics) of the respondents. In the second phase of the results, a factor analysis was used to determine the travel motives of the respondents. In the third phase, ANOVA and Tukey's multiple comparisons were used to compare two or more independent aspects, which were, in this case, age and travel motives (Maree & Pietersen, 2007; Field, 2006).

4. RESULTS

The results of the study are presented and discussed in three sections: firstly, the profile of the respondents; secondly, the factor analysis regarding the travel motives of respondents; and thirdly, the ANOVA and *t*-test.

4.1 Profile of biltong hunters

From Table 1, it can be seen that the results indicated that South African biltong hunters are mainly male respondents (98%), Afrikaans speaking (82%), married (83%), and within their forties (their average age is 47.5 years). The Gauteng province in South Africa is their dominant province of residence. The income of 41% of the respondents is higher than R652 001 per annum, they hunt on average 2.7 times per year within the Limpopo province (their preferred province to hunt), and, on average, they hunt eight species per season. The respondents' hunting trips last on average 3.96 days, and they spend approximately R40 000 per year on hunting. The profile concurs with previous research that was conducted by Van der Merwe, Saayman, Warren and Krugell (2007), Van der Merwe, Saayman, Warren, and Krugell (2010) and Vermeulen (1994). Interesting to note that this research was done 20 years plus after that of Vermeulen (1994) and still the profile stayed the same

Table 1: Profile of the South African biltong hunter

Profile of the South African biltong hunter	
Category	**Profile**
Gender	**Male (98%)**
Language	**Afrikaans (82%) and English (17%)**
Age	**Average age was 47.5 years**
Marital status	**Married (83%)**
Province of residence	**Gauteng (51%) and Western Cape (17%)**
Level of education	**44% had a diploma or degree.**
Occupation	**Professional (31%), Management (22%), and Self-employed (20%)**
Income	**41% earned more than R652 001 per annum.**
Times gone hunting	**2.70 times per year**
Preferred country to hunt	**South Africa (80%)**
Preferred hunting provinces	**Limpopo (48%) and Northern Cape (18%)**
Average length of hunting trip	**3.96 days**
Average expenses per season (excluding game)	**R20 328,75**
Average number of species hunted	**8 species**
Average spending on game per season	**R 19 545,75**
Total spending per person per season	**R39 874,50**

By making use of cross-tabulation, the researchers determined which age categories earn the most income per annum. The results revealed that hunters in the age categories of 35 to 50 years of age and 51 years and older account for a larger percentages of hunters who fall in the higher income bracket of R652 000 and more per annum (Table 2).

Table 2: Cross tabulation, income of hunters

Cross-tabulation, income of hunters									
		What is your current gross annual income?							Total
		R141 001 - R221 000	R20 001 - R140 000	R221 001 - R305 000	R305 001 - R431 000	R431 001- R552 000	R552 001 - R652 000	R652 001 >	
Age	35 years and younger	16 18.4%	5 5.7%	9 10.3%	23 26.4%	14 16.1%	6 6.9%	13 14.9%	87 100.0%
	36-50 years	9 4.5%	10 5.0%	19 9.5%	27 13.5%	23 11.5%	18 9.0%	90 45.0%	200 100.0%
	51 years and older	9 4.4%	3 1.5%	18 8.9%	23 11.3%	21 10.3%	26 12.8%	100 49.3%	203 100.0%
Total		34 6.9%	18 3.7%	46 9.4%	73 14.9%	58 11.8%	50 10.2%	203 41.4%	490 100.0%

4.2 Factor analysis: Hunters' motives

Factor analysis is used to establish latent variables or factors among observed variables (Tustin, Ligthelm, Martins, & Van Wyk, 2005) in other words, the technique is used to reduce the data (Malhotra, 2010). The interpretation of a factor analysis is facilitated by identifying the items that have sufficient loadings on the same factor (Mulder, 2011). Six factors were identified (Table 3), namely adventure, cultural heritage, nature, escape and relaxation, family togetherness and food sources (meat).

The most important factors with the highest mean values were meat (with a mean value of 4.17), escape and relaxation (with a mean value of 3.91) and nature (with a mean value of 3.90). The six factors that were identified explained 59.7% of the total variance. Cronbach's alpha was then used to measure the internal consistency of the travel motives. Fluker and Turner (2000) confirm that Cronbach's alpha is the preferred measure of internal reliability, measuring the correlations between the items describing the same concept. The Cronbach's alpha for the research results ranged between 0.676 and 0.800, which is acceptable.

Decker *et al*. (1980), although 38 years back, still concur with findings of this research, as they found that the primary motives for hunters are to be outdoors, to see some animals, to relax and to get away from the daily routine. To obtain game meat by hunters was also previously identified by Van der Merwe and Saayman (2013), who indicated that game meat products are a major motive for South African biltong hunters to hunt.

Table 3: South African biltong hunters' motives for hunting

Motives identified Variance explained 59.76%	Mean value	Cronbach alpha	Inter-item correlation
Factor 1: Adventure			
	2.88	.772	.361
To collect trophies (.770)			
To hunt different species (.740)			
To experience excess adrenaline (.670)			
To explore new hunting destinations (.571)			
To test my hunting abilities/skills required to hunt (.515)			
To experience the thrill of the hunt (.363)			
Factor 2: Cultural heritage			
	3.41	.800	.443
This is part of my tradition (-.907)			
Because I grew up with hunting (-.857)			
This is part of my lifestyle (-.770)			
For my well-being (-.349)			
It's an annual event (-.339)			
Factor 3: Nature			
	3.90	.735	.456
To learn more about animal behaviour during the hunt (.790)			
It is an opportunity to appreciate nature (.777)			
It contributes to conservation (.668)			
Hunting is a spiritual experience (.576)			
Factor 4: Escape and relaxation			
	3.91	.676	.424
To break away from my routine (.838)			
To relax (.832)			
To spend time with my hunting friends (.601)			
Factor 5: Family togetherness			
	3.44	.788	.651
To benefit my children (.852)			
To have a family breakaway and to hunt together (.834)			
Factor 6: Food source (meat)	4.17		
Hunting for meat and biltong (.888)			

4.3 ANOVAs and Tukey's test: Age

ANOVAs and Tukey's multiple comparisons, together with two-way frequency tables and chi-square tests, were used to investigate any significant differences between the motivational clusters of biltong hunters. The study used the demographic variable 'age' as the dependent variable. The two behavioural aspects that had statistically significant differences were 'spending' and 'travel motives'. The results of the statistical analyses will be discussed next (Table 4).

Table 4: ANOVA's: Age as dependant variable

		N	Mean	Std. deviation	Sig.
Factor 1: Adventure:	35 years and younger	87	3.0230	.79614	.000
	36-50 years	200	2.9925	.77010	
	51+ years	203	2.7036	.73092	
	Total	490	2.8782	.77151	
Factor 2: Cultural heritage:	35 years and younger	87	3.6805	.91115	.001
	36-50 years	200	3.4880	1.00444	
	51+ years	203	3.2365	.95443	
	Total	490	3.4180	.98022	
Factor 3: Nature:	35 years and younger	87	4.0546	.77706	.032
	36-50 years	200	3.9488	.78351	
	51+ years	203	3.8079	.78391	
	Total	490	3.9092	.78646	
Factor 4: Escape and relaxation:	35 years and younger	87	4.2184	.71858	.000
	36-50 years	200	3.8883	.81669	
	51+ years	203	3.8095	.81775	
	Total	490	3.9143	.81226	
Factor 5: Family togetherness:	35 years and younger	87	3.2529	1.32699	.000
	36-50 years	200	3.7525	1.26808	
	51+ years	203	3.2167	1.23273	
	Total	490	3.4418	1.28790	
Factor 6: Food source (meat):	35 years and younger	87	4.2874	.91382	.037
	36-50 years	200	4.2500	.87253	
	51+ years	203	4.0443	.97646	
	Total	490	4.1714	.92853	
Average spending:	35 years and younger	85	R15508.0705	16490.04371	.003
	36-50 years	194	R23538.2113	25316.51514	
	51+ years	203	R18059.0788	16551.84322	
	Total	482	R19814.5062	20733.56641	
Spending on transport:	35 years and younger	83	R2273.434	1509.3043	.014
	36-50 years	194	R3491.722	3845.0994	
	51+ years	201	R3246.537	3008.0960	
	Total	478	3177.077	3217.4641	
Spending on food:	35 years and younger	84	1569.048	1438.6637	.007
	36-50 years	193	2319.487	2939.1555	
	51+ years	197	1689.289	1740.0453	
	Total	474	1924.580	2287.6961	
Spending on beverages:	35 years and younger	85	994.118	935.9046	.004
	36-50 years	193	1559.321	3032.1903	
	51+ years	195	883.282	960.8177	
	Total	473	1179.047	2092.0697	
Spending on meat processing:	35 years and younger	81	1849.20	2356.293	.000
	36-50 years	180	3297.84	3777.533	
	51+ years	188	2314.78	2147.650	
	Total	449	2624.89	2991.546	

Statistically significant difference: $p \leq 0.05$.
A group differs significantly from type (in row) where 'b' is indicated.
C group differs significantly from type (in row) where 'a' and 'b' are indicated.

ANOVAs and Tukey's multiple comparisons, together with two-way frequency tables and chi-square tests, were also used to investigate any significant differences regarding age and the motivational clusters of biltong hunters.

Table 5: Tukey test: Age as dependent variable

Adventure				Cultural heritage			
Tukey $B_{a,b}$				Tukey $B_{a,b}$			
Age_c	N	Subset for alpha = 0.05		Age_c	N	Subset for alpha = 0.05	
		1	2			1	2
51+	203	2.7036		51+	203	3.2365	
36-50	200		2.9925	36-50	200		3.4880
35 and younger	87		3.0230	35 and younger	87		3.6805
Nature				Escape and relaxation			
Tukey $B_{a,b}$				Tukey $B_{a,b}$			
Age_c	N	Subset for alpha = 0.05		Age_c	N	Subset for alpha = 0.05	
		1	2			1	2
51+	203	3.8079		51+	203	3.8095	
36-50	200	3.9488	3.9488	36-50	200	3.8883	
35 and younger	87		4.0546	35 and younger	87		4.2184
Family togetherness				Spending			
Tukey $B_{a,b}$				Tukey $B_{a,b}$			
Age_c	N	Subset for alpha = 0.05		Age_c	N	Subset for alpha = 0.05	
		1	2			1	2
51+	203	3.2167		35 and younger	85	R15 508	
35 and younger	87	3.2529		51+	203	R18 059	
36-50	200		3.7525	36-50	194		R23 538
Spending on Transport				Spending on Food			
Tukey $B_{a,b}$				Tukey $B_{a,b}$			
Age_c	N	Subset for alpha = 0.05		Age_c	N	Subset for alpha = 0.05	
		1	2			1	2
35 and younger	83	R2 273		35 and younger	84	R1 569	
51+	201		R3 246	51+	197	R1 689	
36-50	194		R3 491	36-50	193		R2 319
Spending on Beverages				Spending on Meat processing			
Tukey $B_{a,b}$				Tukey $B_{a,b}$			
Age_c	N	Subset for alpha = 0.05		Age_c	N	Subset for alpha = 0.05	
		1	2			1	2
51+	195	R883		35 and younger	81	R1 849	
35 and younger	85	R994		51+	188	R2 314	
36-50	193		R1 559	36-50	180		R3 297

From the results listed in Tables 4 and 5, the hunters' age had a statistical significant difference on the following motives of hunters: adventure, cultural heritage, escape and relaxation, family togetherness and nature. Tukey's test indicated that hunters in the age categories of 35 years and younger, and between 36 and 50 years, perceive the adventure motive as more important than hunters who are 51 years and older. Hunters' nature motive is more important for hunters younger than 35 years of age than for hunters 51 years and older. For the escape and relaxation motive, the age category 35 years and younger indicated that this motive is more important to them than the two other age categories, namely 36 to 50 years of age and 51 years and older. For the travel motive of family togetherness, the age category 36 to 50 years of age rated this motive more important than the other two age categories (53 years and younger, and 51 years and older). This makes sense, as one tends to find this category to be in the family lifecycle of parenting and launching adult children (Louw, 1990). Cultural heritage as motive was seen as more important by younger hunters in the age categories of 35 years and younger, and 36 to 50 years of age.

Regarding highest spenders, the results indicated a statistically significant difference between average spending, spending on meat processing, spending on food, and spending on beverages. The results indicate the category 36 to 50 years of age to be higher spenders than the other two categories when it comes to spending on food, beverages, meat processing and general spending. The age categories of 36 to 50 years, and 51 years and older spend more on travelling to the hunting destination.

5. DISCUSSION

From the results of the research, the authors pinpointed two findings:

The first finding from this research is that age does impact biltong hunters' behaviour (motives for hunting). In other words, different age groups have different motives for hunting, and therefore, different needs. The current research indicates that there are differences between the three age categories, namely 35 years and younger, 36 to 50 years of age and 51 years and older. The results show that the method used for data analysis is an appropriate method to determine different markets, and therefore recommended for similar research. This finding is supported by the research done by Henderson (2016); Lu-Li *et al*. (2003); Mulder (2011); Winkler and Warnke (2012).

The second finding of this research is that age impacts on biltong hunters' spending behaviour. The results indicate the category 36 to 50 years of age to be higher spenders. Age was previously successfully linked to behaviour of hunters such as hunting motives, but this is the first time a positive linkage was made between age and spending behaviour for biltong hunters. This research, therefore, contributes to new knowledge within the biltong hunting and game farming fraternity on biltong hunters' spending behaviour.

6. MANAGEMENT IMPLICATIONS OF FINDINGS

Management implications for the first finding (age and travel behaviour):
For biltong hunters in the age categories of 35 years and younger, and between 36 and 50 years, adventure is important. Therefore, this new information can now be used for marketing and product development purposes. For product development, product owners can include species that are more adventurous to hunt, such as Bushbuck and Bushpig (seen as dangerous) (Jonker, 2000). The walk and stalk hunting method can also be used, as this can provide the biltong hunter with more adventure as with walk and stalk, the skill-set of the hunter is tested against the that of the animal hunted. In the case of marketing, the marketing strategy of product owners can highlight the fact that adventurous hunts are provided on the farm.

To attract biltong hunters where the hunt for them is more about being in nature, product owners' marketing must be directed at hunters younger than 35 years of age. For product development, product owners can rather make use of walk and stalk as hunting method as opposed to the sit and wait or by making use of a vehicle to hunt from. This will bring hunters closer to the nature expereince. If the farm where the hunt will take place possesses a beautiful and authentic natural environment, this will be of an advantage for the product owner, and the farm can therefore be market for its natrural beauty.

To target the family market, marketing must be directed to the age category 36 to 50 years of age. Products and facilities, for example accommodation, must be suitable to accommodate families. Therefore, accommodation units occupying four to six people are recommended as families' sizes are normally in this region. Also, provide hunting activties that fit the whole family.

Implications for the second finding (age impact on spending behaviour):

Higher-spending biltong hunters can be targeted, based on the age categories. Therefore, if product owners would like to attract higher spenders in order to increase profitability, the age category that needs to be targeted is hunters between 36 and 50 years of age, as they are the higher spenders. This is the first time that research identified this finding and therefore new knowledge has been created for the hunting industry. If the product is situated further away from the market, for example the Northern Cape Province, in relation to the Gauteng hunting market, product owners need to direct their marketing at biltong hunters younger than 35 years of age, as they are more willing to spend more on travel costs and would therefore travel further to hunt.

This research aimed to use the demographic variable, 'age', as the dependent variable in determining biltong hunters' behaviour and spending. From the research, new knowledge has been obtained, which is, age does influence behaviour and spending. The main contribution of this research to new knowledge generated is that product owners now know who the more lucrative hunting market is, namely hunters between 36 and 50 years of age. Added to this is that we now also know more about biltong hunters' travel motives and behaviour.

7. ACKNOWLEDGEMENTS

The authors would like to thank South African Hunters and Game Conservation Association and PotShot for their assistance regarding the research.

This research is in memory of the late Prof Melville Saayman who passed away on 14 March 2019, who worked with me on this research.

REFERENCES

Andereck, K.L. & Nyaupane, G.P. 2011. Exploring the nature of tourism and quality of life perceptions among residents. *Journal of travel research*, 50: 248-260.

Arthur, L.M. & Wilson, W.R. 1979. Assessing the demand for wildlife resources: A first step. *Wildlife society bulletin*, 7(1): 30-34.

Baker, M.J & Hart, S. 2016. *The marketing book*. 7th edition. Routledge: London.

Cini, F. & Saayman, M. 2014. Which age spend the most in national parks? *Koedoe*, 56(2): 1-8.

Decker, D.J., Brown, T.L. & Cutiérrez, R.J. 1980. Further insights into multiple-satisfaction approach for hunter management. *Wildlife society bulletin*, 8(4): 323-331.

Decker, D.J. & Connelly, N.A. 1989. Motivations for deer hunting: implications for antlerless deer harvest as a management tool. *Wildlife society bulletin*, 17(4): 455-463.

Dolnicar, S. 2002. A review of data-driven market segmentation in tourism. *Journal of travel and tourism marketing*, 12(1): 1-22.

Dolnicar, S. 2004. Beyond "commonsense segmentation": A systematics of segmentation approaches in tourism. *Journal of travel research*, 42(3): 244-250

Dolnicar, S. 2008. *Market segmentation in tourism*. Cambridge: CAB international.

Field, A. 2006. Discovering statistics using. *Statistical packages of social sciences*. 2nd ed. California: Sage.

Floyed, M. F & Gramann, J. H. 1997. Experience-based setting management: Implications for market segmentation of hunters. *Leisure sciences*, 19: 113-127

Fluker, M.R. & Turner, L.W. 2000. Needs, motivations, and expectations of a commercial whitewater rafting experience. *Journal of travel research*, 38(4): 380-389.

Foster, D. 1989. *Travel and tourism management*. 4th ed. London: Macmillan.

Fulgoni, G.M. 2018. Are you targeting too much? Effective marketing strategies for brands. *Journal of advertising research*, 58(1): 8-11.

Henderson, C. 2016. *Investigating the social habitat of deer hunters in Michigan*. Michigan, US: Michigan Technological University. Thesis – M.

Higginbottom, K. 2004. *Wildlife tourism: Impacts, Management and Planning*. Altoona Vic: Common Ground.

Jonker, H. 2000. *Kennis vir die jagter*. NBD. Wes-Kaap.

Jönsson, C. & Devonish, D. 2008. Does nationality, gender, and age affect travel motivation? A case of visitors to the Caribbean island of Barbados. *Journal of travel and tourism marketing*, 25(3-4): 398-408.

Kattiyapornpong, U. & Miller, K. 2009. Socio-demographic constraints to travel behaviour. *International Journal of Culture, Tourism and Hospitality Research*, 3(1): 81-94.

Kim, W. G., Park, Y., Gazzoli, G., & Sheng, E. 2011. Benefit segmentation of international travellers to Macau, China. *Journal of Quality Assurance in Hospitality & Tourism*, 12(1): 28-57.

Kotler, P., Bowen, J.T. & Makens, J.C. 2003. *Marketing for hospitality and tourism*. 3rd ed. Upper Saddle River: Prentice-Hall.

Larsen, N. 2010. *Market segmentation: a framework for determining the right target customers.* Aarhus School of Business. Thesis – MBA.

Louw, D.A. 1990. *Menslike ontwikkelings*. 2nd ed. Pretoria: HAUM.

Lu-Li, C., Zinn, H.C, Barro, S.C. & Manfredo, M.J. 2003. A cross-regional comparison of recreation patterns of older hunters. *Leisure sciences*, 25(1): 1-16.

Malhotra, N.K. 2010. *Marketing Research: An Applied Orientation*. 6th ed. New Jersey: Pearson Prentice Hall.

Maree, K. & Pietersen, J. 2007. *Surveys and the use of questionnaires*. In Maree, K., ed. First steps in research. Pretoria: Van Schaik. 155-169.

Marx, S. & Van der Walt, A. 1989. *Bemarkingsbestuur*. Cape Town: Juta.

Molina, A., Gómez, M., González-Diaz, B. & Esteban, A. 2015. Market segmentation in wine tourism: strategies for wineries and destinations in Spain. *Journal of wine research*, 26(3): 192-224.

More, T.A. 1984. Hunting: a theoretical explanation with management implications. *Wildlife society bulletin*, 12(4): 338-344.

Mulder, A.C. 2011. *Motivations of international trophy hunters choose to hunt in South Africa*. Port Elizabeth, SA: Nelson Mandela Metropolitan University. Dissertation.

Nerg, A., Uusivuori, J., Mikkola, J., Neuvonen, M. & Sievanen, T. 2012. Visits to national parks and hiking areas: a panel data analysis of their socio-demographic, economic and site quality determinants. *Tourism economics*, 18: 77-93.

Oliveira, P. & Pereira, P.T. 2010. *Valuing nature attributes by the tourists – are there socio-demographic differences?* Ponta Delgada: Centro de Esudos de Economia Aplicada do Atlantico.

Page, S.J. & Dowling, R.K. 2002. *Ecotourism.* Harlow, UK: Prentice Hall.

Pizam, A. & Reichel, A. 1979. Big spenders and little spenders in US tourism. *Journal of Travel Research,* 18(2): 42-43.

Radder, L. 2005. Motives of international trophy hunters. *Annals of Tourism Research*, 32(4): 1141-1144.

Radder, L., Mulder, A. & Han, X. 2013. Motivations and socio-demographic characteristics of safari hunters: A South African perspective. *Academy of Marketing Studies Journal,* 17 (1): 1-19

Saayman, M., Van Der Merwe, P. & Pienaar, J. 2008. Expenditure-based segmentation of tourists to the Kruger National Park. *Acta academica,* 41(3): 108-127.

Sarabia, S.F.J. & Munuera, A.J.L. 1994. Concepto y usos de la segmentación de mercados: una perspectiva teórica y practica. *Información comercial Española,* 727: 111-124.

Simkin, L. 2016. Segmentation [In Baker, M.J and Hart, S. 2016. *The Marketing Book*. 7th ed. Routledge: London. p 270-294.]

Stanton, W.J., Etzel, M.J. & Walker, B.J. 1991. *Marketing*. 9th ed. New York: McGraw-Hill.

Strydom, J.W., Cant, M.C. & Jooste, C.J. 2000. *Marketing management.* 4th ed. Cape Town: Juta.

Tustin, D.H., Ligthelm, A.A., Martins, J.H. & Van Wyk, H.D.E.J. 2005. *Marketing Research in Practice.* Pretoria: Unisa Press.

Van der Merwe, P. 2014. SA hunting industry. What is the current status? *Game & Hunt,* December, 60-63.

Van der Merwe, P. & Du Plessis, E. 2013. *Game Farm and Hunting Tourism.* Stellenbosch: Sun Media.

Van der Merwe, P. & Saayman, M. 2004. *Game farm management from a tourism perspective.* Potchefstroom: Ons Drukkers.

Van der Merwe, P. & Saayman, M. 2013. Who are the South African hunters and why do they hunt? *Journal of Hospitality and Management Tourism*, 4(1): 9-18.

Van der Merwe, P. & Saayman, M. 2017(a). Competitive trophy hunting: what makes South Africa a competitive trophy hunting destination? *Wildlife ranching, 6: 123-126.*

Van der Merwe, P. & Saayman, M. 2017(b). *A marketing analysis and economic impact of biltong hunting in South Africa*. Potchefstroom: TREES.

Van der Merwe, P., Saayman, M. & Krugell, W. 2007. The determinants of spending by biltong hunters. *South African Journal of Economic and Management Science,* 10(2): 184-194.

Van der Merwe, P., Saayman, M., Warren, R. & Krugell, W. 2010. Socio-demographic profile and travel behaviour of biltong hunters in South Africa. *Acta academica*, 42(3): 61-85.

Van der Merwe, P., Scholtz, M. & Saayman, M. 2011. *National profile and economic impact of biltong hunters in South Africa*. Potchefstroom: Platinum Press.

Vermeulen, C.M. 1994. *Die behoeftes en voorkeure van jagters in die Transvaal*. PU vir CHO. (Dissertation).

Wilson, R.M.S., Gilliga, C. & Pearson, D.J. 1993. *Strategic Marketing Management: Planning, Implementing and Control*. Oxford: Butterworth-Heinemann.

Winkler, R. & Warnke, K. 2012. The future of hunting: an age-period-cohort analysis of deer hunter decline. *Population and environment*, 34(4): 460-480.

Wright, K.B. 2005. Researching internet-based populations: advantages and disadvantages of online survey research, online questionnaire authoring software packages, and web survey services. *Journal of Computer-Mediated Communication*, 10(3): 00-00.

MODEL FOR THE CONTINUANCE USE INTENTION OF MOBILE LEARNING GAMES

MI VENTER* & L DE WET**
*CENTRAL UNIVERSITY OF TECHNOLGY
**UNIVERSITY OF THE FREE STATE

Abstract

Mobile educational applications encompass some of the most valuable learning tools that have ever been developed. Games for learning are most effective when multiple sessions are involved. Previous research on the use of educational games in mathematics education has focused primarily on the learning potential of these games and has not adequately addressed the continuance use intention of these games. The purpose of this paper is to provide a model for the continuance use intention of mobile mathematical learning games. A mixed method research methodology was employed where qualitative and quantitative data was gathered through surveys and interviews. Sixty children, aged 8 to 12, from selected schools in one of South Africa's provinces, participated in the study. The results indicated that a combination, balance and interplay of the various dimensions of enjoyment and engagement (cognitive, affective and physical) in a mathematical mobile learning game influenced the continuance use intention of learners. The resultant theoretical model could provide educators, parents and educational game designers with an integrated approach that should allow them to design and evaluate specific mathematical mobile learning games for motivational potential.

Keywords: mathematical applications, mathematical games, mobile games, continuance use intention, primary school learners

1. INTRODUCTION

Many teachers, parents and learners are experiencing the transformational opportunities that mobile technologies bring to learning (Thiruchelvam, 2014; Huang, Chang & Wu, 2017). Research studies have shown improved performance of primary school learners in mathematics (maths) after the use of several mobile mathematical learning games (MMLGs) (Bos & Lee, 2013; Pope, Boaler & Mangram, 2015; Riconscente, 2013; Subramanya & Farahani, 2012). Despite the promising findings of these studies, MMLGs will be able to assist primary school learners in improving their maths skills in the long run only if they perceive these MMLGs in a positive light and continue to use them on a regular basis (Kapp, 2013). Continuance use intention (CUI) can be defined as a user's intention to continually use a system or reuse a system (Bhattacherjee, 2001). The continuous use of content in MMLGs has the advantage of learners gaining deeper insight into certain maths concepts, as they repeatedly practise difficult problems (Bos & Lee, 2013). Without knowledge of what drives the continuance use intention (CUI) of learners towards MMLGs, educators and parents will not be able to select the MMLGs with the best potential to stimulate continued use behaviour. This may result in MMLGs failing to be an effective tool to assist in the elevation of the maths skill levels of primary school learners in South Africa (SA).

Currently, limited research is available regarding the factors that drive learners to continue using MMLGs. The aim of this paper is to propose a novel model that could be used to predict the CUI of MMLGs. The main research question that was formulated to guide this study was: Which constructs influence the CUI of primary school learners towards MMLGs?

The paper is structured firstly to present the theoretical model. Secondly, the research design and methodology are discussed, followed by the results, conclusions, limitations and future research.

2. LITERATURE REVIEW

2.1 Theoretical model

No theoretical model to predict the CUI of learners in digital game-based learning (DGBL) environments currently exists. Enjoyment has consistently been argued to be one the most important motivations for children to interact with technology and is deemed to be a very important aspect of educational learning material (Shernoff, Hamari & Rowe, 2014). If educational technology does not

provide a positive experience, children are unlikely to interact with it or accept it, let alone re-use it (Wang, Shen & Ritterfeld, 2008). Vorderer, Klimmt and Ritterfeld (2004) argued that media-related enjoyment is quite a complex construct and is composed of various physical, affective and cognitive dimensions. In addition, they claimed that a comprehensive account of media enjoyment should also consider the antecedents of enjoyment. In a similar fashion, Domagk, Schwartz, and Plass (2010) believed that constructs related to motivation in DGBL environments, correlate to cognitive, affective and behavioural theoretical foundations and should be taken into account when designing educational games. These authors created the INTERACT model of learner engagement in DGBL environments, which distinguishes among cognitive engagement, affective engagement, and behavioural engagement. Therefore, based on the conceptualisations of Vorderer, Klimmt and Ritterfeld (2004) and Domagk *et al.* (2010), the antecedents of interactive media engagement and enjoyment were divided into three dimensions, namely:

- the cognitive dimension of media engagement and enjoyment (CDME), referring to the mental processing, integration, organisation and cognition in a game and the perceptions thereof;
- the affective dimension of media engagement and enjoyment (ADME), referring to the emotional engagement with the game environment and experienced emotions invoked by the game environment;
- the physical dimension of media engagement and enjoyment (PDME), referring to the aspects that the physical senses perceive, as well as the physical interaction with the system.

Theories that address these separate dimensions were therefore, sought to shed light on the constituents of these dimensions. Designers and researchers of video games regularly use the concept of *flow* as an indication of engagement and enjoyment and direct their attention to the important balance that have to exist between challenge and skill. Games should be designed so that the level of challenge is not too great (resulting in frustration), nor too slight (which would lead to boredom) (Salisbury & Tomlinson, 2016). The constructs of Flow Theory (Csíkszentmihályi, 1990), namely concentration, challenge, curiosity, feedback, goal clarity and skill, are generally accepted to be able to predict the cognitive engagement and enjoyment in various game settings (Sweetser & Wyeth, 2005). These constructs were, therefore, included in the theoretical model of the study in order to explain the CDME.

In order to explain the ADME, the Theory of Intrinsically Motivating Instruction (TIMI) proposed by Malone and Lepper (1987), was investigated. According to these two authors, the fantasy component of TIMI has the potential to invoke strong emotions from players, which then act as a mechanism to draw them into an instructional game. As the players identify with game characters and stories, they become emotionally involved with the fantasy world (Kiili, 2005). Moreover, Sedano, Laine, Vinni and Ellis (2013) found a significant positive correlation between fantasy and affective engagement. The fantasy construct was, therefore, included in the theoretical model to address the ADME.

With regard to PDME, Bailey, Wise and Bolls (2009) argued that physical engagement in a game depends on the number of senses engaged by the medium. They further added that it is related to how aesthetically pleasing the graphics, sound and animation components of a game are. Van der Heijden (2003) coined this term as perceived visual attractiveness and included it in his extended Technology Acceptance Model (TAM) for website usage. He further claimed that the perceived visual attractiveness will impact the physical enjoyment of users only if the system was easy to use. Two constructs contained in the expanded TAM of Van der Heijden (2003) were included in the PDME, namely perceived ease of use and aesthetics (perceived visual attractiveness). The following nine constructs included in the theoretical model, namely aesthetics, challenge, concentration, curiosity, fantasy, feedback, goal clarity, ease of use and skill, will be referred to as *game constructs* in this paper.

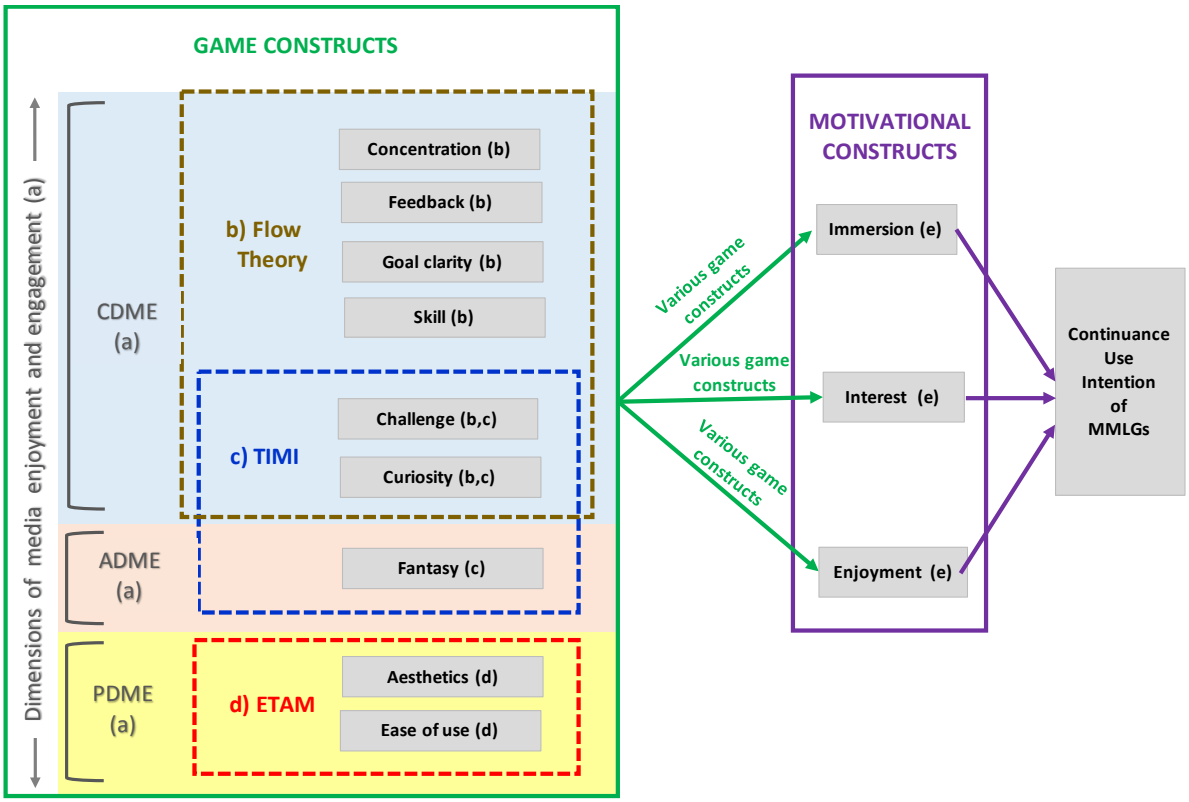
The Input-Process-Outcome Game Model (IPOGM) of Garris, Ahlers and Driskell (2002) was used to extend media enjoyment into the immersion, interest and enjoyment motivational constructs of the theoretical model, as shown in Figure 1. According to the IPOGM, as users initiate game play, they make subjective judgments regarding whether the game is interesting, fun and engaging, and these judgements will motivate users to continue playing a game. Garris *et al.* (2002) grouped these motivational constructs into enjoyment, interest and immersion and claimed that these constructs were influenced by various game characteristics.

In the following section each of the game constructs will be discussed, followed by a discussion on each of the motivational constructs.

2.1.1 Game constructs

Concentration

Concentration can be defined as the focused attention of an individual on what he or she is doing (Jin, 2012). The more concentration a task requires in terms of attention and workload, the more captivating it will be. Concentration is, therefore, positively related to the engagement of learners in DGBL environments (Brown, Ceccarini & Eisenhower, 2007). In addition, concentration is one of the most important predictors of flow and enjoyment in gaming and DGBL environments (Kiili, 2005; Chang, 2013).



Theories used in framework:

a) Media enjoyment theory of Vorderer, Kimmt and Ritterfield (2004) and INTERACT model of Domagk, Schwartz and Plass (2010).

b) Flow Theory of Csíkszentmihályi (1990).

c) Theory of Intrinsically Motivating Instruction (TIMI) of Malone and Lepper (1987).

d) Extended TAM of Van der Heijden (2003).

e) Input-Process-Outcome Game Model (IPOGM) of Garris, Ahlers and Driskell (2002).

Figure 1: Theoretical model for CUI towards MMLGs

Feedback

In educational games, feedback refers to some response from the game to an action by the learner. Educational games should use scores to tell players how they are progressing and reward players with positive feedback on progress and success, thereby encouraging mastery of the game content (Parsons, Ryu & Cranshaw, 2007). Klimmt, Hartmann and Frey (2007) observed that players enjoyed watching the results of the actions they performed in a digital game.

Goal clarity

According to Shi and Shih (2015), the goals of a game are the central concept of a game on which all game element designs should be based. Goals and objectives help learners to engage, since the achievement of goals plays a significant role in motivating them (Parsons *et al.*, 2007). For example, Samur (2012) found that clear, meaningful and achievable goals increased and sustained Grade 5 learners' engagement while they were playing two MMLGs, namely Candy Factory and Pearl Diver.

Skill

Skill is defined as how adept a player is at playing a game and is one of the components deemed necessary by Csíkszentmihályi (1990) for an individual to enter a state of flow. In order for players to experience flow, their perceived skills must match the challenge provided by the game, and both challenge and skills must exceed a certain threshold (Sweetser & Wyeth, 2005). Skill has been used to measure the flow experience of playing console-based video games (Jin, 2012), as well as the flow experience in DGBL environments (Shernoff *et al.*, 2014).

Challenge

Challenge is defined as a sense that one's capabilities are being stretched (Sweetser & Wyeth, 2005). A positive challenge is frequently recognised as among the most important predictors of flow and players' enjoyment in DGBL and gaming environments. This is because players experience positive challenges as rewarding and become excited when these challenges match their skills (Shernoff *et al.*, 2014). In empirical studies in DGBL environments, challenge has been widely found to improve learner enjoyment, engagement, understanding of educational content, as well as prolonged play intention (Sadler, Romine, Stuart & Merle-Johnson, 2013).

Curiosity

Curiosity in digital game-based environments refers to the desire of players for uncertainty and the pleasure of reducing information gaps through the exploratory actions a player takes in a game. In addition, there is a direct link between curiosity and player engagement levels (To, Ali, Kaufman & Hammer, 2016). Likewise, Sedano *et al.* (2007) confirmed that curiosity was the main driving force for the engagement in mobile learning games for learners of varying ages. According to Mouaheb, Fahli and Moussetad (2012), the curiosity generated by uncertainty in a game, activates and maintains the desire of players to continue playing a game.

Fantasy

'Game fantasy' refers to the virtual fantasy world embedded in digital games by making use of virtual characters, stories and multimedia (Tamborini & Skalski, 2006). A large body of evidence suggests that the fantasy world (virtual characters and environment) embedded in educational games presents a wide array of benefits and advantages. For example, it was found that due to the fantasy world of DGBL environments, learners were more engaged and motivated to learn (Tan, Goh, Ang & Huan, 2013), felt immersed and developed self-efficacy and collaboration skills (Sadler *et al.*, 2013).

Aesthetics

The aesthetics of a digital game refers to the audio, graphic and animated elements that present the virtual world to players (Shi & Shih, 2015). Various studies confirmed the importance of aesthetics in information systems. For example, the audio, graphic and animated elements were found to cognitively and emotionally engage learners in DGBL (Huang, Johnson & Han, 2013). The findings of Chang, Kaasinen and Kaipainen (2012) underscored the importance of aesthetics, with their experimental study establishing that the aesthetics of mobile apps were positively related to the decision of users to use it on a regular basis.

Ease of use

Perceived ease of use includes how easy it is to learn, control and understand a mobile game, as well as the clarity of instructions and flexibility of game play (Chinomona, 2013). In addition, it is proposed that educational games that are easy to use will be less threatening to learners and, therefore, increase perceived enjoyment (Moon & Kim, 2001). Empirical studies have proven that ease of use is a significant predictor of the intention to play mobile games (Liu & Li, 2011), as well as of the CUI of mobile games (Chinomona, 2013).

2.1.2 Motivational constructs

Immersion

Immersion is an element of flow that can be described as deep but effortless involvement that often results in loss of concern for self and everyday life, as well as an altered sense of time (Sweetser & Wyeth, 2005). When players are in a state of immersion, they become less aware of themselves, their surroundings and time (Brown & Cairns, 2004). Immersion has been widely cited as the reason why players have enjoyed and wanted to replay digital games (Krall, 2012; Pedersen, 2012). For example, Shin and Shin (2011) found immersion to be a significant predictor of perceived enjoyment and use intention of social network games, while Li, Liu, Xu and Heikkila (2013) found immersion to be a significant predictor of the CUI in social network games. It is also positively associated with the CUI of online games (Xu, Turel & Yuan, 2012).

Interest

Samur (2012) defined interest in a DGBL environment as the learners' positive and negative feelings about the task, such as a task being interesting or boring. Interest is closely linked to intrinsic motivation and learners will be intrinsically motivated only by activities that they find intrinsically interesting, activities that have the appeal of challenge, novelty, or aesthetic value (Ryan & Deci, 2000). Experimental studies have found several constructs that could increase the interest of learners in DGBL settings. For example, Sedano *et al.* (2013) reported that the incorporation of fantasy significantly increased learners' interest in DGBL activities. Moreover, Gilakjani (2012) highlighted the role of multimedia in enhancing student interest, while Parsons (2007) illustrated the positive relationship between task-specific goals and leaner interest and involvement in game play. Research also indicated that higher levels of interest in educational games lead to higher levels of engagement and usage (Coller & Shernoff, 2009; Coller, Shernoff & Strati, 2011).

Enjoyment

Enjoyment can be defined as the extent to which the activity of using an information system is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated (Van der Heijden, 2004). According to Vorderer *et al.* (2004), enjoyment is at the core of all media entertainment, including digital games. Wang *et al.* (2008) agreed by stating that enjoyment is regarded as one of the most important factors affecting consumer behaviour in gaming contexts. Enjoyment has been found to be a significant predictor of the intention to use mobile games (Liu & Li, 2011), and of the CUI of mobile games (Chinomona, 2013; Nguyen, 2015).

3. RESEARCH DESIGN AND METHODOLOGY

3.1 Research Design

The pragmatic paradigm was selected for the study. Pragmatism incorporates different worldviews, different assumptions and provides the foundation for different forms of data collection and analysis, particularly suited for mixed methods studies (Creswell, 2008). The mixed methods approach was selected as the strategy of inquiry for the study, as it allows the researcher to collect a variety of data using multiple methods, strategies and approaches, resulting in complementary method strengths while compensating for inherent method weaknesses (Kumar, 2014).

3.2 Research Methodology

3.2.1 Research instrument

The Ballometer, a visual research tool that was designed to obtain Likert scale responses from children (Rebane & Roost, 2014), was used as the survey instrument for the study. The 5-point Likert scale used in the Ballometer, namely '1 - Not at all', '2 - A little', '3 - Somewhat', '4 - Pretty much' and '5 - Very much', was adopted from a questionnaire designed by Shernoff *et al.* (2014) for the measuring of engagement in educational games and 'gamified' learning environments. The measures included in the Ballometer were adapted from prior research and are shown in Appendix A. In addition, open-ended, in-depth group interviews were conducted to gather the qualitative data for the study.

3.2.2 Reliability and validity

The Ballometer was pilot-tested before being used in the actual research study. In addition, measures from previous studies were applied to ensure content validity of the Ballometer. A principal component analysis (PCA) on the 13 constructs included in the Ballometer was conducted and the results indicated good convergent validity. The Cronbach's α was calculated, resulting in a value of 0.934, which was above the accepted level of 0.8 (Field, 2009). This indicated that the Ballometer was a reliable measuring instrument. The MMLGs that learners were exposed to during the study were carefully selected for their educational potential by using two reputable educational media rating sites, namely Barefire Labs and Common Sense Education (Costanza, 2014).

3.2.3. Population and sampling

The population for the study consisted of primary school learners in Bloemfontein, a city in the Free State province of South Africa (SA). A purposeful sampling technique was employed by applying various criteria, for example age and gender, where the researcher chose participants who would be most suitable to answer the research questions (Etikan, Musa & Alkassim, 2016). The sampling strategy that was used resulted in the following sample: 60 learners, of which 53.33% were girls and 47.67% were boys, 8.33% were eight (8) years old, 10.00% were nine (9) years old, 33.33% were 10 years old, 28.33% were 11 years old and 20.00% were 12 years old.

3.2.4 Data collection

Four groups of learners were exposed to 20 MMLGs over a period of eight (8) weeks during the afternoons in classrooms at various schools. Each session ranged between 60 and 90 minutes. The MMLGs were installed on seven-inch Android tablets. Learners completed a Ballometer for every MMLG they played, resulting in 626 valid surveys. Interviews were conducted with learners on three occasions during the eight-week period.

3.2.5 Data analysis

The quantitative data collected in the study was analysed in SPSS 19. Stepwise linear multiple regression was used to analyse the quantitative data. Additionally, all interviews were recorded and transcribed. Content analysis was used in order to identify recurrent themes in the qualitative data gathered from these interviews.

3.2.6 Ethical considerations

A detailed consent form was distributed to the parents of every participant, and all participants also completed a consent form. The formal ethical clearance procedure of the University of the Free State in SA, from where the research took place, was followed and ethical clearance for the current study was obtained in 2015.

4. RESULTS

4.1 Results of regression models

Three stepwise multiple regression models were constructed in order to determine which combination of game constructs (aesthetics, challenge, concentration, curiosity, fantasy, feedback, goal clarity, ease of use and skill) were able to predict the three motivational constructs (enjoyment, interest, and immersion) respectively. An additional multiple regression model was constructed in order to determine which combination of motivational constructs were able to predict the CUI of MMLG of primary school learners.

4.1.1 Results of stepwise multiple regression for the enjoyment motivational construct

A total of seven game constructs, namely aesthetics, concentration, curiosity, fantasy, goal clarity, ease of use and skill, made a statistically significant contribution to the first regression model and were entered into this regression model. This resulted in a significant model R^2= 0.69, $F(7,618)$ = 197.50, $p < 0.001$; adjusted R^2=0.688. The adjusted R^2 value of 0.69 indicated that 69% of the enjoyment motivational construct could be accounted for by the aesthetics, concentration, curiosity, fantasy, goal clarity, ease of use and skill game constructs.

4.1.2 Results of stepwise multiple regression for the interest motivational construct

A total of six game constructs, namely aesthetics, challenge, concentration, fantasy, goal clarity and skill, made a significant statistical contribution to the second regression model and were entered into this regression model. This resulted in a significant model R^2= 0.68, $F(6,619)$ = 223.59, $p < 0.001$; adjusted R^2=0.68. The adjusted R^2 value of 0.68 indicated that approximately 68% of the interest motivational construct could be accounted for by the aesthetics, challenge, concentration, fantasy, goal clarity and skill game constructs.

4.1.3 Results of stepwise multiple regression for immersion motivational construct

A total of six game constructs, namely aesthetics, challenge, concentration, curiosity, fantasy and ease of use, made a statistical contribution to the third regression model and were entered into this regression model. This resulted in a significant model R^2= 0.62, $F(6,619)$ = 168.78, $p < 0.001$; adjusted R^2=0.62. The adjusted R^2 value of 0.62 indicates that y 62% of the immersion motivational construct could be accounted for by the aesthetics, challenge, concentration, curiosity, fantasy and ease of use game constructs. A coefficients table comparing the three regression models is shown in Table 1.

The aesthetics, concentration and fantasy game constructs were significant predictors of all the motivational constructs. Aesthetics was also the strongest predictor of enjoyment and interest, whereas fantasy was the strongest predictor of immersion. Fantasy was the second most important construct in the prediction of enjoyment, aesthetics was the second strongest predictor of immersion and concentration was the second most important predictor of interest.

Table 1: Table of compassion between motivational constructs

Game Constructs	Motivational Constructs								
	Enjoyment			Immersion			Interest		
	β	t	p	β	t	p	β	t	p
Aesthetics	0.23	6.22	<0.001	0.19	4.71	<0.001	0.26	7.26	<0.001
Challenge	-	-	*ns*	0.08	2.33	<0.020	0.16	5.28	<0.001
Concentration	0.15	5.66	<0.001	0.17	5.50	<0.001	0.23	7.88	<0.001
Curiosity	0.16	4.84	<0.001	0.11	2.91	0.004	-	-	*ns*
Fantasy	0.18	4.74	<0.001	0.30	7.26	<0.001	0.21	5.53	<0.001
Goal clarity	0.14	4.45	<0.001	-	-	*ns*	0.12	3.80	<0.001
Ease of use	0.10	3.47	0.001	0.14	4.71	<0.001*	-	-	ns
Skill	0.11	3.71	<0.001	-	-	ns	0.10	3.72	<0.001

4.1.4 Results of stepwise multiple regression for CUI construct

All motivational constructs made a significant statistical contribution to the last regression model used for the study, and were entered into this regression model. This resulted in a significant model R^2= 0.80, $F(4,621) = 652.68$, $p < 0.001$; adjusted R^2=0.80. The adjusted R^2 value of 0.80 indicates that 80% of the CUI construct could be accounted for by the enjoyment, immersion, and interest constructs. The coefficients table of this regression model is shown in Table 2.

Table 2: Model coefficients for regression model of CUI motivational construct

Motivational constructs	B	SE	β	t	P
(Constant)	-0.05	0.08		-0.61	0.544
Enjoyment	0.64	0.04	0.60	18.17	< 0.001
Immersion	0.20	0.03	0.20	6.61	<0.001
Interest	0.17	0.04	0.16	4.15	<0.001

The model that was developed to predict the CUI for this study had superior predictive power when compared to other models that were constructed to predict the CUI of various games. For example, the model constructed by Nguyen (2015) explained only 34% of the variance in the CUI of mobile games. Furthermore, the model by Chang (2013) explained 68%, and the model by Li *et al.* (2013) explained 61% of the variance in the CUI of social network games. In addition, the current model is also superior to other regression models for the prediction of the CUI in DGBL. More specifically, the model by Liao and Wang (2011) predicted only 46%, and the model by Tao, Cheng, and Sun (2009) only predicted 50% of the CUI of business simulation games. Moreover, this regression model provided exceptional insight into which motivational constructs would drive the CUI of learners. According to this model, when a learner enjoys a MMLG, is interested in the activities and environment, and becomes very involved in the MMLG, forgetting about other things, the probability that the learner will be motivated to continue using this MMLG is very high. A detailed summary of the results of the regression models is shown in Figure 2 and a high-level summary of the results of the regression models is shown in Figure 3.

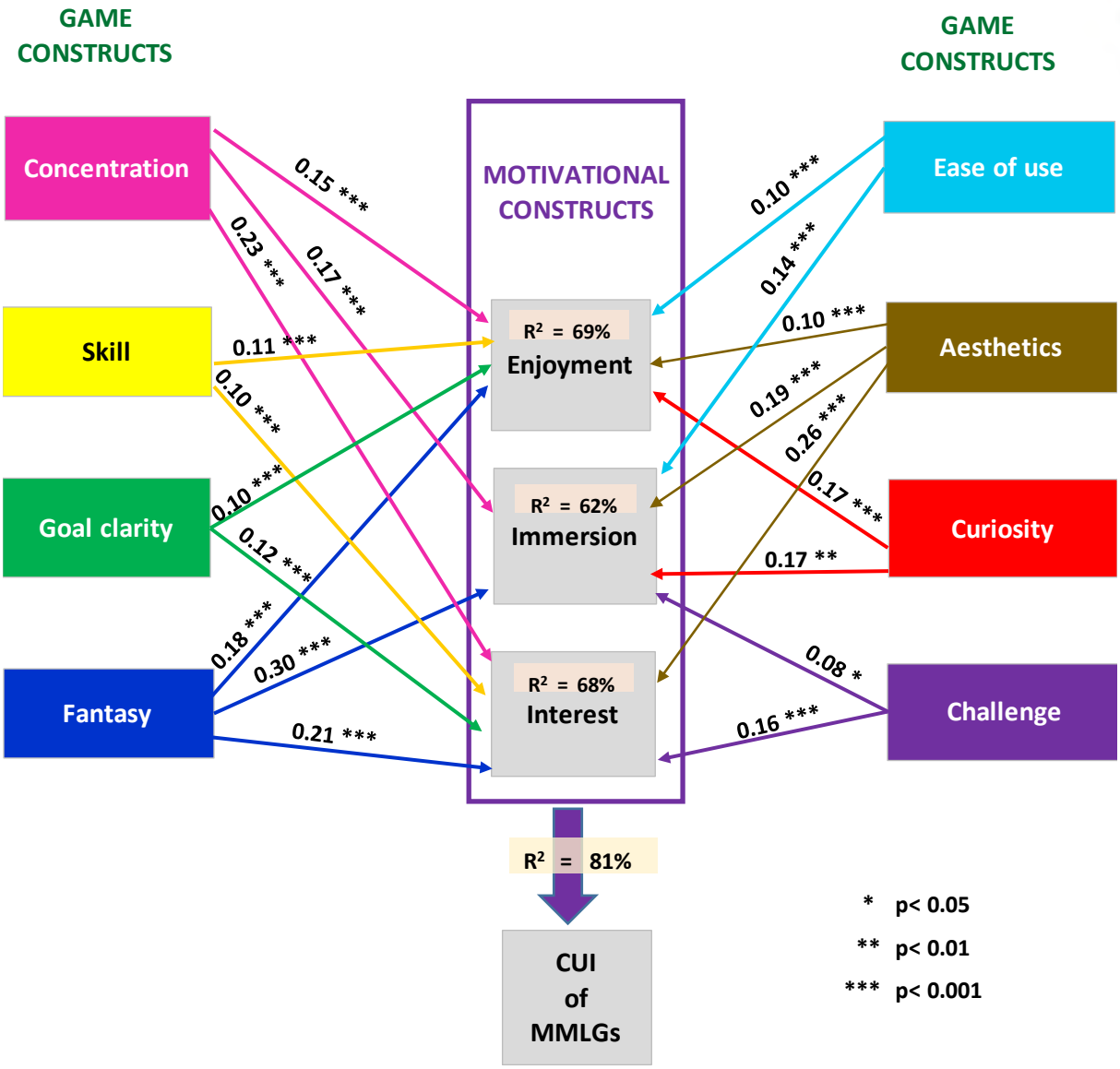


Figure 2: Detailed summary of regression models

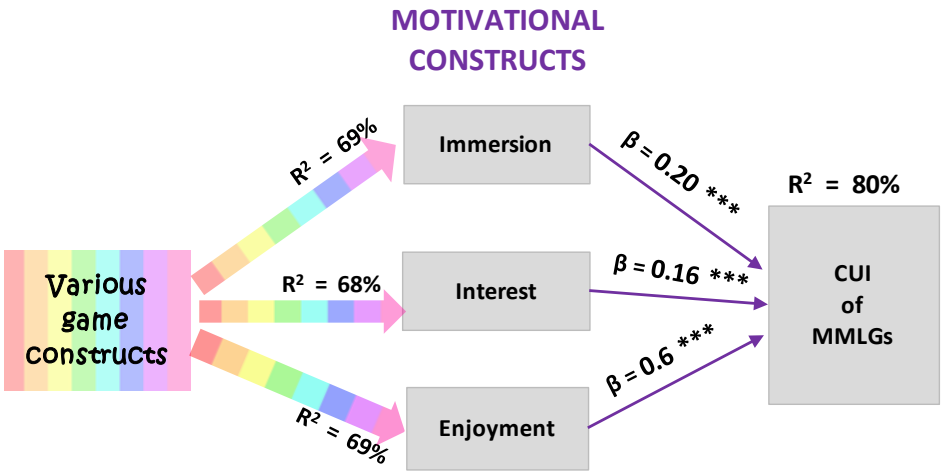


Figure 3: High level summary of regression results

4.2 Results of interviews

During interviews learners were asked why they wanted to replay MMLGs. The reasons that were provided are summarised in Table 3. From Table 3 it can be seen that the rewards that learners received while playing MMLGs were mentioned by the largest percentage of learners. Games usually reward the players' achievements as a mechanism to increase engagement and immersion (Torrente *et al.*, 2011). In most games, the system provides rewards when players reach a target specified by the designers. These player rewards could include gathering valuable game objects, gaining power or unlocking new levels or objects (Shi & Shih, 2015).

Table 3: Reasons why learners wanted to replay MMLGs

	Reason	n	%
1	Rewards	48	32.0%
2	Fantasy	35	23.3%
3	Interaction mechanisms	14	9.3%
4	Variety	10	6.7%
5	Learning math	9	6.0%
6	Simulates real games	8	5.3%
7	Control - Customisation	7	4.7%
8	Aesthetics	6	4.0%
9	Interest	5	3.3%
10	Challenge	4	2.7%
11	Concentration	2	1.3%
12	Clear Goals	1	0.7%
13	Immersion	1	0.7%
	Total	150	100.0

Table 4 indicates the various rewards that learners mentioned during interviews. Learners particularly enjoyed the following four rewards: cake ingredients to bake cakes (19%), earning pets and food for pets (15%), characters improving after each level (13%), and bullets to fight zombies with (10%).

Table 4: Types of rewards in MMLGs

Rewards	n	%
Cake ingredients to bake cakes	9	19%
Earning pets and food for pets	7	15%
Character improves after each level	6	13%
Bullets to fight zombies with	5	10%
Carrots to buy things with	5	10%
Level Up	4	8%
Free creatures	3	6%
Hats	3	6%
Diamonds to buy things with	2	4%
Dragon grows	2	4%
Gold Medals	1	2%
Mini game at end of level	1	2%
Total	48	100%

Specific comments in terms of the rewards received in MMLGs made by some learners were:

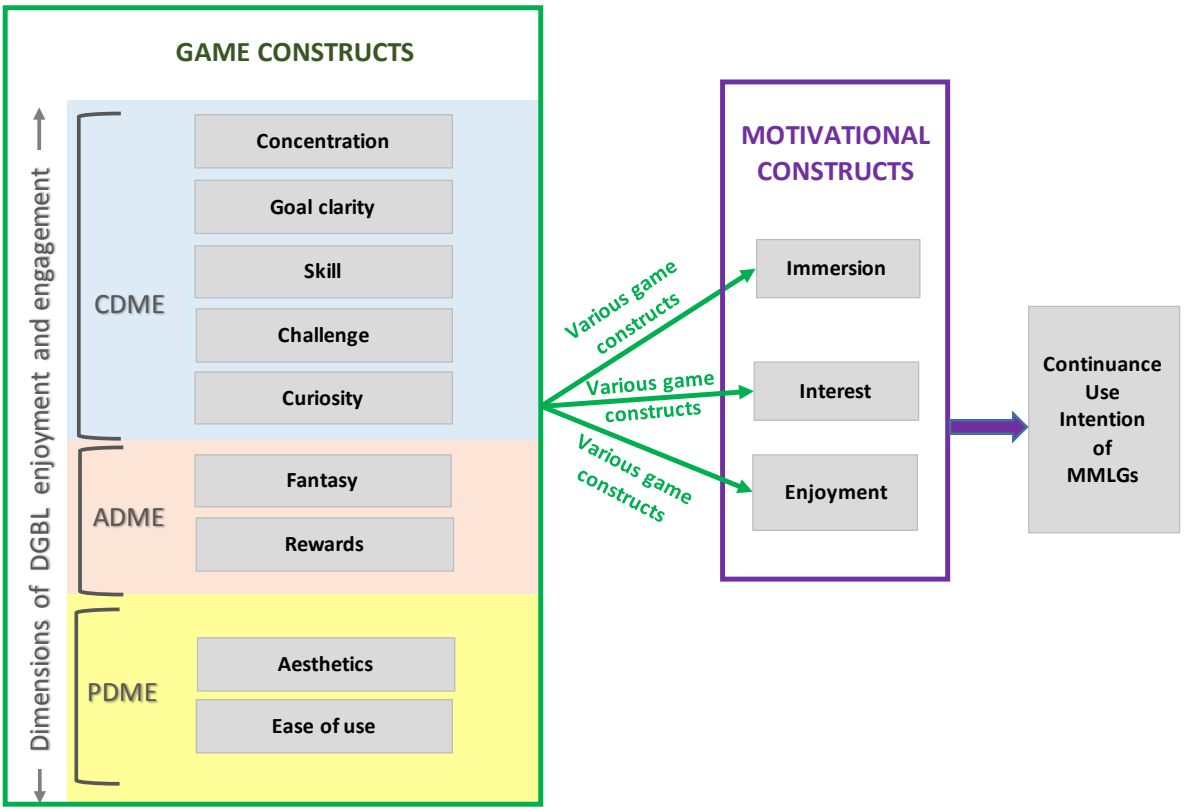
- Learner 1 (boy): 'I want to play the *Squeebles Fractions* game again because I liked the different flavours and toppings I get to bake cakes with. You do cake sums that makes you crave the cake and then you can bake your own cake. I just wish I could eat my own cake. The judges in the game decide how your cake tastes (like) and then give you a score'.
- Learner 2 (girl): 'I want to play *Pet Bingo* again because I want more pets, they are so adorable!'
- Learner 3 (girl): 'I want to play *King of Maths Junior* again because your player gets more pretty and more funny as you go along'.
- Learner 4 (boy): 'I want to play *Math Vs Zombies* again, the most because you collect bullets to shoot the zombies'.

5. CONCLUSIONS

The potential of MMLGs to improve the maths skill levels of SA learners is of utmost importance for the educational system in SA. This study has shed light on what drives learners to continue using these MMLGs. The main research question that was formulated to guide this study was: Which constructs influence the CUI of primary school learners towards MMLGs? This research question was answered by providing a theoretical model composed of three motivational constructs, namely enjoyment, interest and immersion. These constructs were able to predict the CUI of primary school learners towards MMLGs. In turn, various game constructs in the theoretical model were able to predict the three motivational constructs.

In contrast to existing research in DGBL, the main contribution of this research study is the integrated theoretical model that was developed through in-depth and systemic effort to incorporate elements from different distinct theories. The constructs in the theoretical model and the relationships amongst them represent the complex and dynamic interplay that is characteristic of MMLGs, and that in turn influences the CUI of primary school learners. The theoretical model that was developed can, therefore, be used to predict the CUI of primary school learners towards MMLGs.

The revised theoretical model of the study is presented in Figure 4. The theoretical model was revised by removing the feedback construct from the CDME, while adding the rewards construct to the ADME due to the strong support it received during interviews. The feedback construct was removed since it was found not to be a significant predictor of any of the motivational constructs in the three regression models.



CDME - Cognitive dimention of media enjoyment and engagement
ADME - Affective dimention of media enjoyment and engagement
PDME - Physical dimention of media enjoyment and engagement

Figure 4: Revised Theoretical model for CUI towards MMLGs

This study also provides empirical evidence that a combination of balance and interplay of the various dimensions of enjoyment and engagement (cognitive, affective and physical) in a MMLG influences the motivation of a learner to continue using MMLGs. This can be substantiated with three points:

Firstly, the aesthetics and ease of use constructs, grouped together as the PDME, were found to be significant predictors of motivation to continue using MMLGs. These physical aspects are therefore very important to motivate learners to continue using an MMLG. Learners will be influenced by how pleasing the graphics, sound and animations in a game are to the physical senses and how easy it is to physically use the MMLG. Educators and parents should, therefore, ensure that an optimal combination of these constructs is present in MMLGs. However, the physical dimension of a MMLG in isolation will not be enough to keep learners motivated. Another dimension is needed to stimulate the cognitive abilities of learners.

Secondly, the challenge, concentration, curiosity, goal clarity and skill constructs were grouped together to form the CDME and were found to be significant predictors of motivation to continue playing a MMLG. This means that activities provided in a MMLG need to be challenging, must be coupled with sufficient skill levels, and must require the player to concentrate and have clear goals in order to cognitively engage learners. Educators and parents should, therefore, also ensure that MMLGs provide sufficient opportunity for learners to be cognitively engaged in various activities. The cognitive dimension of a MMLG on its own will, however, also not be able to keep learners motivated to continue using an MMLG. Without emotional engagement in an MMLG, embodied by the ADME, learners will not be motivated to continue using an MMLG.

Thirdly, the ADME was represented by the fantasy and rewards constructs in the study, which both proved to be significant predictors of the motivational constructs. The fantasy construct was found to be the strongest predictor of motivation in this study, as was proven by the high statistical prediction

power towards the motivational constructs, as well as the strong support that it received during the interviews. Additionally, the rewards construct was found to create strong positive emotions in learners and was highly intertwined with the fantasy worlds of the MMLGs. Therefore, the fantasy world and rewards in a MMLG should be used to emotionally engage learners with the characters, environment and storyline. The implication of this is that educators and parents should, in particular, select MMLGs with engaging fantasy environments that offer meaningful rewards. The theoretical model developed in this study could provide educators, parents and educational designers with an integrated approach that will allow them to design and evaluate specific MMLGs for motivational potential.

6. LIMITATIONS AND FUTURE RESEARCH

The study had the following limitations: It was conducted in one city of SA only, random sampling was not possible or feasible, and the study had a limited sample size due to time and budgetary constraints. Due to the above-mentioned limitations, the findings from this study cannot be generalised to the broader population of SA.

As the scope of this study focused only on the CUI of primary school learners and not on the educational potential of these MMLGs for learning, it did not investigate the influence of the game constructs on the maths knowledge improvement of learners. It is suggested that the theoretical model of the study could be used to investigate the role that various game constructs could play on measured maths learning improvement of learners. The theoretical model of the study, which proposed a system of linked game constructs that predicted motivational constructs, could also serve to clarify existing findings, as well as to structure future research. Existing studies could be classified in accordance with the three dimensions of media enjoyment and engagement. Clarifying which constructs are examined in a given study will enable useful comparisons. The application of the theoretical model could provide the base for in-depth comparisons that would highlight similarities and differences between different studies.

APPENDIX A: Measures of constructs adopted from prior literature

Construct	Ballometer Measures
Aesthetics	How much did you like the music, animations and the images in the game? (Shi & Shih, 2015).
Challenge	How challenging is the game? (Shi & Shih, 2015).
Concentration	How hard were you concentrating while playing the game? (Shernoff *et al.*, 2014)
Control	How much control did you have over what you wanted to do in the game? (Fu, Su & Yu, 2009).
CUI of MMLGs	How much would you like to play the game again at home? (Lee & Tsai, 2010).
Curiosity	How curious were you in the game about what would happen next? (Lee & Tsai, 2010; Choi & Kim, 2004).
Fantasy	How much do you like the make-believe aspects of the game, e.g. the environment, characters and story of the game? (Shi & Shih, 2015).
Feedback	How much feedback did you receive when you did things correctly or incorrectly in the game? (Fu *et al.*, 2009).
Goal clarity	How clear was the goal of the game? (Rebane & Roost, 2014)
Immersion	How immersed were you in the game? (I lost track of time while using it / I became very involved in the game forgetting about other things.) (Shernoff *et al.*, 2014).
Interest	How interesting was the game? (Shernoff *et al.*, 2014; Choi & Kim, 2004).
Ease of use	How easy was the game to use? (Thong, Hong & Tam, 2006).
Enjoyment	How much fun did you experience while playing the game? (Shernoff *et al.*, 2014)
Skill	How skilled were you at the game? (Shernoff *et al.*, 2014)

REFERENCES

Bailey, R., Wise, K. & Bolls, P. 2009. How avatar customizability affects children' s arousal and subjective presence during junk food – Sponsored online video games. *Cyberpsychology & behavior,* 12(3): 277–283.

Bhattacherjee, A. 2001. Understanding information systems continuance: an expectation-confirmation model. *MIS quarterly,* 25(3): 351–370.

Bos, B. & Lee, K. 2013. Mathematics apps and mobile learning. *Society for Information Technology & Teacher Education International Conference,* 2013, 3654–3660.

Brown, E. & Cairns, P. 2004. A grounded investigation of immersion in games. In *Extended Abstracts of the 2004 Conference on Human Factors in Computing Systems*, 1297–1300.

Brown, A., Ceccarini, P. & Eisenhower, C. 2007. Muckrakers: Engaging students in the research process through an online game. In *Proceedings of the Thirteenth National Conference of the Association of College and Research Libraries*, 226–236.

Chang, C.C. 2013. Examining users' intention to continue usi ng social network games: A flow experience perspective. *Telematics and Informatics*, 30(4): 311–321.

Chang, T., Kaasinen, E. & Kaipainen, K. 2012. What Influences Users' Decisions to Take Apps into Use?: A Framework for Evaluating Persuasive and Engaging Design in Mobile Apps for Well-being. In *Proceedings of the 11th International Conference on Mobile and Ubiquitous Multimedia*, 2000–2010.

Chinomona, R. 2013. Mobile Gaming perceived enjoyment and ease of play as predictors of student attitude and mobile gaming continuance intention. *Mediterranean Journal of Social Sciences*, 4(14): 237–248.

Choi, D. & Kim, J. 2004. Why people continue to play online games : In search of online contents. *Cyberpsychology & behavior*, 7(1): 11–25.

Coller, B.D. & Shernoff, D.J. 2009. Video Game-based education in mechanical engineering: A look at student engagement. *International Journal Of Engineering Education*, 25(2): 308–317.

Coller, B.D., Shernoff, D.J. & Strati, A.D. 2011. Measuring engagement as students learn dynamic systems and control with a video game. *Advances in Engineering Education*, 2(3): 1–32.

Costanza, K. 2014. *App reviews to help choose ed tech this holiday season*. [Online], Available: http://www.joanganzcooneycenter.org/2014/12/19/app-reviews-to-help- choose-ed-tech-this-holiday season/ [2016, January 15].

Creswell, J.W. 2008. *Research design: Qualitative, Quantitive, and mixed methods approaches*. Thousand Oaks, California: Sage Publications Ltd.

Csíkszentmihályi, M. 1990. *Finding flow: The psychology of engagement with everyday life.* New York: Harper Perennial.

Domagk, S., Schwartz, R.N. & Plass, J.L. 2010. Interactivity in multimedia learning: An integrated model. *Computers in Human Behavior*, 26(5): 1024–1033.

Etikan, I., Musa, S.A. & Alkassim, R.S. 2016. Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5(1):1–4.

Field, A. 2009. *Discovering statistics using SPSS*. London: SAGE.

Fu, F., Su, R. & Yu, S. 2009. EGameFlow: A scale to measure lea rners' enjoyment of e-learning games. *Computers & Education*, 52(1): 101–112.

Garris, R., Ahlers, R. & Driskell, J.E. 2002. A research and practice model. *Simulation and Gaming*, 33(4): 441–467.

Gilakjani, A.P. 2012. The significant role of multimedia in motivating EFL learners' interest in English language learning. *International Journal of Modern Education and Computer Science*, 4(4): 57–66.

Huang, W.D., Johnson, T.E. & Han, S.H.C. 2013. Impact of online instructional game features on college students' perceived motivational support and cognitive investment: A structural equation modeling study. *Internet and Higher Education*, 17(1): 58–68.

Huang, Y., Chang, D. & Wu, B. 2017. Mobile Game-Based Learning with a Mobile App: Motivational Effects and Learning Performance. *Journal of Advanced Computational Intelligence*, 21(6): 963–970.

Jin, S.A. 2012. Toward integrative models of flow: Effects of performance, skill, challenge, playfulness, and presence on flow in video games. *Journal Of Broadcasting & Electronic Media*, 56(2): 169–186.

Kapp, K. 2013. *Top 10 + 1 instructional game design best practices*. [Online], Available: http://karlkapp.com/top-10-1instructional-game-design- best-practices/ [2017, November 09].

Kiili, K. 2005. *On educational game design: Building blocks of flow experience on educational game design.* Published Doctoral Thesis, Tampere University of Technology, Publication 571, Tampere, Finland.

Klimmt, C., Hartmann, T. & Frey, A. 2007. Effectance and control as determinants of video game enjoyment. *Cyberpsychology & Behavior*, 10(6): 845–847.

Krall, J. 2012. Aspects of replayability and software engineering: Towards a methodology of developing games. *Journal of Software Engineering and Applications*, 5(7): 459–466.

Kumar, R. 2014. *Research Methodology a step by step guide for beginners*. Thousand Oaks, California: Sage Publications Ltd.

Lee, M.C. & Tsai, T.R. 2010. What drives people to continue to play online games? An extension of Technology Model and Theory of Planned Behavior. *International Journal of Human-Computer Interaction*, 26(6): 601–620.

Li, H., Liu, Y., Xu, X. & Heikkila, J. 2013. Please stay with me! An empirical investigation on hedonistic IS continuance model for social network games. In *Proceedings of the Thirty Fourth International Conference on Information Systems*, 1–18.

Liao, Y. & Wang, Y. 2011. Investigating the factors affecting students' continuance intention to use business simulation games in the context of digital learning. In *Proceedings of the 2011 International Conference on Innovation, Management and Service*, 119–124.

Liu, Y. & Li, H. 2011. Computers in human behavior: Exploring the impact of use context on mobile hedonic services adoption: An empirical study on mobile gaming in China. *Computers in Human Behavior*, 27(2): 890–898.

Malone, T.W. & Lepper, M.R. 1987. Making learning fun: A taxonomy of intrinsic motivations for learning. *Aptitude learning and instruction*, 3(3): 223–253.

Moon, J.W. & Kim, Y.G. 2001. Extending the TAM for a World-Wide-Web context. *Information and Management*, 38(4): 217–230.

Mouaheb, H., Fahli, A. & Moussetad, M. 2012. The serious game: what educational benefits? *Procedia - Social and Behavioral Sciences*, 46: 5502–5508.

Nguyen, D. 2015. *Understanding Perceived Enjoyment and Continuance Intention in mobile games.* Master's thesis. Aalto University.

Parsons, D., Ryu, H. & Cranshaw, M. 2007. A design requirements framework for mobile learning environments. *Journal of Computers*, 2(4): 1–8.

Pavlas, D. 2010. *A model of flow and play in game-based learning: The impact of game characteristics, player traits, and player states*. Doctoral thesis. University of Central Florida. [Online], Available: http://www.navistudios.net/Pavlas_Davin_A_201012_PhD.pdf.

Pedersen, K. 2012. *Replayability in strategic computer games*. [Online], Available: https://halhprints.archives-ouvertes.fr/hprints-00728892/ [2016, September 11].

Pope, H., Boaler, J. & Mangram, C. 2015. Wuzzit TroubleThe Influence of a digital math game on student number sense. *International Journal of Serious Games*, 2(4): 1–18.

Rebane, R. & Roost, K. 2014. *Design and development of virtual environments*. (Unpublished master's thesis), University of Tartu Viljandi Culture Academy,Viljandi, Estonia.

Riconscente, M.M. 2013. Results From a controlled study of the iPad fractions game Motion Math. *Games and Culture*, 8(4): 186–214.

Ryan, R. & Deci, E. 2000. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *The American psychologist*, 55(1): 68–78.

Sadler, D.T., Romine, L.W., Stuart, E.P. & Merle-Johnson, D. 2013. Game- based curricula in biology classes: Differential effects among varying academic levels. *Journal of Research in Science Teaching*, 50: 479–499.

Salisbury, J.H. & Tomlinson, P. 2016. Reconciling Csikszentmihalyi ' s Broader Flow Theory with Meaning and Value in Digital Games. *Transactions of the Digital Games Research Association*, 2(2): 55–77.

Samur, Y. 2012. *Measuring Engagement Effects of Educational Games and Virtual Manipulatives on Mathematics.* Doctoral dissertation. Virginia Polytechnic Institute and State University.

Sedano, C., Leendertz, V., Vinni, M. & Ellis, S.M. 2013. Hypercontextualized learning games: Fantasy, motivation, and engagement in reality. *Simulation & Gaming*, 44(6): 821–845.

Sedano, C.I., Laine, T.H., Vinni, M. & Sutinen, E. 2007. Where is the answer?: The importance of curiosity in pervasive mobile games. *Proceedings of the 2007 conference on Future Play*, 46–53.

Shernoff, D., Hamari, J. & Rowe, E. 2014. *Measuring Flow in Educational Games and Gamified Learning Environments*. In Tampere, Finland EdMedia.

Shi, Y. & Shih, J. 2015. Game Factors and Game-Based Learning Design Model. *International Journal of Computer Games Technology*, 2015: 3.

Shin, D.H. & Shin, Y.J. 2011. Why do people play social network games? *Computers in Human Behavior*, 27(2): 852–861.

Subramanya, S.R. & Farahani, A. 2012. Point-of-View Article on: Design of a Smartphone App for Learning Concepts in Mathematics and Engineering. *International Journal of Innovation Science*, 4(3): 173–184.

Sweetser, P. & Wyeth, P. 2005. GameFlow: A model for evaluating enjoyment in games. *Computers in Entertainment*, 3(3): 5–6.

Tamborini, R. & Skalski, P. 2006. The role of presence in the experience of electronic games. In Mahwah, NJ, USA: Erlbaum *Playing Computer Games: Motives, Responses, and Consequences*, 225–240.

Tan, L.J., Goh, H.L.D., Ang, P.R. & Huan, S. V. 2013. Participatory evaluation of an educational game for social skills acquisition. *Computers & Education*, 64: 70–80.

Tao, Y., Cheng, C. & Sun, S. 2009. What Influences college students to continue using business simulation games? The Taiwan experience. *Computers & Education*, 53(3): 929–939.

Thiruchelvam, N. 2014. *Attitudes towards tablet devices as an educational tool*. Master's thesis. Heriot Watt University.

Thong, J.Y.L., Hong, S.J. & Tam, K.Y. 2006. The effects of post-adoption beliefs on the expectation-confirmation model for information technology continuance. *International Journal of Human Computer Studies*, 64(9): 799–810.

To, A., Ali, S., Kaufman, G. & Hammer, J. 2016. Integrating curiosity and uncertainty in game design. In *Proceedings of 1 st International Joint Conference of DiGRA and FDG*, 1–16.

Torrente, J., Marchiori, E.J., Blanco, A. Del, Sancho, P., Ortiz, I.M., Moreno-Ger, P., Fernandex-Manjon, B., Mellini, B., *et al*. 2011. *Production of creative game-based learning scenarios: A Handbook for Teachers*. [Online], Available: http://collection.openlibra.com.s3.amazonaws.com/pdf/Production-of-creative-game-based-learning-scenarios.pdf?AWSAccessKeyId=AKIAIGY5Y2YOT7GYM5UQ&Signature=X0jnbFo7X/5IxSkgueRv41rQbmg=&Expires=1396519661 [2016, June 05].

Van der Heijden, H. 2003. Factors Influencing the Usage of Websites: The Case of a Generic Portal in the Netherlands. *Information & Management*, 40(1): 174–185.

Van der Heijden, H. 2004. User Acceptance of Hedonic Information Systems. *MIS Quarterly*, 28(4): 695–704.

Vorderer, P., Klimmt, C. & Ritterfeld, U. 2004. Enjoyment: At the heart of media entertainment. *Communication Theory*, 14(4): 388–408.

Wang, H., Shen, C. & Ritterfeld, U. 2008. Enjoyment of digital games: What makes them " seriously " fun ? In U. Ritterfeld, M. Cody, & P. Vorderer (eds.). New York: Routledge *Serious games: Mechanisms and effects*, 25–47.

Xu, Z., Turel, O. & Yuan, Y. 2012. Online game addiction among adolescents: Motivation and prevention factors. *European Journal of Information Systems*, 21(3): 321–340.

Yee, N. 2006. Motivations for play in online games. *CyberPsychology & Behavior*, 9(6): 772–775.

JOURNAL FOR NEW GENERATION SCIENCES

PUBLICATION POLICY

1. The Journal for New Generation Sciences (JNGS) publishes original research-based papers in the technological sciences. Technological science refers to the development of knowledge through application and goes beyond disciplinary borders and subject specific issues.

2. The JNGS has as aim the development of use-oriented research. Use-oriented research is a combination of applied research and use-inspired basic research. The objective is for business, industry, government as well as social communities (known as the “quadruple helix”) to benefit from the application of the research results.

3. Used-oriented research should be executed in the context of Gibbons's Mode 2 Knowledge Production. This mode of knowledge production implies that knowledge production is produced in the context of application, is transdisciplinary in nature and is reflective of and responsive to societal needs.

4. The JNGS focuses on papers which reflect the scientific results of:

    - Science, Technology, Engineering, Mathematics and Arts (STEAM) and the management of STEAM research. (Arts cover humanities and social sciences.)
    - Applied research informed by problems and challenges as faced by industry, business, government and social communities.
    - Partnerships with industry, business, government and social communities (“quadruple helix”).
    - Knowledge creation in the context of Mode 2 Knowledge Production.
    - Scholarship in teaching and research.
    - Research projects leading to SET+A and Management qualifications.
    - Income generation through research.
    - Entrepreneurship through innovation.

5. Research outputs are defined as evidence-based critical analysis, interpretation and reflection to solve problems and challenges as faced by business, industry, government and social communities. This approach embodies the search for and the generation of new knowledge through scholarly work supported by partnerships with business, industry, government and social communities.

6. Although the research focus is on applied research, no applied research can be undertaken without an understanding of basic research. The JNGS follows the Frascati research classification of basic and applied research. The following terminology is applied to these definitions.

    - Basic research: Original investigation with the primary aim of developing more complete knowledge or understanding of the subject under study.

    - Applied research: Original investigation undertaken in order to acquire new knowledge and directed primarily towards specific practical aims or objectives.

7. All papers are peer reviewed by at least two experts. An editorial review also secures the quality and relevance of each paper.

8. The Editor reserves the right to make such alterations as he or she sees fit to it to accommodate the style and presentation of papers to the house style. Where any mjor changes are necessary, the text may be returned to the author for correction and n or approval.

9. On a policy level, the JNGS supports the National Plan on Higher Education (NPHE, 2001) Outcome 13: Research concentration and funding linked to research outputs and the DHET Research Outputs Policy (2015).

10. The JNGS supports both the high-quality scholarly work of established researchers and capacity building amongst new researchers to build a responsive and responsible community of practice.

11. All papers will be subjected to review for possible copyright infringements (for example via tools such as Safe-assign and Turn-it-in) before submission for review.

12. On acceptance of a paper for publication, the corresponding author should confirm that the research results were not previously published in the public domain and that the author has approval to publish materials (including but not limited to, for example, images, tables, graphics and photographs). If the submission contains material for which the author does not hold copyright, it will be required to confirm in writing that permission has been obtained from the copyright owner to use such material and that permission has been granted to the JNGS to publish such information. Any and all material owned by a third party must be clearly identified and acknowledged as such within the text or content of the submission.
13. Copyright is transferred to the Central University of Technology, Free State, on acceptance for publication.

14. An author grants the Central University of Technology, Free State, the non-exclusive right to reproduce, translate, and/or distribute his or her submission (including the abstract) worldwide in print and/or electronic format royalty-free.

15. Papers can be published in Institutional Repositories with proper reference to the JNGS. Only post-print (final draft of post-refereeing and accepted paper) or publisher's version/PDF format may be used for Institutional Repository purposes. This is based on the international standard set by SHERPA/RoMEO Archiving Policy (category blue).

16. The author of a published paper will receive a copy of the relevant issue of the JNGS.

Ethical and integrity statement:

The Journal for New Generation Sciences promotes open, reflective and responsible scientific discourse. The JNGS subscribes to the values of no harm to human subjects, animals and the environment, as well as care for human vulnerability and that the ideologies of racism, terrorism and sexism are not promoted. Authors can subscribe to any acknowledged scientific paradigm, conviction and personal life and worldview subject to the responsible application thereof to the research and if the paradigm, conviction and life and worldview do not contradict and/or violate the Constitution of the Republic of South Africa and/or the Universal Declaration of Human Rights.

Disclaimer

The Journal for New Generation Sciences contains the views, thoughts, research results, inventions, discoveries, information and conclusions of its contributing authors. The information expressed therein is to be ascribed solely to the respective authors and does not necessarily reflect the views, beliefs and/or convictions of the JNGS, its Editorial Board or the Central University of Technology, Free State. The JNGS disclaims any and all responsibility or liability for any damage, loss or infraction of any kind resulting from the views, thoughts, discoveries, information and conclusions contained in the JNGS.

GUIDELINES FOR THE SUBMISSION AND PUBLICATION OF PAPERS

1. Papers are published in English. The preferred length is between 5000-5500 words, excluding the reference list, figures, graphs and images. All papers should be accompanied by a 150-200 word abstract in English.

2. All papers should have three to five keywords. This should be part of the abstract of the paper.

3. Papers should be properly edited, stylistically polished and carefully proofread.

4. Source references in the text should be in the abridged Harvard referencing style.

5. All footnotes should be regarded as footnotes.

6. Abbreviations and acronyms should be written out the first time that they are used.

7. Italics should not be overused for emphasis. Latin phrases such as per se must be italicised. Words in languages other than that of the manuscript should be given in quotation marks.

8. Authors may suggest the names of three to five potential reviewers (with a short motivation as to why a particular reviewer is nominated and an indication of any possible conflict of interest should that particular reviewer be used).

9. Refereeing is always anonymous. All papers will be peer reviewed by two referees and the editorial team.

10. Page fees of ZAR 500.00 per page will be charged on the publication of the paper.

11. On submission of a paper, each paper must be accompanied by the following information:

    i. Title of paper
    ii. Corresponding author
    iii. Full details of author(s)
    iv. Ethical approval of research project (for clinical and animal research)
    v. Ethical clearance by authors' home research committee if human subjects are involved in the research
    vi. Research problem/focus of the paper (maximum: 100 words)
    vii. What new knowledge is created: List three major findings (maximum: 100 words per finding)
    viii. Indication how the paper meets the scope of the JNGS (maximum: 100 words).
    ix. Indication of each author's percentage of participation in writing the paper.

Note: The purpose of this submission is to act as self-assessment by the author(s) and to involve the author(s) in the quality assurance of a paper.

Address for submissions:

An MS Word document not exceeding 1MB can be submitted to the Editor of the Journal for New Generation Sciences, Prof. LOK Lategan, Office for Research and Innovation, Central University of Technology, Free State, Private Bag X20539, Bloemfontein, 9300. Tel: 051 507 3279. Fax: 051 507 3275. (E-mail: llategan@cut.ac.za).

Title of the paper:

Name of reviewer:

(The review report issued to the author will not contain or disclose the identity of the reviewer.)

Confirmation by reviewer that there is no conflict of interest with the research and/or publication of the research.

Please provide your comments in respect of the following questions:

1. Does the title reflect the contents of the paper? Yes/No

Motivate: .....

.....

2. Do you deem the paper to be proof of thorough research and knowledge of the most recent debates and literature in this field of study? Yes/No

Motivate: .....

.....

3. Does the paper reflect a high scientific standard of reasoning? Yes/No

Motivate: .....

.....

4. Does the paper contribute to the application of research results? Yes/No

Motivate: .....

.....

5. Does this paper reflect the aim and objectives of the JNGS? Yes/No

Motivate: .....

.....

6. CHECKLIST TO RATE THE MANUSCRIPT

The enclosed checklist can be used by the reviewer to assist with the recommendation to the JNGS:

	LOW						HIGH			
CRITERIA	1	2	3	4	5	6	7	8	9	10
To what extent has the research problem been clearly formulated?										
To what extent is the theoretical framework within which the research has been described appropriate?										
To what extent has relevant and existing theory reflected in general and specialist literature been integrated into the research?										
To what extent are data collection methods appropriate for the research programme/ hypothesis?										
To what extent is the argument in the article clear, logical and analytical?										
To what extent does the article contribute to new knowledge in the subject?										
To what extent is the research report original?										
To what extent is new knowledge/ interpretation produced on the basis of user friendly research?										
To what extent is the research useful to the world of work?										

7. What is the desirability of this paper being published in the JNGS. Please provide provid comments on your recommendations:

7.1 Without alterations: Yes/No

Motivate: .....

.....

7.2 With the following alterations:

Motivate: .....

.....

7.3. Preferably not:

Motivate: .....

.....

8. Recommendation(s) to the author(s) how the paper can be improved.

.....

.....

9. Can your comments in this form be communicated to the author(s)? Yes/No

.....

.....

Please send your report to the Editor: Journal for New Generation Sciences, Private Bag X20539, Bloemfontein, 9300. E-mail: llategan@cut.ac.za.
Tel: 051 507 3279. Fax: 051 507 3275.

ADDRESS LIST

JNGS 2019, Vol. 17 No. 1

Prof. R. Bhagwan
Associate Professor: Child and Youth Care Program
Durban University of Technology
E-mail: bhagwanr@dut.ac.za

Dr C.J. Burman (Corresponding author)
Senior lecturer
University of Limpopo
E-mail: christopher.burman@ul.ac.za

Dr S. Semenya
Liaison Officer: Technology Transfer
University of Limpopo
E-mail: sebuasemenya@gmail.com

Prof. R. I. D. Pooe (Corresponding author)
Associate Professor
University of Johannesburg
E-mail: dpooe@uj.ac.za

Dr P. Pillay
Former PhD student
Vaal University of Technology

Dr M. Reid (Corresponding author)
Lecturer: School of Nursing
University of the Free State
E-mail: ReidM@ufs.ac.za

Prof. A. Joubert
Professor (Units)
University of the Free State
E-mail: gnvkaj@ufs.ac.za

Dr P. Nel
Associate Professor
University of Johannesburg
E-mail: petrusn@uj.ac.za

Prof. P. van der Merwe (Corresponding author)
Senior researcher and lecturer
North-West University
E-mail: Peet.vandermerwe@nwu.ac.za

Prof. M. Saayman (late)
Research director
North-West University
For correspondence see Prof. P. van der Merwe

Dr L. de Wet (Corresponding author)
Senior Lecturer: Computer Science and Informatics
University of the Free State
E-mail: dWetL@ufs.ac.za

Mrs. M.I. Venter
Lecturer
Central University of Technology
E-mail: marisa@cut.ac.za