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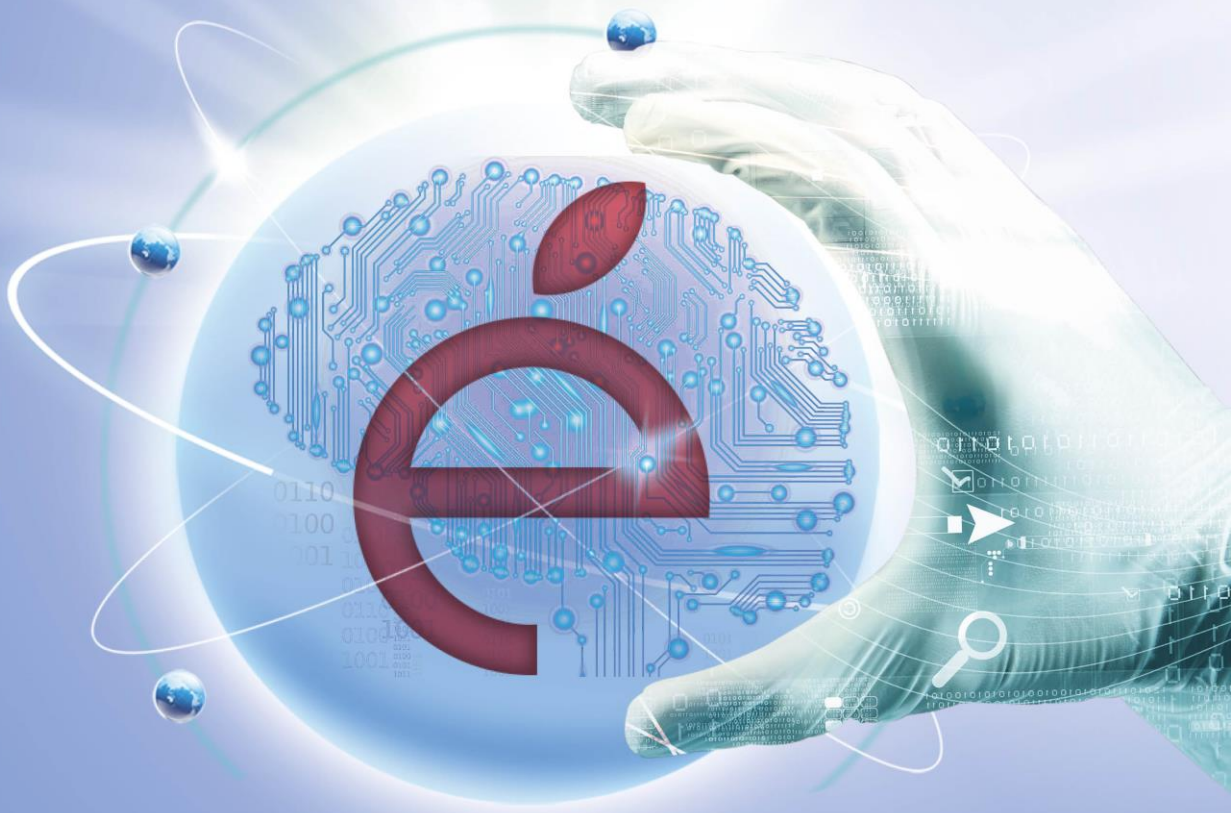

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LEARNER ABSENTEEISM IN A RURAL, SMALL TOWN: A CASE STUDY OF KOGMA GREAT KAI

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The aim of this study was to investigate the management of learner absenteeism in rural high schools in the Kogma District of Education. A qualitative research approach through a case study design was used and a sample of twelve participants was purposively drawn from the rural high schools in the district. Semi-structured in-depth interviews (face-to-face) and documentary analysis were used to gather data from the target group. The results of the study indicated that a problem of learner non-attendance exists in these rural high schools. A number of factors have been identified as being the prime cause of absenteeism among these learners. These factors include their social and economic setup, geographical location and distance to school, and the unavailability of parental guidance and support. It was noted that learners would sneak out of school without being noticed. This has been attributed to a failure of the school management system and school management teams. School management team members did not seem to be proactive in dealing with issues of learner attendance and principals were regarded as the only persons who should deal with learners who transgressed national learner attendance policy. School Management Teams (SMTs) seemed to also be relying on the School Nutrition Programme (SNP) as a way of combating absenteeism in schools. The issue of dealing with problems related to the causes of learner absenteeism was regarded as the responsibility of life orientation teachers. The data also revealed that SMTs focused on control rather than on devising strategies to combat learner attendance. This was made manifest in the regular marking of class registers. There were no indications that the information obtained from class registers helped the SMTs to effectively manage learner attendance.

Keywords: *learner attendance, learner, management, School Management Team, leadership, absenteeism*

1. Background to the Study

Learner achievement is affected in a negative way by absenteeism. Truancy from elementary and high school results in learners not succeeding in their academic work. Poor attendance is determined to be one of the factors leading to low student test scores (DeKalb, 1999). Having learners attend school regularly must be a priority for all schools in the country.

In a general sense, attendance means to go regularly to or being present at school (South African Schools Act 84, 1996). It is implicit in the South African Schools Act (SASA) that 'attendance' means participating in the full, applicable, and compulsory educational programmes of the school, unless there are other grounds which justify a learner's non-attendance, such as illness or lawful suspension (South African Schools Act, 1996). Failure to attend school has serious negative consequences on learners and the society they live in (Musser, 2011). The management of learner attendance is an administrative phenomenon which schools ought to take cognisance of. A school has a duty to protect every learner's fundamental right to education and a learner is obliged to attend school punctually and regularly unless there is a valid reason for his/her absence.

The Policy on Learner Attendance, effective from 1 January 2011, is compulsory for implementation by all Public Schools (Department of Basic Education, 2010). This policy seeks to promote punctual and regular attendance at public schools and sets out procedures for managing and monitoring learner attendance, including over the examination periods. The South African Schools Act (Section 3) provides for action to be taken by the Head of Department if a learner of does not attend school without a valid explanation (Department of Basic Education, 2014). The national policy on learner attendance states that class registers must be used as official records of learner attendance and absence. Registers must be used to monitor the attendance of learners at schools (Department of Basic Education, 2010). Schools must promote punctual and regular school attendance and provide standardised procedures for recording and monitoring learner attendance (Department of Education, 2007). Learners, however, seem to absent themselves from schools despite the fact the policy requires that the principal manages their attendance (South African Schools Act, 1996). The policy states that

the principal can delegate the management of learner attendance to his/her deputies and Head of Departments (HODs).

The School Management Team (SMT) is assumed to perform all of the management tasks of the school, including monitoring learner attendance and promoting a culture of teaching and learning (Naidoo, 1999). Though the national policy states that the principal can delegate the task of managing learner attendance, it does not specify how SMTs must manage learners' attendance other than by controlling classes and completing the period registers. Furthermore, there seems to be no provincial policy on how the schools themselves should manage learner attendance. Based on national learner attendance policy, schools are expected to develop their policies on learner attendance (Department of Education, 2010). "SMTs should share the overall responsibility for monitoring teaching and learning with the Principals and where they operate successfully, they have great potential to improve classroom practice through HODs sharing their ideas, developing school-wide policies and enacting consistent practice throughout the school" (Bush, Joubert, Kiggundu and van Rooyen, 2009). Although SMTs are tasked to manage schools, it seems as though there is a problem with their management of learner attendance as there is a serious problem of learner absenteeism South African (Bush et al., 2009). Given that each school has to develop its own policy on learner attendance, this study sought to investigate how SMTs, as school managers, manage learner attendance in schools.

Absenteeism is the failure by a student to regularly attend school during agreed times or participate in a meaningful manner in his or her planned education programme (Sheldon, 2007). Chronic non-attendance describes a situation where a student is absent for 10 days or more per term (Epstein & Sheldon, 2002). Chronic absenteeism means missing 10 percent of a school year for any reason. Truancy is also regarded as absenteeism. This describes a situation where learners deliberately arrive late to school, bunk classes, or leave the school premises during school hours without permission (Wittenberg, 2005). Absenteeism is generalised, with researchers categorising absenteeism as either school non-attendance, disaffection, school refusal, or school phobia (Whitney, 1998). These are the consequences of a lack of management of learner attendance. This study therefore sought to investigate how SMTs manage learner attendance.

Although many writers have researched learner absenteeism (Sheldon, 2007; Nauer, White, & Yerneni, 2008 & Gottfried, 2010), there is a dearth in the literature on how SMTs manage learner attendance in schools. Gottfried (2010) researched the consequences of a lack of management of learner attendance. It emerged that in high-income countries with good administrative systems, the extent of learner absenteeism can be easily calculated. The learner absence rates were estimated at between 3 to 6 percent in high-income countries (Sheldon, 2007). Gottfried (2010) further indicated that in the USA the absence rate was around 5%; in Canada 6%; in Israel 5.8%; in Ireland around 5.5%; and in England, 2.6%.

Low-income countries have high absenteeism rates as compared to high-income countries (Nauer, White and Yerneni, 2008). Absentee rates in a number of countries averaged 19% with a range from 11% to 28% (Gottfried, 2011). Peru had an 11% absentee rate, Ecuador 14%, Zambia 17%, India 25%, Uganda 27%, and Kenya 28% (Nauer, White and Yerneni, 2008). While the national rates were high, this varied depending on the geographic location and socio-economic conditions of schools (DoE, 2010).

Despite the extensive literature which has emerged around issues of learner absenteeism (Hallam and Roaf, 1995; Thambirajah, Grandison and De Hayes, 2008), at the current moment in South Africa, literature on the management of learner attendance in schools is limited. Hence this study focuses on the practices of SMTs in managing learner attendance. A study by the Community Agency for Social Enquiry and Joint Education Trust (2007) highlighted that South Africa has not undertaken dedicated studies to measure the extent of learner absenteeism, and that the administrative data from South African schools was incomplete. A study into learner absenteeism, commissioned by the Department of Education, found that the prevalence of learner absenteeism in South African schools was between 5 and 15 percent in 2007 (Weideman, Goga, Lopez, Mayet, Macun and Barry, 2007). This suggests that there is a problem with how learner attendance is managed that needs to be systematically investigated.

According to the South African Schools Act (1996), parents and guardians are compelled to ensure that the learners for whom they are responsible must attend school from the first school day of the year in which such a learner reaches the age of seven years until the last school day of the year in which such a learner reaches the age of fifteen years (or the ninth grade,

whichever comes first). The Act further compels heads of schools to employ several measures if learners fail to attend school. Such measures include an investigation into the circumstances of the learner's absence from school, the adoption of appropriate measures to remedy the situation, and the issuing of written notices to the parent/s of the learner where necessary (SASA, 1996).

Regular attendances at school where learners interact with peers and teachers is an important determinant of learner achievement. Being absent from school has negative consequences for the learners involved and the people around them. Learners who are frequently absent are at risk of not achieving their educational, social or psychological potential and their future career prospects are limited (Musser, 2011). Most of them end up breaking the law and landing up in jail. Only when learners are ill or after extraordinary events (such as the death of parents or close family members) are learners permitted to absent themselves at schools. Learners are supposed to be in class every schooling day. This, however, has not been the case among learners in South Africa.

The scale of school non-attendance in South Africa is serious and certainly requires urgent attention. President Zuma's State of the Nation Address (2009) and the Development Bank of Southern Africa Education Road Map (2007) highlighted concerns relating to learners being in school and in class. In developed countries, absenteeism rates usually range between 6 and 8 percent. However, absenteeism rates in African countries have been found to be much higher than other countries, sometimes as high as 50% (Weideman et al., 2007).

2. Problem Statement

Learner absenteeism affects not only the learner but the pass rate of the district, province, and the nation as a whole. It is the duty of parents and guardians as well as the principles or school officials to ensure that learners attend school. According to SASA (1996), parents and guardians are compelled to ensure that learners for whom they are responsible attend school from the first school day of the year. Furthermore, SMTs, such as school principals are expected to, among other things, manage learner attendance. The Southern African Development Community (SADC) region has a high rate of non-attendance of learners within schools

(Weiderman et al., 2007). Furthermore, the report by the Community Agency for Social Enquiry and the Joint Education Trust (2007) highlighted that such a high rate of learner non-attendance compromised the results and quality of education in South Africa. While learners are supposed to be learning they are loitering and being involved in other criminal activities amongst other abuses like alcohol and substance abuse.

3. Aim of the Study

The aim of the study is to explore learner absenteeism in a rural, small town: A case study of Kogma Great Kai.

4. Research Questions

- What role do SMTs play in assisting teachers to manage learner attendance?
- What are the practices of SMTs in implementing learner attendance policies?
- How do school learner attendance policies enable SMTs to manage learner attendance?

5. Literature Review

This section reviews the literature on some related studies that have been conducted. These studies include learner absenteeism and its causes. It was also necessary to review literature on leadership and management as this study was about SMTs who are in leadership positions of schools.

5.1 Learner Absenteeism

Hallam and Roaf (1995) and Thambirajah and De Hayes (2008) noted that school non-attendance carries the same meaning as school absenteeism. Non-attendance in South African schools is a serious concern for the Ministry of Education and is one of the challenges that most schools face. Students who are frequently absent are at risk of not achieving their educational, social and psychological potential and their future seems to be dim because they may place themselves at risk of harm during periods of absence, and they are more likely to be involved

in socially unacceptable activities or behaviours (Rhodes, Thomas, Lemieux, Cain and Guin, 2010). The South African Department of Education (2007:20) indicates that a learner is considered absent when "he or she is not at school the entire day". A learner is deemed to be absent when such a learner is not in class or is not there when a class or period register is marked (Nauer, White and Yerneni, 2008). The term ‘absenteeism’ is substantial and varied. The concept of learner non-attendance is often used as a collective concept that includes various types of absenteeism. Full absenteeism refers to absence from class for the entire day (Moseki, 2004). When a learner absents himself or herself from school ‘fully’ it means he or she won’t attend or come to school at all.

Based on the literature reviewed and the definitions employed in other studies, the present study adopts the simple definition of learner absenteeism, where a learner is absent when the learner is not at school for an entire day. This is also the definition currently employed by the South African Department of Education (2007) and the schools surveyed for this study when recording attendance. A distinction can be made between authorised and unauthorised absenteeism and between partial and full absenteeism.

5.2 Partial Absenteeism

Partial absenteeism refers to absence for a part of the day; that is, attending half of the subjects (Lyon and Cotler, 2007). Partial absenteeism is when a learner is absent from school for some part of the day. This refers to when a learner either comes to school in the afternoon and avoids morning classes or comes to school for morning classes and fails to attend afternoon classes.

6. Learner Non-attendance in South Africa

Poor learner performance in the South African education system, particularly in Grade 12 examinations, represents a challenge (Legotlo, Maaga and Sebego, 2002). Therefore, the need to gain a better picture of the causes and solutions to the problem cannot be overemphasised. Research was consequently conducted to collect qualitative data to determine how SMTs mange learner attendance in schools. The South African education system prescribes that barring illness or an extraordinary event such as the death of parents or close family members,

learners are supposed to be in class every schooling day (Wittenberg, 2005). However, this has not been the case among learners in South Africa. The scale of learner non-attendance in South Africa is serious and certainly requires attention.

Most of the research in South Africa indicates that learners arrive late for school, where about 20% of the learners are not at school by 8h30 (Moseki, 2004). The majority of absences in South Africa are authorised absences though partial absences occur. It was reported in one study that partial absenteeism occurs mostly in science subjects. Students absent themselves from difficult subjects such as mathematics and biology and this contributes to partial absenteeism.

6.1 Reasons for Non-attendance

Various factors contribute to learners not attending school. Personal, socio-economic and school factors have been regarded as the major factors causing non-attendance of learners in schools (van Wyk and Lemmer, 2009). These factors are discussed below.

6.1.1. Personal Factors

One important individual factor that leads to learners not attending school is learner illness (Bezuidenhout and Joubert, 2008). When learners are ill this warrants a valid reason for authorised absenteeism (Reid, 2007). Learners won't be deemed absent from school when they are sick to the extent that they can't attend school. Non-attendance due to illness is therefore authorised absenteeism. Hallam and Roaf (1995) note that illness is an acceptable reason for not attending school. Certain diseases that can be spread to other learners such as chicken pox are valid diseases that warrant students not to attend school. Such diseases require permission from the educators for learners not to attend school.

Age is another demographic factor that results in learners not attending school. Various studies have shown that older learners do not attend school as regularly as younger learners (Malcolm, Wilson, Davidson and Kirk, 2003). Learners also often lack self-confidence and are dependent on their parents, resulting in a decreased self-esteem (Lyon and Cotler, 2007).

Usually learners who fear failure and have learning problems are more likely not to attend school than learners who perform well (Thambirajah et al., 2008). It is also believed that learners who find it difficult to interact with fellow learners because of developmental problems miss school more often than learners who have a high self-esteem.

6.1.2 Socio-economic Factors

Poverty is an additional factor that inhibits learners from attending school in South Africa. A study conducted in the Eastern Cape found that poverty is one thing that stops learners from attending school. Most learners in rural schools are from poor backgrounds where their parents cannot afford to pay school fees. School fees, the associated costs of school materials, and the uniforms that learners are expected to have are among the barriers discouraging learners from attending school. Access to school is compromised by costs of school fees, uniforms, transport and costs of clinic visits (Nelson Mandela Foundation, 2005). Students in rural schools who fail to pay their school fees are sent away (Railsback, 2007).

The HIV and AIDS pandemic facing the country is one of the social factors that contributes to the increased number of learners not attending school in Southern Africa (UNAIDS, 2006). In South Africa, HIV/AIDS is prevalent amongst 5.6% of children aged between 2 to18 years, according to the Human Sciences Research Council (DoE, 2007). The prevalence is higher in the 0-9 years age group (Nelson Mandela Foundation, 2005). A report by UNAIDS (2006) on children aged between 13 and 18 in Uganda found that these children have a parent or both parents living with HIV/AIDs. The increased HIV epidemic results in declined school attendance as children have to cater for their sick parents.

A lack of transport among most rural learners also affects their attendance at school. Transport as a factor may lead to learners arriving late for school or not arriving at all for the day. This results in partial absenteeism in many cases as children may miss some classes because they could not be at school on time. Most learners in rural schools have to travel long distances to school thus presenting a major challenge to them to attend school daily. The Nelson Mandela Foundation (2005) research likened the walk to school to a ‘bridge’ between home and formal education. Often this ‘bridge’ is a threatening one, especially for girls who are vulnerable to

threats. These unsafe conditions associated with long walks to school affect learner attendance at school. Walking long distances under rainy conditions, among others, is one obstacle that affects learner attendance at schools.

Food security is another factor contributing to learner non-attendance in schools. Due to increased poverty rates in South Africa, in rural areas most learners are forced to go to school having barely had a cup of tea, if anything at all to eat (Wittenberg, 2005). Some learners attend school after only having porridge at home. Poor nutrition results in learners being unhealthy at school and showing signs of starvation, skin diseases and other health-related conditions (Nelson Mandela Foundation, 2005). The issue of children going to school hungry is widely spread in South Africa, and UNESCO (2009) reports that school feeding schemes increase learner participation, particularly in areas where poverty levels are high. It was evidenced that in rural schools where learners are provided with integrated nutrition programmes, the attendance is better as compared to rural schools where learners are not given integrated nutrition programmes.

Teenage pregnancy is a further factor contributing to learner non-attendance. Having a child at a young age places a young woman at an immediate and long-term disadvantage. A study in Brazil indicated that early pregnancy was the primary reason for young women leaving school (Kearney, 2008). Most of the young females who have unwanted pregnancies are forced not to attend school due to pregnancy-related sicknesses. They also have to miss school to cater for their newborn babies, thus affecting their progress in school. Most learners who become mothers might leave school permanently; others may return to school and find it hard to progress.

A further factor that is important to this study that affects learner attendance is the life of learners in urban and rural areas. The Nelson Mandela Foundation's (2005) study reported that non-attendance is higher in rural areas than in urban areas in South Africa. Similarly, Zafar, Kgobe, Napo and Parker (2006) state that in South Africa, children who live in rural areas are reportedly much less likely to attend school than children living in urban areas. The attendance of learners improves as one moves from commercial farming areas to homelands and from homelands to urban informal areas. Children located in schools in inner deep rural areas are

more involved in economic domestic work-related activities than those in commercial areas (Nelson Mandela Foundation, 2005). Such learners are exposed to poor road and transport networks or have to walk long distances to school, which definitely affects their attendance rate at schools (UNESCO, 2009).

Child labour is a further factor that can lead to learner non-attendance (Teasley, 2004). With the increased poverty in rural areas some learners are forced to find temporary employment to help to feed their families rather than attending school. Usually, older learners are confronted with this problem as they are forced to look after the younger ones, especially in homes were parents might have died from HIV/AIDS and the older children have no option other than to find employment to feed the family. It is reported that among the most common reasons for children not attending school in South Africa, especially in rural areas, is that their families need them to work (HRSC, 2005). Poverty-stricken learners are more likely to indulge in child labour as they need to find ways to support themselves.

6.1.3 School Factors

Increased violence, bullying, and sexual abuse in South African schools might be a factor leading to learner non-attendance (DoE, 2007). Violence and bullying in schools result in a loss of interest in school, increasing absenteeism, and eventually dropping out of school altogether (Buchel, 2006). Often learners who are sexually abused, bullied, or who are victims of violence lose interest in school or fear attending school, resulting in their decreased attendance at school.

Where female learners are subjected to sexual advances by male teachers this contributes to their decreased attendance at school. According to the South African Human Rights Commission (2006), female learners are subject to sexual harassment by male teachers as they are coerced to engage in sexual activities for money or food. Such behaviours by teachers contribute to the decreased attendance of female learners in schools as they fear being sexually abused by their teachers.

In South Africa, bullying is predominant in urban areas where society's racial divides are still strong (Nelson Mandela Foundation, 2005). Discrimination is dominant in such schools, to the extent that learners who feel that they are being excluded find no reason to attend school daily, thus contributing to the non-attendance of such learners. Many learners from rural schools miss school because they fear being laughed at by other learners because of the conditions at their homes. Poverty-stricken learners are subject to such kind of abuse and this contributes to their decreased attendance at school.

The punishment that children receive for late-coming is another factor that contributes to the non-attendance of learners in schools. Such punishment results in the full absenteeism of learners as they fear that if they arrive late for classes they will be punished. Such learners resort to not attending school at all. Kearney (2008) confirms that highly punitive measures contribute to learner absenteeism, indicating that inconsistency and minimal consequences for non-attendance can lead to learners not attending school. The excessive use of corporal punishment can lead to consistent teacher violence and this could also influence learner non-attendance. In schools where corporal punishment is still practiced, guilty learners are more likely not to attend school as they fear to be punished (Moseki, 2004). Learners who fear being punished either for late-coming or for other negative behaviour are more likely not to attend school as they fear the punishment they will receive for such kind of behaviour.

The relationship that exists between a learner and an educator also contributes significantly to learner non-attendance. When a positive, healthy relationship exists between a learner and an educator, the learner will attend school more often. If a negative, unhealthy relationship exists between a learner and an educator, however, the learner is more likely to miss school more often. Negative relationships between learners and educators usually result in educators making derogatory remarks that demotivate learners to attend school (Kearney, 2008). In this way, negative attitudes displayed by educators towards learners drive certain learners out of school. Insults and humiliating remarks by educators lead to school non-attendance (Moseki, 2004).

The relationship that exists between a learner's parent(s) and the school may also contribute to non-attendance. In situations where there is poor communication between parents and the school, there is no co-operation, and this contributes significantly to learner non-attendance. If

learners see that their parents are not concerned about their activities at school, are not involved, and do not engage in building relationships with the educator, such learners may stay away from school knowing that their parents won't be concerned (Nelson Mandela Foundation, 2005). Parental involvement therefore contributes significantly to learner attendance.

6.1.4 Family Factors

A weak parent-child relationship has been noted as contributing to learner non-attendance (Chisholm, 2004). A weak parent-child relationship contributes significantly to a parent's decreased involvement in a learner's education. In the rural areas where learners live with their grandmothers, there is a weak relationship that exists between the two and this might add significantly to learner non-attendance in schools. Usually people who are not concerned with school or who never succeeded in school are less likely to get involved in education to the extent that such learners might tend not to attend school (Togo, 2009). UNESCO (2009) reported that where parent-child relationships are strongly established, and where parents have a greater interest in their children's education, children are more likely to attend school (Chisholm, 2004).

Learners whose parents abuse alcohol and drugs exhibit high absenteeism rates. Parental alcohol and drug abuse and domestic violence are grouped under potential family factors that influence a learners' participation in education. It is believed that drug users and alcoholics are abusive to such an extent that they abuse their children hence resulting in decreased attendance. The children of alcoholic and drug-dependent parents may also not attend school because their parents may spend all of their money on drugs or alcohol, leaving their children without food and money for fees and uniforms (Williams, 2011).

South Africa is characterised by single-parent households. It is reported that learners who emerge from single-parent households are more likely to report higher levels of absenteeism than learners from households headed by two parents (Togo, 2009). Learners who come from poverty-stricken and single-parent homes where the single parent suffers from HIV are particularly vulnerable to non-attendance in schools as these learners are often forced to assume the role of the head of the household (UNAIDS, 2006).

6.1.5 Environmental Factors

Environmental factors contribute significantly to learner non-attendance in rural schools. Extreme weather conditions that are hazardous to learners can result in learner non-attendance. Floods, heavy thunderstorms and snow, for instance, can result in some learners not attending school (Hogan, 2008). Students who have to walk long distances to school will not attend if they see that heavy rains are about to pour; some might be late for school resulting in partial absenteeism. Very cold weather can result in rural learners not attending school as they are generally from poor families which can't afford to buy jerseys to wear at school.

7. Methodology

This study constituted of a qualitative assessment of learner absenteeism in the rural town of Kogma Great Kai in the Eastern Cape province of South Africa. A qualitative approach involves the collection of data in an interpretive, naturalistic setting in an effort to interpret and make sense of phenomena in terms of the meanings people bring to them (Denzin and Lincoln, 2000). The target population was the entire aggregation of learners who attended school in the area. The researcher used convenience sampling, which is a method of drawing representative data by selecting people because of their ease of availability or ease of access (Burns and Grove, 1997:236). Four official SMT members (principal, deputy principal, head of department and one educator) were interviewed. These officials were selected because they are the ones who deal with school management. Data were collected by tape recording the information from the interviewers. The research took note of both verbal and non-verbal communication with regards to learner absenteeism in the small, rural town. The interview guide served as the primary instrument in data collection.

8. Discussion of the Findings

This section discusses the findings of the study under the following headings: perceived problems and causes of learner non-attendance, the effects of school policies on learner attendance, and the practice of managing learner attendance in schools.

8.1 Perceived Problems and Causes of Learner Non-attendance

The data revealed that learner non-attendance was a major problem as the majority of the participants indicated that learners do not attend school regularly. Different participants highlighted different problems regarding learner attendance.

The failure of the learners to attend classes while on the school premises was highlighted by some of the participants as a problem that must be managed. This was an indication that learner attendance was not properly managed by the SMTs. The lack of parental involvement in learner education was also viewed as a problem by the SMTs. The participants mentioned that parents were not responding to calls to come to school to account for the failure of their children to attend school. This means that SMTs were unable to work with parents when parents were called to account. There were few, if any sessions that were held between parents and SMTs to devise strategies of dealing with learner non-attendance. This suggests that when it came to issues of managing learner attendance, processes were not followed in accordance with systems theory.

Systems theory requires that all aspects of the organisation are taken into consideration. A school is a system consisting of learners, teachers, parents, and school governing bodies (SGBs). This system is also influenced by the community at large and socio-economic factors. Any person working in line with systems theory should take into consideration all aspects pertaining to the school.

According to Fayol's administrative theory, a manager needs to be able to formulate plans, organise resources, and deal with people. In this study, there was no evidence that SMTs were dealing with people in managing learner attendance. Instead, in some cases, the task of managing learner attendance was assigned to the principal, who used his/her discretion in phoning the parents to come to school to account for their children's absence, for instance. As one of the most important factors in enhancing learner outcomes, managing school attendance requires the collaboration of all of stakeholders. In other words, in order for SMTs to effectively manage learner attendance, they should work in collaboration with other relevant stakeholders.

The school environment as a system shows how SMT and other stakeholders could work collaboratively in achieving learner attendance.

The SMTs have witnessed that poverty/hunger, alcohol/drug abuse, a lack of commitment by learners, poor teacher attitudes, teenage pregnancies, laziness, peer pressure, household work obligations, a lack of parental involvement, sickness, a fear of punishment, and abuse (sexual and bullying) are some of the problems in their schools but there were no efforts in place to deal with these problems. They also agreed that the long distance most learners had to travel to get to school was a problem, resulting in some learners being marked absent as the register was supposed to be marked at 08:00 in the morning. The regular marking of registers indicated that SMTs were mainly concerned with control rather than forming strategies to dealing with the problem of learner absenteeism.

Poverty was again viewed as a serious factor attributing to learner non-attendance, with the SMTs mentioning that learners stay with their grandparents, who depend solely on pension grants for a living. Child-households were also highlighted by the SMTs, stating that some of the learners do not have parents. As the heads of families, these students perform household chores before attending school. This is in line with what was raised by the Nelson Mandela Foundation (2005). In addition, some of the participants concurred that access to school was compromised by the cost of school fees, uniforms, transport and clinic visits. They further mentioned that bad roads and damaged bridges were problems, especially in the winter season. Cold winter weather, wind, bad rains and thunderstorms cause learner non-attendance to increase. It became apparent, therefore, that poor learner attendance was not just a school matter, but also a societal matter, making it crucial for SMTs to work with communities to improve learner attendance in the selected schools.

The lack of parental involvement was also rated highly by the participants indicating that many of the learners were staying with grand-parents. According UNESCO (2009), in the rural areas where learners live with their grandmothers, there was a weak relationship that exists between the two and this might significantly impact on learners' non-attendance in school. When a strong relationship exists between the parents and children, and where parents have a greater

interest in their children's education, children were more likely to attend school (Chisholm 2004). It was also noted that grand parents cannot walk the long distance to attend school activities. The participants from the schools strongly agreed that long distances, bad roads and bad conditions of bridges were contributing to learner non-attendance. This was confirmation of what Hogan (2008) indicated as one of the reasons for learner non-attendance at school. Floods, heavy thunderstorms and snow can result in some learners not attending school (Hogan, 2008).

The fact that it most participants indicated that learners who do have adequate school books and uniforms was a cause of learner non –attendance might be an indication that SMTs did not have a strategy to manage learner non-attendance in the selected schools.

Although the data revealed that drug and substance abuse were causes of learner non-attendance, there was no indication of how SMTs deal with this problem and this was worsened by the fact that parents were not taking part in school governance.

8.2 Effects of School Policies on Learner Attendance

The SMT strongly agreed that there was a learner attendance policy in the rural schools under investigation and they indicated that it was the general national policy for learner attendance. They confirmed that the policy promotes punctual and regular attendance at school and provides schools with standard procedures for recording, managing, and monitoring learner attendance. However, most of the participants agreed that they have not developed their own learner attendance policy that would talk specifically to their own problems or challenges. Only the national policy was used. According to the responses of the participants, only a plan, not a policy, was developed by the SMTs.

Some of the participants were not even aware that they were expected to develop their own policy and review it annually. They accepted that the learners were still arriving late and roaming around the streets even though the national policy was implemented at their schools. It is the responsibility of the SMTs to develop an attendance policy and a plan that talks specifically to the challenges of their particular schools. The view of Morris and Rut (2004) is

that if such a policy was created in the school and communicated to the educators and parents, learner attendance was likely to increase.

The participants also confirm that the lack of parental involvement was still a problem in their school. When parents were asked to come and account for the non-attendance of their child, they failed to comply because of the long distance to school. The fact that parents were not turning up when they were called to account for their children's absence might be an indication that they did not regard any procedure that was not the product of their engagement. It means that the policy and the plan have not addressed the problem of the long distances to these rural schools. According to the responses from the participants, it was clear that there were gaps in the existing national policy to cover the challenges of the rural schools under investigation in this study.

8.3 The Practice of Managing Learner Attendance in Schools

It emerged that SMTs did not have good practices that sought to combat learner non-attendance. This was confirmed by the fact that there were many problems associated with learner non-attendance. The majority of the participants, however, were of the view that SMTs assisted in managing learner attendance despite there being no formal procedure developed at school level that was followed to manage learner attendance. The introduction of the learner attendance register was mentioned by the participants as one of the best practices implemented by the SMTs. The majority of the participants confirmed that SMTs have acknowledged that there is learner non-attendance problem in their schools and that they have developed a plan to reduce learner non-attendance. However, there was no indication of parental involvement in the plan.

SMTs noted that parents were not attending school meetings during the week days and this resulted in the schools changing meeting days to Sundays, after church. This practice was noted as best as it improved the attendance of parents. However, there was no indication of how parents influenced learner attendance in these meetings. It could therefore be assumed that the SMTs simply presented their plans to the parents without considering their inputs. There was

also no indication that teachers were involved in the planning of any strategy by the SMTs to manage learner attendance.

This practice of SMTs not involving teachers and parents in managing learner attendance is not in line with Fayol's theory of administration. Fayol (1937) places emphasis on the administrative function of management. There was no evidence of coordination of programmes that were aimed at managing learner attendance in the selected schools.

The fact that the SMTs did not have a clear strategy that sought to include all of the stakeholders in the management of learner attendance was an indication that they were not running schools in line with systems theory. Systems theory puts forth the premise that organisations, like living organisms, were made up of numerous component subsystems that must work together in harmony for the larger system to succeed (Kast and Rosenzweig, 1972). According to this theory, the SMT members should not try to work alone in addressing learner non-attendance but must involve other members of the school in order to produce initiatives that can help the whole system (the school) achieve its goals. Kast & Rosenzweig (1972) indicate that systems theory also enables us to understand the component and dynamics of client systems, the school community in this case, in order to interpret problems and develop a balanced intervention strategy.

It was reported that the SMT members did communicate the policies and the plan to all relevant stakeholders that they think can assist in the management of learner non-attendance. However, the involvement of these stakeholders in the policy development stage was not highlighted in the findings.

9. Conclusion

From the findings of this study, it can be concluded that there is a problem of learner non-attendance in the rural schools in the Kogma education district. This was made evident by the responses of the participants which highlighted that learners are sometimes fully absent from school, and that others, despite being on school premises, do not attend classes. The researcher also came to conclude that the practices implemented by schools to manage learner non-attendance have been ineffective as learner non-attendance is still a problem at schools.

Although various practices have been implemented, they have not yielded satisfactory results in helping to significantly reduce learner non-attendance. The researcher can also conclude that the SMTs in question relied too heavily on the national learner attendance policy, without devising strategies to manage learner attendance that suited their particular context.

10. Recommendations

The following recommendations are suggested:

- Rather than relying solely on national policy, it is recommended that clear SMT policies for managing learner non-attendance be developed and communicated to all school stakeholders. The policy should clearly specify the roles of each stakeholder in managing learner non-attendance at school.
- In ensuring policy implementation, the Department of Education should develop a manual for the SMTs with regards to the implementation of learner attendance policies so that the line of operation of the SMTs is clear.
- A lack of parental involvement has been noted as one of the causes of learner non-attendance. SMTs should therefore strive to hold meetings where learners' parents are asked to attend so that they can see how schooling is beneficial to their children.
- Due to the diversity in geographical locations, societal norms, values, and culture, there is a need for a policy which seeks to address the problems in each school's specific area.
- There is a need for prescribed formal procedures which state the process and procedures to be followed if there is learner non-attendance. This includes calling of parents or guardians.
- Coordination through the team secretariat should be central to the planning and implementation of policies and programs for managing leaner attendance.
- Learner non-attendance is a community challenge. All stakeholders should therefore be involved in finding solutions to mitigate the problem.
- To address the lack of communication of policies and planning to all relevant stakeholders, annual meetings are needed to clearly outline the policies and planning of programs to address learner non-attendance. These meetings should also table challenges, report on how problems have been dealt with, and the possible way forward.

- Continuous moderation and assessment should be also emphasised to ensure that there are steps and measures which are taken to mitigate problems.
- Schools should ensure that there are websites and newsletters to keep stakeholders informed of the school calendar. Accountability and transparency of the school processes and system should be upheld.
- To address the lack of government policies which address the challenges of rural schools, the district and provincial offices of the department of education should be involved and informed of the unique problems faced by rural schools.
- With regards to the lack of resources and infrastructure development, there is a need for the government to ensure that the learners' needs are met and that their learning environment is stable and conducive to learning. This also includes roads, bridges, and effective mode of transportation.
- Bullying and violence within schools should be reported and dealt with accordingly to ensure that other learners are not affected. A support system should also be put in place to address the societal and social problems which result in the non-attendance of learners.

The following recommendations are suggested for further research:

- This study focused exclusively on secondary schools, therefore it is recommended that future studies focus on primary schools.
- It is recommended that a comparative study of rural and urban schools be conducted.
- It is also recommended that future research focuses on the role of parents on learner attendance.

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THE LAW AS A TOOL TO GUARANTEE THE INCLUSIVE EDUCATION OF THE NIGERIAN CHILD

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Educating a child with special needs or disability in Nigeria continues to raise concerns of a lack of quality. While education is provided for in the 1999 Constitution of Nigeria, it is seen as more of an obligation than a right by the majority of Nigerians. From the Nigerian child with a hearing impairment to the one with vision or mobility challenges, the question of their rights in education remain violated and neglected. The absence of equal treatment affects the dignity of the Nigerian child.

It is on the above premise that the authors adopt a multidisciplinary approach to analysing the education of children with special needs in Nigeria. The study draws from international and national legal frameworks and argues that more needs to be done to ensure quality in education. In addition, the study advances the legal basis for holding governments accountable for failing to meet its obligations in the education of the Nigerian child. The paper is structured in different sections which deal with the legal framework, conceptual clarifications, and the advancement of the basis for demanding equal and quality education for the Nigerian child. Finally, the paper makes some conclusions and recommendations.

Keywords: *education, child, disability, courts, constitution, inclusive*

1. Introduction

The importance of education and its role in the development of any nation cannot be overemphasised. To paraphrase the words of Mandela, education is a tool through which the child of a peasant farmer can become a teacher, a leader, and possibly even the president of a nation (Exley, 2013). Fafunwa (1974) sees education as a means of transforming a society, while Nduka (1975) sees education as a means of preserving the culture and way of life of a people. Obayan (2003) describes the continuum to post-functional literacy as basic education.

While the above captures the essence of education, it is noted that defining education is not as simple. Authors like Fafunwa (1974) have defined education as the totality of the process of a life from cradle to grave. One can deduct from Fafunwa's concept that education can be divided into several strata- formal, informal and non-formal. Aside the sphere of formal, informal and non-formal education, Nigerian education is divided into four phases of pre-basic, basic, secondary and tertiary education (UBE Act, 2004). The focus of this paper is on the basic phase of the education of the Nigerian child, with particular reference to the child with disabilities. Certain factors influence the education of a child; these could be divided into the areas of accessibility, affordability, availability, adaptability (Tomaševski, 2004).

While education is hugely premised on policies, the law as a regulatory instrument is central to how a society is determined and run. For instance, Nigeria is run according to the Constitution of the Federal Republic of Nigeria (CFRN, 1999) alongside other Acts of the National Assembly (Duze, 2012). It is also to be noted that aside from national laws, Nigeria also has obligations under international law. Nigeria has entered into several treaties that it must strive to follow and not violate. Some of these include the African Charter on Human and Peoples' Rights (ACHPR), the African Charter on the Welfare and Rights of a Child (ACWRC), the UN Covenant on the Rights of Peoples with Disability (CRPD), the International Covenant on Economic, Social and Cultural Rights (ICESCR), and the Universal Declaration of Human Rights (UDHR), among others (Anyanwu & Onuora-Oguno, 2013).

Despite the abovementioned national and international laws, statistics show Nigeria to have about 10.5 million children out of school (UNESCO, 2013). The Nigerian government, through

the minister for education, claim that the figure has recently been reduced to 8.6 million children (The Nigerian Guardian Newspaper, 2018). Aside from this, the quality of education has remained a major worry. Corruption in the education sector remains high, depriving millions of children from accessing basic education and moreover, basic education of a high quality. Most severely affected in this matrix are children living with disability. While special education is well captured in the policies, the level of access and availability remain at its lowest ebb. With the emerging concept of inclusive education, it is therefore pertinent to examine what role the law is able to play in guaranteeing the inclusive education of the Nigerian child in Nigeria.

On the basis of the above, this paper examined the question of the 4A's in Nigeria's basic education in line with examining the question of quality. The paper discusses inclusive education and its applicability to Nigerian education, examined the role that the law can play in guaranteeing the education of the child with disability in Nigeria, and finally, makes conclusions.

2. The 4As in Nigerian Basic Education, in Line with Examining the Question of Quality

The theory of the 4As was development by a former United Nations Special Rapporteur on education. The 4As are identified as:

- Accessibility
- Availability
- Affordability
- Adaptability

The question of accessibility deals with the ability of a child to easily access schools within a particular circumference from his/her place of dwelling. Therefore, if a child has to travel more than 5km to access a school, it is said not to be accessible (General Comment No 13,199). When we talk of accessibility, the question of how easy it is for school children to access the school also comes into play. Access for the blind, deaf, and crippled are all parameters for monitoring the

level of availability of education. In addition to the aforementioned parameters, the availability of brails, learning aids and reasonable accommodation are some other parameters that could inform access for persons with disability

With regards to availability, the question is to what extent schools are available in the community. When they are available are they sufficiently accessible in terms of the necessary infrastructure? What, for example. are the sanitary conditions of the school like to ensure the protection of the girl child? The question of availability therefore goes beyond having physical structures place. It also pertains to the quality of the available infrastructure. In this situation, the more disadvantaged situation of the girl child and those including those living with some form of disability is noted by the authors (World Bank, no date).

The third A speaks of affordability. What costs does the child have to bear to access the available education? Calculating affordability has to contend with the challenges of transportation, labour and other unseen costs that a pupil has to bear, either directly or indirectly (Woolman and Fleisch, 2009). In some Nigerian communities, the Parent Teachers Association (PTA) is tasked with employing what are now called PTA teachers. The parents must bear the cost of this and a child whose parents are unable to bear such cost will not have access to school.

The fourth A deals with the question of adaptability. Considering places described as hard to reach in some areas of Nigeria, to what extent is the curriculum and calendar able to adapt to their peculiarities? It has been found, for instance, that deviating religious ideologies have affected and continue to affect the level of acceptability of education to the northern part of Nigeria (Fafunwa, 1974). Again, the conflict between the Western concept of education and the African concept has created a dysfunctional premise which affects the level of access to education (Hansungule and Onuora-Oguno, 2013). The question of adaptability also speaks to the ability of schools to ensure the elimination of all forms of discrimination that might be capable of eroding the dignity of a child (Hansungule and Onuora-Oguno, 2013; Fafunwa, 1974; Adetutu, 2010). The Almajiri and fisherman style of education are good initiatives lauded in Nigeria in this direction, however, the question of efficiency and curriculum relevance looms large.

The interplay of the 4As in the education sector discussed above is intended to ensure the quality of education., however according to recent statistics by UNESCO, Nigeria remains the nation with the highest number of out-of-school children. This statistic implies an absence of either one or all of the 4As. Having discussed this, this paper proceeds to perform a conceptual analysis of inclusive education and its applicability to Nigerian education.

3. Inclusive Education and its Applicability to Nigerian Education

According to Kavale and Forness (2000), the process of ensuring that schools conform to standards and meet the requirements of any child is inclusive. The approach of inclusion in education began in the aftermath of the Salamanca Summit in 1994. The idea was to ensure that the hitherto special educational structure was discouraged. The main reason for this was the argument that a child trained in a special education school would not be living in a 'special' society but rather an inclusive one (Serges-Alain, 2013). The underpinning factor here is that every child (regardless of their ability) must have adequate access to education. Vislie (2003), on another hand, sees inclusive education as a process and not a state. Rose (2001) further stresses the need to have the relevant teachers to be able to drive inclusive education in Nigeria as this will help to curb the challenges of discrimination and enhance quality in curriculum interpretation and implementation.

The applicability of inclusive education is grounded in both the national and international laws previously mentioned. On a national front, Section 18 of the CFRN (1999) provides the main basis for the education of the Nigerian child. This is provided in Chapter 2 of the Constitution, however, which to a great extent makes it a mere aspiration, excluding it from the watchful eyes of the law via the courts. In addition to the CFRN, the National Policy on Education (NPE, 2013) further provides for inclusive education. However, it does not clearly mark out the difference between special education and inclusive education, with the latter embracing the former in its approach to learning (Ghergut, 2012). The Universal Basic Education Act (UBE Act, 2004) is another pivotal policy document in the realisation of basic education in Nigeria, yet its description and prescription of inclusive education is incomprehensive to say the least as it simply makes mention of the term without giving content to it.

Despite the paucity of provisions in local legislation for inclusive education and the position of education as a fundamental human right, international law can provide succor to the Nigerian child. Article 26 of the UDHR, articles 13 and 14 of the International Covenant on Economic,

Social and Cultural Rights (ICESCR), Article 28 of The Convention on the rights of the Child (CRC), and Article 11 of the African Charter on the Rights and Welfare of the Child (ACHRWC), are all examples of international law instruments that are applicable to education in Nigeria. While the above instruments speak generally to the question of the child's access to education, the Covenant on the Rights of Peoples with Disability (CRPD) specifically covers the challenge of inclusive education.

Article 24 of the CRPD states that parties should ensure that:

a) Persons with disabilities are not excluded from the general education system on the basis of disability, and that children with disabilities are not excluded from free and compulsory primary education, or from secondary education, on the basis of disability;
b) Persons with disabilities can access an inclusive, quality and free primary education and secondary education on an equal basis with others in the communities in which they live;
c) Reasonable accommodation of the individual's requirements is provided;
d) Persons with disabilities receive the support required, within the general education system, to facilitate their effective education;
e) Effective individualised support measures are provided in environments that maximise academic and social development, consistent with the goal of full inclusion.

The paper now proceeds to examine how the applicable laws discussed can be leveraged to guarantee inclusive education in Nigeria.

4. The Role the Law Can Play in Guaranteeing the Education of the Child with Disability in Nigeria

The use of the word 'law' in this paper represents both the letter of the law and legal institutions. Two of such institutions discussed in this paper are the Nigerian courts and the Nigerian National Human Rights Commission. In determining the roles the two institutions can play, examples will be drawn from their counterpart institutions in South Africa and India.

4.1 The Courts

The first challenge the Nigerian courts have in using the law to guarantee access to education in general is has been identified as the placement of Section 18 of the in Chapter 2 of the CFRN. This chapter has been deemed to be non-justifiable by virtue of section 6(6)(c) of the CFRN. According to Egbewole and Onuora-Oguno (2012), however, this challenge can be overcome by relying on the obligations of Nigeria to various international law treaties. Furthermore, the role the law can play via the courts has been shown in South Africa and India respectively. According to Skelton (2013), the courts have the power to provide direction for the legislation in the implementation of policies that affect availability and access to education.

In the *Western Cape Forum for Intellectual Disability v Government of the Republic of South Africa* case, the courts held that the onus to ensure the provision of education lies more on the state than individuals. The court consequently ordered the state to increase the funding of a private NGO that catered for the education of children with disabilities. Commenting on the importance of the case, Murungi (2011) reiterated that the case was important and timely as it exposed the obligation of states to honor its obligations under international law. The impact of this case means that in Nigeria, various homes that are run on a philanthropic basis may be able to get some form of subvention from the government to aid the continued and effective running of the homes.

In another case which hinged on availability, the courts found that the destruction of an educational institution without providing for adequate alternatives is not in the best interest of the child. The *Juma Musjid Primary School and others v Essay NO and others* case highlighted both the negative and positive right content of the right to education. In application to Nigeria,

it is imperative that the law is able to bear down on activities in the various private-owned schools that have been notorious for violating both the rights to and in education (Jjuko and Kabonesa, 2007). Another challenge that has been noted by several scholars in Nigeria relates to the availability of teachers (Fredickson, no date). The law, however, can be used to ensure the resolution of this challenge. In the *Centre for Child Law and others vs The Minister of Basic Education and others* case, the courts reversed the dismissal of about 4000 teachers based on the finding that the budget must not be used as a premise to violate constitutional and international law obligations of the state.

Examples from India represent the perception of the central and intrinsic role of education to every child. The India situation represents the essence of understanding that denying a child education is equal to denying such a child life (Unnikrishnan J.P. v. State of Andhra Pradesh, 1993).

The above examples have demonstrated that the law, as exercised by the courts, has a very important role to play in guaranteeing access to education and therefore can be engaged by Nigerians towards realising the rights of the child to basic education.

4.2 National Human Rights Institutions (NHRI)

Generally seen as a quasi-judicial body, the NHRI was created based on the Paris Principles to enable the realisation of human rights in nations. During the Military Juanta of Abacha, Nigeria established its NHRI; however, its operation was poor due to the general suppressive nature of the military regime.

The National Human Rights Commission Act (NHRC Act, 2004), places an obligation on the Commission to, among other things, ensure that they:

a) monitor and investigate all alleged cases of human rights violation in Nigeria and make appropriate recommendations to the Federal Government for the prosecution and such other actions as it may deem expedient in each circumstance;
b) assist victims of human rights violations and seek appropriate redress and remedies on their behalf;
c) undertake studies on all matters relating to human rights and assist the Federal Government in the formulation of appropriate policies on the guarantee of human rights;
d) publish regularly reports on the state of human rights protection in Nigeria.

From the mandate stipulated above, the NHRC is an institution that can be relied on by stakeholders in Nigerian education (especially those in the area of inclusive education) to create awareness of the on-going neglect and rot in the sector. While the NHRC must be strengthened to realise its full potential, it provides a promise that can be utilised. In both South Africa and India, NHRIs alone have served as tools in the hands of the law to assist in realising of the right to education.

In *The Head of Department: Department of Education, Free State Province v Welkom High School & Harmony High* (The Welkom Case), for example, the South African Human Rights Commission was admitted as an amicus. Consequently, if the NHRC utilises its promotional mandate, it is envisaged that it can collaborate with bodies like the Nigerian Union of Teachers (NUT) and other bodies to guarantee the right to the inclusive education of the Nigerian child.

5. Conclusion

The paper has attempted to conceptualise education from the perspective of various Nigerian scholars. In addition, it examined the various legal instruments that regulate education in Nigeria. The study found that education in Nigeria remain at its lowest ebb in terms of access and quality. In examining the role the law can play in enhancing access to inclusive education,

the paper concludes that the despite the shortcomings of Nigerian laws, international law places an obligation on Nigeria to ensure the proper implementation of policies. It is also concluded that in countries like South Africa and India, the law has been effectively used to ground the realisation of education.

Finally, it is concluded that the courts and the National Human Rights Institutions are important bodies that will aid in realising access to an inclusive education in Nigeria. The paper concludes by recommending enhanced cooperation between the various organisations involved in education in Nigeria and that they use the law as a viable tool to realise inclusive education in Nigeria.

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DETERMINING THE POSSIBILITY OF EXTENDING THE ACADEMIC ADVISING CENTRE'S FUNCTION TO AUGMENT STUDENTS' PROFESSIONAL PREPAREDNESS FOR EMPLOYMENT

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This article seeks to determine the capabilities of the Academic Advising Centre (AAC) in assisting students in preparation for their transition from the college to the workplace. The AAC aims to support students academically, helping them to reach their academic goals and to succeed. Therefore, the aim of the study is to determine the possibility of extending the AAC's capabilities in equipping students with employability attributes and to make recommendations to extend the role of the AAC's functions.

The study adopted a quantitative approach to collecting data from the target population, that being the AAC. A random sample was chosen which comprised the academic advisors who were available to participate in the survey questionnaire administered via SurveyMonkey. The sample selected consisted of 46 respondents. Thirty-seven responses were received.

The key recommendations from the study were sourced from both secondary and primary research. In terms of secondary research, literature reveals that academic advising should adopt a developmental approach that integrates career advising to mentor students academically. This approach should facilitate a process in which students are aided in learning about themselves, their goals, and how to attain them. From a primary research perspective, most of the academic advisors are aware that there is a need for training and development to facilitate students beyond their academic career through career advising.

Keywords: *Academic Advising Centre, employability attributes, academic advisor, career advising, employability, academic success*

1.1 Introduction

The article seeks to determine the capabilities of the Academic Advising Centre (AAC) in assisting student in preparation for transition from college to the workplace. The AAC aims to support students academically to reach their academic goals and successes. Within the context of academic advising, the interaction between students and advisors should be academically and career oriented. The interaction should identify the academic paths to reach prospective career goals.

To enhance the role of academic advisors and student success, the AAC extends its functions to the integration of academic and career advising, specifically by instilling employability attributes in students. For this study, 'employability' is defined as a set of attributes and competencies that the AAC will attempt to integrate with academic support services in order to develop self-empowerment and reflective learning amongst students.

1.2 Research Problem

The AAC's main services are to assist students academically and to mentor students to help them to achieve academic excellence. The AAC's mission is "Building relationships for academic success". By interacting with students and other colleagues, the researcher has experienced instances where students would ask for additional assistance with regards to their career prospects and professional preparedness for employment.

1.3 Aim of the Study

The aim of the study is to determine the possibility of extending the Academic Advising Centre's capabilities to equip students with employability attributes and to make recommendations to extend the AAC's functions.

1.4 Research Objectives

- To determine the possibility of extending the AAC'S functions to augment students' professional preparedness for employment.
- To make recommendations to extend the role of the AAC based on the findings of the study.

1.5 Research Questions

- What are the possibilities of extending the AAC's functions to augment student's professional preparedness for employment?
- What recommendations can be made to extend the role of the AAC based on the findings of the study?

2. Literature Review

2.1 Introduction

Education has been recognised as an experience that brings change to aspiring youth. The educational experience should therefore expose students to curricular components that facilitate smooth transitions throughout their academic and career prospects (Watson, 2002:208). There is a robust body of literature which deals with higher education as a tool that plays a role in creating and preparing young people for career development and independence. For instance, the UK government policy prioritizes education and the enhancement of graduate employability. It recognises that academic achievement is equally important as extracurricular achievements (Taylor, 2016).

2.2 Receiving Career Guidance when Enrolling for a Course

The definition of student success encompasses academic achievement, whereby a student engages in an educational purpose with the outcome of attaining knowledge, skills, and competencies (te Wierik, Beishuizen and Van Ons, 2015:1948). Therefore, the education students receive should prepare them for future occupations and bring with this an awareness of the basic qualities and skills necessary to succeed beyond graduation (Chireshe, 2012:305).

When a child goes to school, it is to acquire knowledge that will enable a better future. So, the education that the child receives, should help in preparation for employment (Hughey and Hughey cited in Chirese, 2012: 305).

Although knowledge and skills can be acquired in many ways, Barres (2013:275) states that students enter college excited about their prospective careers within their chosen field of study. Unfortunately, many students graduate with unclear career paths and a loss of passion. Karp (2013:2) further elaborates on how complex the completion of college is, explaining that multiple junctures may overwhelm students into making incorrect choices and failing to finish their courses. Karp (2013:2) further explains that although college offerings may be intellectually attractive, these can unfortunately be overwhelming to students and create barriers to their success.

The primary focus of academic advising is to establish a developmental approach where students are supported in a meaningful educational process which ensures academic success. According to Grites (2013:5), by taking a developmental approach, higher educational institutions support and stimulate students in a systematic process based on student-advisor relationships. Grites (2013:5) further elaborates on developmental academic advising, describing it as a relationship focused on enrichment, identifying life goals, acquiring necessary skills, and personal growth. The developmental approach should reflect the institution's mission with respect to developing students. When an institution's mission reflects a developmental approach, it is evident through supporting students comprehensively with information, academic support through advising, guidance and assistance in making educational and occupational choices.

According to Karp and Stacey, (2013:1), advisors play a tremendous role in assisting students in making choices in complex environments and guiding them to additional institutional services that link the overall academic experience. Young-Jones, Burt, Dixon, and Hawthorne (2012:7) elaborates that an advisor can play a pivotal role in encouraging students to involve themselves more in co-curricular activities. Such activities go beyond curriculum by complementing the learning experience of the student by providing opportunities to identify their strengths and interests relevant to their career goals. Young-Jones et al. (2012:7) have also observed that empirical research primarily demonstrates the impact of advising with

student retention, rather than on student outcomes. Research is therefore needed to better understand the impact of advising on a student's career development, and to further enhance the role of academic advisors.

2.3 Career Guidance's Role in Course Completion

McCalla-Wriggins (2016:2) states that career advising is needed by all students. With sixty percent of learners in South Africa having not received career guidance or counselling at school, Maree and Beck (2004) have observed that South African schools in disadvantaged communities are not properly utilising career guidance programmes, such as life orientation. Maree and Beck (2004) further express that in 2009, learners who passed matric had not received career guidance and consequently did not apply to further their studies at higher educational institutions. These realities need to be explored by institutions as opportunities and a sense of responsibility should prompt them to proactively create academic structures to guide students in exploring vocational options that suit their strengths, skills and passions (Kuhn and Padek, 2009:3).

The effects of career guidance and its potential can be considered at different levels: individual, organisational and societal. Through better management and making the choices regarding academic prospects clearer, an individual's potential can be magnified. If learners are assisted in identifying learning programmes that are in alignment with their aspirations, there is a potential benefit that could stream to education and training providers. Lastly, in a societal context, efficient human resources can arise from career guidance. Where learners are encouraged and motivated, there are fewer dropouts from educational institutions.

According to Karp (2013:1), to improve completion rates and help students to attain their educational goals, colleges need to have a variety of reforms which they plan to implement. This, Karp (2013:1) explains, builds on the notion that if a student has a clear path to follow, the likelihood of course completion is improved. Karp (2013:1) further elaborates that such reforms should be predicated on the notion that students can identify appropriate programs of study and connect those to their longer-term academic and career goals. Lastly, Karp (2013:1) believes that for colleges to be effective, they need to shift their focus to guidance and advising

activities that assist students in identifying and pursuing appropriate goals which are relevant to their interests.

2.4 Integrating Academic Advising and Career Advising

Nelson (2016:3) believes that teaching encompasses different forms that begin with classifying student learning outcomes. Advising is therefore one form of teaching, where the predominant task is helping a student to clarify and set their goals. It is therefore imperative that an academic advisor acknowledges timing when imparting information - understanding first what is required, and whether expertise is needed.

According to Nelson (2016:3) for advisors to transit to career advising, preparation is needed. Such preparation will allow new dimensions of advising to be explored on how to meet student's needs. Through the expansion of advising to career advising, a change in approaches will occur that will focus more to student's needs, and how to connect their prospective careers with their current academic state. Therefore, a soundly good mission statement that encompasses the expansion should be comprehensive in educating and promoting qualified individuals with employability skills to contribute to the economic status of their communities (Nelson, 2016:4).

Academic advisors play an important role in providing academic and career advising. According to Karp (2013:5) literature has identified how academic and career advising to intertwine and sometimes overlapping. So, under ideal circumstances, such elements should enhance student engagement, whereby a student is advised on how to explore and to decide on a career goal.

The utilisation of counselling and advising programmes underlines the fact that students enter college with career goals. Institutions have consequently allocated resources to advising and counselling, the intent of which is to help guide individuals along the path of clarification. Advising and counselling is most effective when it is required by the students and when the two are systematically linked to one another as well as to other student services and programmes. The effectiveness of advising and counselling is further enhanced when they form an integral part of the educational process, which all students are expected to experience (te Wierik et al., 2015:1947).

Within the vast body of literature, Karp (2013:5) has identified academic and career counselling as integrated and sometimes being separate. Karp (2013:5) emphasises that the purpose of advising is not merely to impart information to students. The purpose of advising entails a process of facilitation whereby students are supported in self-awareness, identification and in the attainment of their goals.

2.5 Students' Inquiries about Career Guidance in Academic Advising Sessions

According to Pargett (2014:2), there is a strong need for a relationship between the advisor and the student. Some researchers believe that it is up to the student to seek and maintain a relationship with the advisor and to disclose information at their discretion, however the effort needs to go both ways for a professional relationship between the advisor and the student to be formed. An academic advisor plays a pivotal role in students' academic success by mentoring the students and providing them with expert advice to augment their development (Pargett, 2014:2).

Developing a developmental approach can be expensive for some institutions. Some expenses can require additional staff members and program tools to be developed. For instance, according to (Levin and Garcia cited in Karp 2013) City University of New York has a program called Accelerated Study in Associate Program (ASAP) that costs over 16,000 US dollars per student compared to approximately 9,800 US dollars for a regular attending fee at City University of New York. Fortunately, there are other less expensive reforms of advising that other institutions have explored such as online advising. Conducting academic and career advising online allows institutions to reduce costs and provide information efficiently using appropriate systems tailored to students' needs.

2.6 Career Advising in Preparing Students for Employability

Students need to know about generic skills, according to Singh (2015:1), generic skills enable an individual to adapt, organize and strategically apply their specific skills in new situations and circumstances. Therefore, an academic advisor can bring awareness of how students need to explore skills that most employers highly value when employing graduates (Green, 2016:2).

Through encouragement, students are assisted in taking preliminary steps towards career development.

Tsai (2013:345) reveals that employability skills are generic skills rather than being specific to a job title. They span across all industry types, business sizes, and job levels. The ability to communicate, analyse, solve problems, work to quality standards, people's skills, attitude, reliability and professionalism are considered job readiness skills by employers (Tsai, 2013:346). According to Karp (2013:7) "Advisors must teach individuals how to examine their preferences and personality traits to aligns those with labour market options and develop coherent plans for attaining career goals."

Harvey (2013:1) expresses that employability is not always automatic and is not merely about getting employed by virtue of coming from a vocational background. Developing attributes, experiences and techniques are just a few aspects which influence one's employability. Therefore, it is imperative that the emphasis is less on enabling a student to be employed and more on other elements of employability that promote career advancements among students Developing attributes for employability is about learning, and the emphasis should be less on 'employ' and more on 'ability'. To empower and enhance students, advisors need to emphasize developing reflective abilities to students (Harvey, 2013:1)

3. Research Methodology

The study took a quantitative approach to collecting the necessary data. A questionnaire was administered using Survey Monkey to the AAC academic staff, who were the population for the study. The questionnaire was constructed with eight questions that would answer the research questions formulated for this study. The questions were simple and easy to eliminate boredom for respondents.

The AAC staff consists of academic advisors from six faculties namely, the business faculty, the technical faculty, the faculty of social science, the creative faculty, the high school faculty, and the information technology faculty. Forty-six samples were selected to participate in this study. With the use of convenient sampling, all members of the population were conveniently available to participate.

A quantitative data analysis is helpful in providing quantifiable results. Quantitative data can be analysed in a variety of ways. “To begin analysing quantitative data, the researcher must identify the level of measurement associated with the quantitative data, there are four levels of measurement namely, Nominal, Ordinal, Interval and Ratio.” (Pell Institute, 2010:1).

For this study, data was analysed using SurveyMonkey. The data was viewed and accessed once the collection was complete. By browsing, creating export charts, filters, and individual responses, the results were downloaded in multiple formats to summarise each of the survey questions.

4. Research Findings

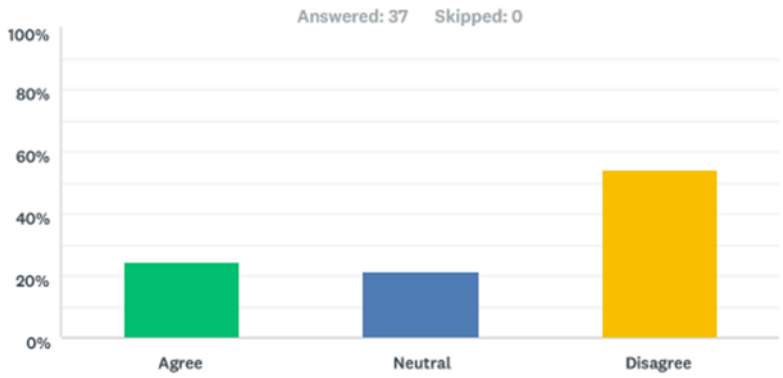
4.1 Response Rate

Out of forty-six academic advisors within the AAC, thirty-seven responded to the survey. The response rate was 80%.

4.2 Findings

The majority of the academic advisors are within the ages of 20-35. That represents 97.22% of the respondents. There is an equal balance of females and males.

Figure 1: Career guidance at tertiary level

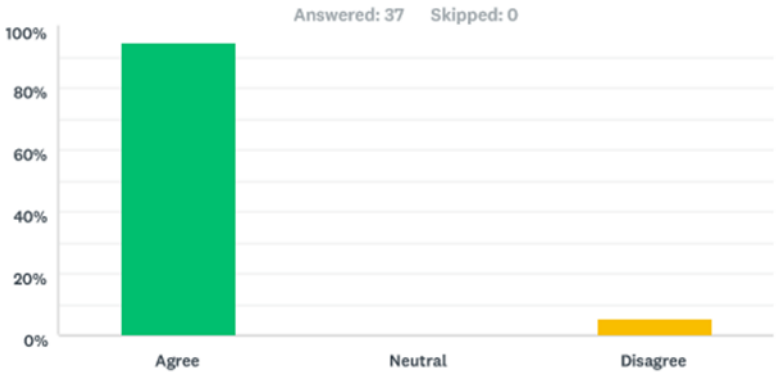


Answer Choices	Responses	
Agree	24.32%	9
Neutral	21.62%	8
Disagree	54.05%	20
TOTAL		37

Respondents were asked whether they had received career counselling at their tertiary level, the majority 54.05% of the respondents disagreed with the statement. 21.62% of the respondents remained neutral and 24.32% agreed with the statement.

When students enter tertiary level, they are normally excited about their career prospects. Sadly, majority do not graduate with the same level of excitement and passion (Barres, 2013:275). More than half of the respondents attested that they did not receive career guidance when they entered tertiary level. These realities reveal a gap on the support services of higher education institutions to explore and capitalize on maximising on the level of academic and career support before a student enrols for a qualification.

Figure 2: The role of career guidance in motivating students

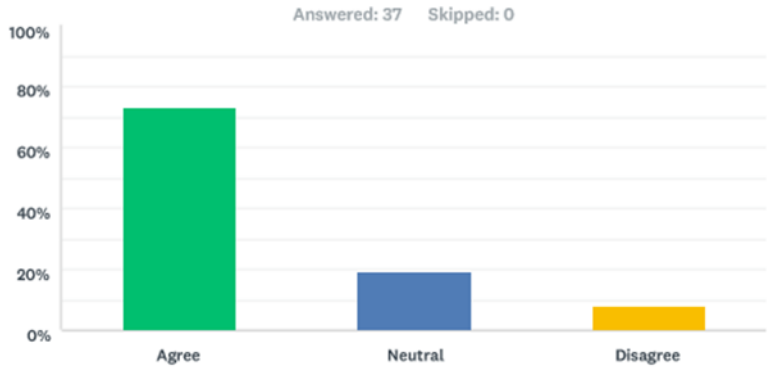


Answer Choices	Responses	
Agree	94.59%	35
Neutral	0.00%	0
Disagree	5.41%	2
TOTAL		37

Figure 2 demonstrates that within the AAC, 94.5% of the respondents agreed to the notion that career guidance plays a crucial role motivating students to complete their chosen field of study. 5.4% of the respondents did not agree with the statement, and there were no respondents with neutral responses. To improve completion rates and help students attain their educational goals, colleges must provide a variety of ways to help students in developing clear paths that they can follow and subsequently increase their rate of course completion (Karp, 2013:1).

All students need career advising (McCalla-Wriggins, 2016:2). It is evident on most respondents that agree on how career guidance that students receive motivates them to complete their courses. Such realities need to be explored by institutions as opportunities and instil a sense of responsibility to proactively create academic advising methods for students to explore their academic and career options (Kuhn and Padek, 2009:3).

Figure 3: As an academic adviser, my students have asked for career assistance during our academic advising sessions

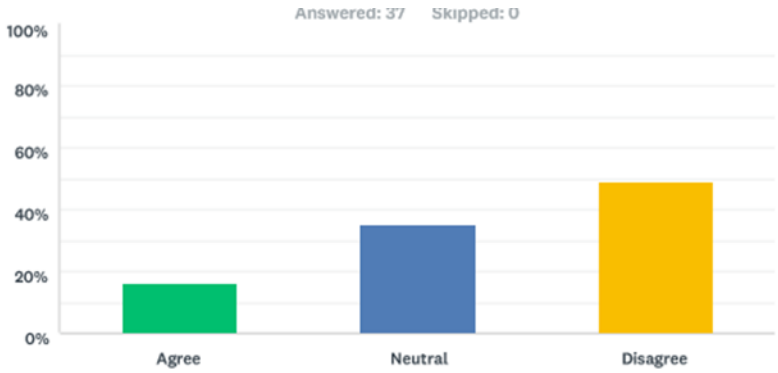


Answer Choices	Responses	
Agree	72.97%	27
Neutral	18.92%	7
Disagree	8.11%	3
TOTAL		37

The respondents were asked whether they have ever had instances where the students that they advise had asked for further assistance in their career prospects. The findings, as depicted in Figure 3, indicate that 72.97% of the respondents agreed with the statement, 18.92% remained neutral, and 8.11% of the respondents disagreed.

As an academic advisor, during an academic session, it important to ask relevant questions to student's academic status to respond accordingly and provide expert advice. This gives students the opportunity to ask for help beyond their subject content, therefore it is pivotal for the academic advisor provide expert advice and refer students to other institutional support services to enhance their learning experience.

Figure 4: My training is adequate to advise students with career enquiries

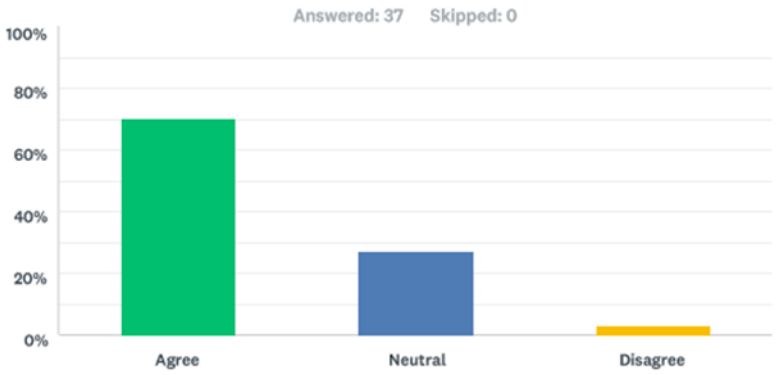


Answer Choices	Responses	
Agree	16.22%	6
Neutral	35.14%	13
Disagree	48.65%	18
TOTAL		37

Responding to the question of whether respondents received adequate training to advise students with career enquiries, Figure 4 illustrates that 48.65% disagreed, implying that they had not received the necessary training. 16.22% of the respondents agreed, implying that they believed their training was adequate, and 35.14% had neutral response to the question.

Nelson (2016:3) believes that advising is a form of teaching, and that all forms of teaching begin with identifying learning outcomes. Helping a student clarify and set career goals becomes a paramount task in the academic advising process. Knowing when to give information and understanding what kind and how much is needed requires expertise and attention from an advisor. Nelson (2016:3), states that for advisors who have been trained in traditional advising approaches, making the transition into career advising may require additional reading and preparation but will add new dimensions. The first step in expanding advising practice, involves paradigm realignment, a shift from information focus to, from focus on the immediate time frame to connections in the future, and from curriculum completion to career salience (Nelson, 2016:3)

Figure 5: I am Interested in Becoming A Career Advisor



Answer Choices	Responses	
Agree	70.27%	26
Neutral	27.03%	10
Disagree	2.70%	1
TOTAL		37

Figure 5 illustrates that within the AAC, 70.27% respondents have an interest in becoming a career advisor to their students. 27% had neutral response to the question and only 2% showed a disinterest in becoming a career advisor to students.

With advisors uniquely positioned to form professional relationships with students, the academic advising centres can explore the level of interest that the respondents reveal of becoming more than academic advisors to their students.

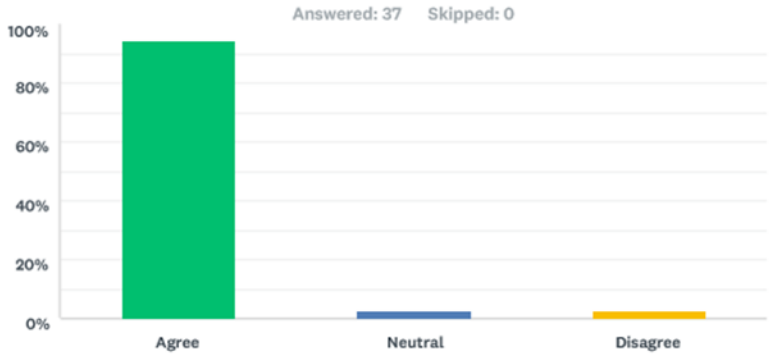
Figure 6: I require further training to become a career advisor

Answer Choices	Responses	
Agree	91.89%	34
Neutral	5.41%	2
Disagree	2.70%	1
TOTAL		37

Figure 5 demonstrated that there was a considerable number of respondents who were interested in becoming a career advisor. Figure 6 illustrates that 91.89% of the respondents acknowledge that they would need further training to become a career advisor to the students that they advise. 5.1% had neutral response and 2.7% disagreed that receiving further training would be necessary to become a career advisor.

Figures 4, 5 and 6 reveal a correlation on the interest and capabilities that can be further explored to maximise the role of academic advisors. For the expansion of the AAC, preparation and further training to equip academic advisors in guiding students beyond academically is needed.

Figure 7: Career guidance will be beneficial if integrated with academic advice



Answer Choices	Responses	
Agree	94.59%	35
Neutral	2.70%	1
Disagree	2.70%	1
TOTAL		37

Figure 7 illustrates that a majority 94.59% of the respondents agree that career guidance would be beneficial to students if it were integrated with academic advice. 2.7% disagreed with this statement and another 2.7% of the respondents had a neutral response to the statement.

Academic advisors are uniquely positioned to assist students academically, and to further enhance their mentorship role by assisting students by career advising. Karp (2013:5) acknowledges the vast body of literature which identify academic and career counselling as an integral and sometimes separate concept. However, there is an underlying notion that under ideal circumstances, counselling should help students to engage in exploring and deciding on their career pathways.

The utilisation of counselling and advising programmes underlines the fact that students enter college with career goals. Institutions, on this matter have allocated resources to advising and counselling whose intent is to help guide individuals along the path of clarification. Advising and counselling is most effective when required by students and is systematically linked to one another and other student services and programmes. The effectiveness is further enhanced when they are integral part of the educational process which all students are expected to experience (te Wierik et al., 2015:1947).

Figure 8: Integrating academic advice with career advising could instil employability attributes in students

Answer Choices	Responses	
Agree	94.59%	35
Neutral	2.70%	1
Disagree	2.70%	1
TOTAL		37

Figure 8 shows that 94.59% of the thirty-seven respondents agreed that integrating academic advice with career advising has the potential to instil employability attributes in students. 2.7% of the respondents had a neutral response to the question. Another 2.7% disagreed with the statement.

Tsai (2013:345) reveals that employability skills are generic skills rather than being specific to a particular job title. They span across all industry types, business sizes, and job levels. The ability to communicate, analyse, solve problems, work to quality standards, people's skills, attitude, reliability and professionalism are considered job readiness skills by employers (Tsai, 2013:346). Therefore, Karp (2013:7) posits that advisors must teach individuals how to examine their preferences and personality traits to aligns those with labour market options and develop coherent plans for attaining career goals.

Harvey (2013:1) expresses that employability is not always automatic and is not merely about getting employed by virtue of coming from a vocational background. Developing attributes, experiences and techniques are just a few aspects which influence one's employability. Therefore, it is imperative that the emphasis is less on enabling a student to be employed and

more on other elements of employability that promote career advancements among students. It is about learning, and the emphasis should be less on 'employ' and more on 'ability'. Harvey (2013:1) stresses that the emphasis is on developing critical, reflective abilities, with a view to empowering and enhancing the learner.

4.3. Findings

4.3.1 Findings from Literature Review

Within the literature, there is a strong emphasis on the belief that the purpose of advising is not merely to impart information to students, but rather to facilitate a process by which students are aided in learning about themselves, their goals and to attain them.

- The development of individuals' intellectual and personal growth, so as to help them to achieve their academic and career goals, should be the most important outcome of higher education (Watson, 2002:208).
- The education that students receive should prepare them for future occupations and bring awareness of the basic qualities and skills necessary to succeed beyond graduation (Chireshe, 2012:305).
- Grites (2013:5) states that the primary focus of academic advising is to establish a developmental approach where students are supported in a meaningful educational process ensuring academic success. Karp and Stacey (2013:1) support this, stating that advisors play a tremendous role in assisting students in making choices in complex environments and guiding them to additional institutional services that link the overall academic experience.
- According to Nelson (2016:3), advising is a form of teaching, and all forms of teaching begin with identifying student learning outcomes. Helping a student clarify and set career goals becomes a paramount task in the academic advising process.
- To expand the use of guided curricular activities, higher educational institutions need to renew their focus on guidance and advising activities to help students to identify and pursue their career goals and interests.

- To improve completion rates and help students attain their educational goals, Karp (2013:1) believes that colleges must have an array of reforms which they plan to implement to build on the evidence that giving students clear paths to follow improves their likelihood of course completion.
- Tsai (2013:345) revealed that employability skills are generic skills rather than being specific to a particular job title; they span across all industry types, business sizes, and job levels. The ability to communicate, analyse, solve problems, work to quality standards, people's skills, attitude, reliability and professionalism are considered job readiness skills by employers (Tsai, 2013:346).
- Advisors must teach individuals how to examine their preferences and personality traits to aligns those with labour market options and develop coherent plans for attaining career goals.
- Employability is about more than about developing attributes, techniques or experience just to enable a student to get a job, or to progress within a current career. It is about learning, and the emphasis should be less on 'employ' and more on 'ability'. Harvey (2013:1) stresses that the emphasis is on developing critical, reflective abilities, with a view to empowering and enhancing the learner.

4.3.2 Findings from Primary Research

- The majority of the respondents were between the ages of 20-35 within the AAC.
- The respondents consisted of an equal number of females and males.
- A collective of 75.6% of respondents were neutral and did not receive any form of career guidance at tertiary level.
- A total of 94.5% of the advisors agree that academic advising does play a role in motivating students to complete their course.
- Approximately 73% of the academic advisors at the AAC indicated that within their academic advising sessions with students, they have encountered students that seek career assistance from them.
- A collective percentage of 83.8% of the academic advisors responded 'neutral' or disagreed that they had received adequate training to equip them to advise students beyond purely academic advising.

- The majority of the respondents agreed that they would like to be able to be able to assist students with career guidance and acknowledge that they would need to be trained in order to become career advisors.
- A large percentage (94.5%) of respondents agreed that the integration of academic and career advising would be beneficial to the students that they are currently advising. The same 94.5% of respondents also acknowledged that integrating academic and career advising could effectively develop the employability attributes of their students.

4.4 Recommendations

4.4.1 Gap in the Academic Advising Context

From the primary data collected for the study, it is evident that although academic advisors are functioning effectively in assisting students academically, there is gap that needs to be filled with regards to responding to career-oriented queries from students. The majority of the academic advisors agreed that they have experienced instances where students require more than just academic advice. Ideally, an advisor would conduct an integrated academic and career session with a student, using a developmental approach to teach individuals how to examine their preferences and personality traits and how to align those with labour market options in order to develop coherent plans for attaining their career goals.

Literature reveals that higher educational institutions focus on the outcomes of heightening individuals' intellectual abilities; therefore, institutional academic advising is mainly informational. This creates a gap in developing students in terms of career advising. An academic advisor who knows the importance of skills will encourage their students during advising sessions on generic skills. Through encouragement, students are assisted in taking preliminary steps towards career development.

4.4.2 Training and Development

Literature suggests that by taking a developmental approach, higher educational institutions can support and stimulate students in a systematic process based on student-advisor

relationships. Making the transition into career advising may require additional reading and preparation but will add new dimensions to institutions. This is supported by the primary data collected among academic advisors who revealed that training and development would be necessary for them to become career advisors.

Implementing a developmental approach to academic and career advising requires additional staff and resource tools and these developments are expensive in nature. However, the academic advisors are well positioned to extend their capabilities to respond to career-oriented queries through training. Approximately 70% of the academic advisors are interested in extending their capabilities beyond academic advising. Another reform that the institution can implement relates to the use of online resources, which the AAC currently use to advise students academically. Within each faculty, a career advisor could be positioned to encourage students in taking preliminary steps towards career development, to introduce the most valued skills by employers, and to assist in self-awareness and the development of skills to enable students to progress within their career paths with clarity.

Helping a student to clarify and set their career goals becomes a paramount task in the academic advising process. Advisors would have to be trained in traditional advising approaches before making the transition into career advising as it requires additional reading and preparation but will add new dimensions.

4.4.3 Extending the Functions of the AAC Through Career and Academic Advising

Literature reveals that a comprehensive advising approach aims to educate and graduate qualified individuals with the skills needed to enter suitable employment and contribute to the economic development of communities. Of the academic advisors that participated in the survey questionnaire, there was a considerable amount (94.5%) of respondents who agreed that academic advising plays a role in motivating students to complete their course(s).

To make academic and career advising effective, it needs to be required by students. According to the academic advisors, 73% attested that within their academic advising sessions with students, they have encountered a number student who asks for assistance with regards to their

career choices. Therefore, to enhance the role of the AAC, career counselling and academic advising must be linked to one another to effectively facilitate the educational process and introduce the importance of the skills to be developed.

The emphasis should be to develop critical and reflective abilities with a view to empower students, the introduction of employability is about more than just enabling a student to get a job or to progress within their chosen career. It is about learning and exploring their career paths beyond graduation.

Within each faculty, a career advisor needs to be introduced to facilitate the academic advisors in handling students that require assistance in clarifying their academic choices aligned to their career paths. An academic advisor who understands the importance of employability skills will encourage students to consult a career advisor within their faculty to heighten their awareness of the employability attributes that they need to develop or discover the skills they already possess.

Given the primary data collected among the academic advisors at the AAC who indicated their interest in becoming career advisors to the students that they currently advise, further research could produce certainty on how to further develop these individuals.

4.5 Conclusion

The research design of the study adopted the appropriate methods of collecting primary data to fulfill the initial inquiry of the study. The objectives of the study were met due to the appropriateness of conducting the research. To extend the functions of the AAC, further research is needed to ascertain how the recommendations of this study can be developed. The academic advisors already hold professional relationships with students, therefore integrating their roles to include career advising would be ideal for future circumstances.

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WELLNESS FACTORS IMPACTING STUDENT ACADEMIC PERFORMANCE FROM A HIGHER EDUCATION PERSPECTIVE

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This paper focuses on the wellness factors that impact on academic performance at Higher Education Institutions. This study was conducted at a private college in Gauteng, with a sample of 60 students. For the purpose of this research, wellness factors were based on the Leafgren and Elsenrath (1986) wellness model (cited in Botha, 2007) and included the following dimensions: emotional wellness, environmental wellness, financial wellness, occupational wellness, physical wellness, social wellness, spiritual wellness, and intellectual wellness. Core findings revealed that all students who participated in this study had compromised wellness dimensions, with as much as 42% of them indicating that they were experiencing financial problems. Based on the wellness model, if not dealt with in a positive manner, these types of stresses lead to poor academic performance and can result in poor student retention and increased dropouts. To counteract the ripple effects of poor academic performance, poor student retention, and increased dropouts, students in this study have made recommendations for support services that can assist them to change their behaviour and consequently improve their academic performance.

Keywords: *academic performance, students, factors, wellness, student support centres, Higher Education*

1. Introduction and Background

Student wellness plays a central role in ensuring academic success in the context of higher education. There are various factors that impact on the academic performance of students. According to UCDAVIS (2017), the wellness model is a holistic model which identifies eight, interrelated dimensions of wellness. UCDAVIS (2017) briefly explains these dimensions in the list below:

1) Emotional wellness -makes reference to an individual's feelings, and how they react and cope with these feelings.
2) Environmental wellness – considers the physical environment that we live in. The physical environment must be respected, and we should live in harmony
3) Financial wellness – considers the financial situation of an individual and how money is being spent
4) Intellectual wellness – refers to an individual's mindset, with having a mind frame that is open to new ideas, knowledge and experiences
5) Occupational wellness – refers to an individual career development
6) Physical wellness – relates to how well an individual takes care of their body.
7) Social wellness –social networks and social roles form an important component of social wellness
8) Spiritual wellness – this refers to developing a set of values that have meaning and is used constructively in a person's life

The World Health Organization (WHO) defines health as "a state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity" (UCDAVIS, 2017). This definition is inclusive of wellness, as it covers the eight dimensions of the wellness model.

For students to achieve the optimal level of wellness as defined above, it is essential that students make conscious decisions that ensure that they live a healthy and fulfilling life that will also contribute positively to academic performance (UCDAVIS, 2017).

In a study conducted by Du Plessis (2015) at Stellenbosch University, it was noted that scientific evidence points to the benefits of using a wellness approach in an academic environment.

In Du Plessis' words (2015:2-3), the reasons for this include the following:

1) Wellness enhances student success (well students perform better academically than less well students).
2) Wellness promotes happiness, well-being and health (well students are happier and healthier, physically and mentally).
3) Wellness promotes the development of graduate attributes (well students have characteristics that are sought after by employers).
4) Wellness programmes […] will lighten the burden of support services […].
5) The wellness approach is a strength-based and evidence-based approach and aims to optimise the potential of all students (both 'strugglers' and 'flourishers').

According to a study by Baldwin, Towler, and Oliver (2017) that took place in Tennesses among college students, psychological distress, including depression and anxiety, has significantly increased over the years. It was further reported that 30% of college students experienced stress and 21% of college students reported difficulties sleeping. These factors impacted negatively on the academic performance of students.

In a study by Anderson (2015), statistics further reveal that academic performance is impacted negatively by various factors. This study was conducted in the United States of America and factors identified show the percentage by which academic performance is impacted: alcohol (28%), violent behaviour (58%), rape (68%), depression (8.9%), and falling asleep in class (45.1%).

Higher Education Institutions need to address the matter of wellness and provide support to students accordingly. If the wellness needs of students are not addressed, these institutions will face a crisis as students will not perform academically and as a result, will drop out. This will lead to both retention rates and the pass rates of students being incredibly poor. It is important

that students also learn to live a well-balanced life – striking a balance with their academics and other areas of their lives.

2. Research Aims

The aim of this research is two-fold. Firstly, this research aims to determine the wellness factors that impact on student academic performance. This research secondly aims to determine if there is a need to provide support centres for students to access during their academic years of study.

3. Research Objectives

The research aims will be addressed through the following research questions:

- What are the wellness factors that impact on student academic performance?
- What are the different types of support centres students would like to access in their academic years of study?

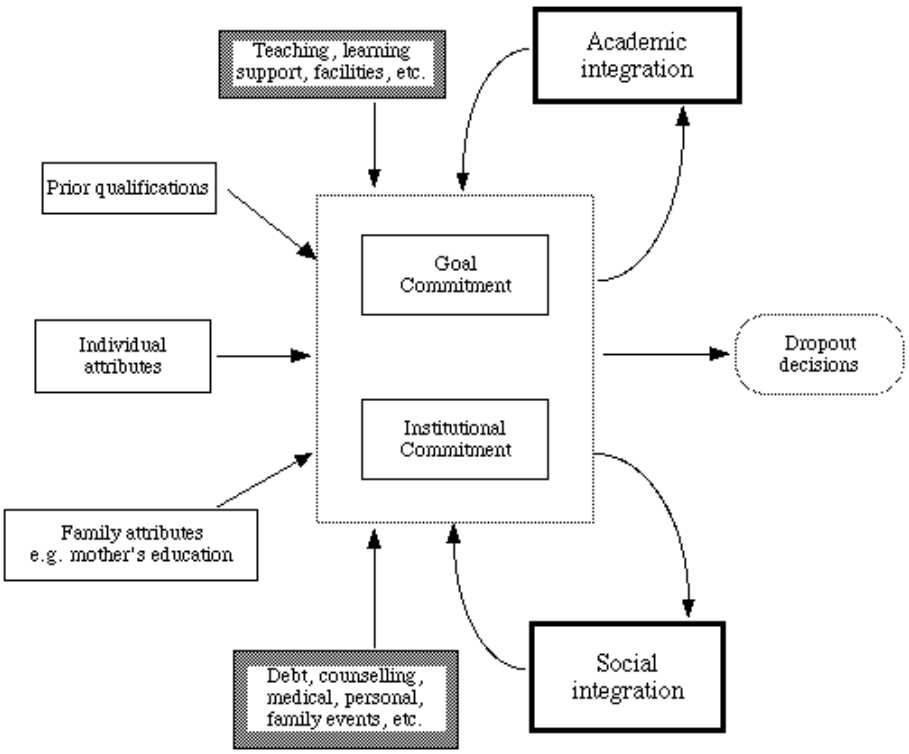
4. Literature Review

This research used three theoretical frameworks to explain the link between academic performance and student retention and student dropout: Tinto's integration theory, Spady's sociological theory, Bean and Eaton's psychological theory.

4.1 Tinto's Integration Theory

Tinto's model was developed in 1975 and focused on social and academic integration. In Figure 1, Draper (2003) graphically illustrates how social integration and academic integration affects academic performance and dropout.

Figure 1: Tinto's Integration Theory



Source: Draper (2003)

Social integration focuses on the following factors that impact on academic performance:

- Number of friends
- Personal contact and interactions with lecturers

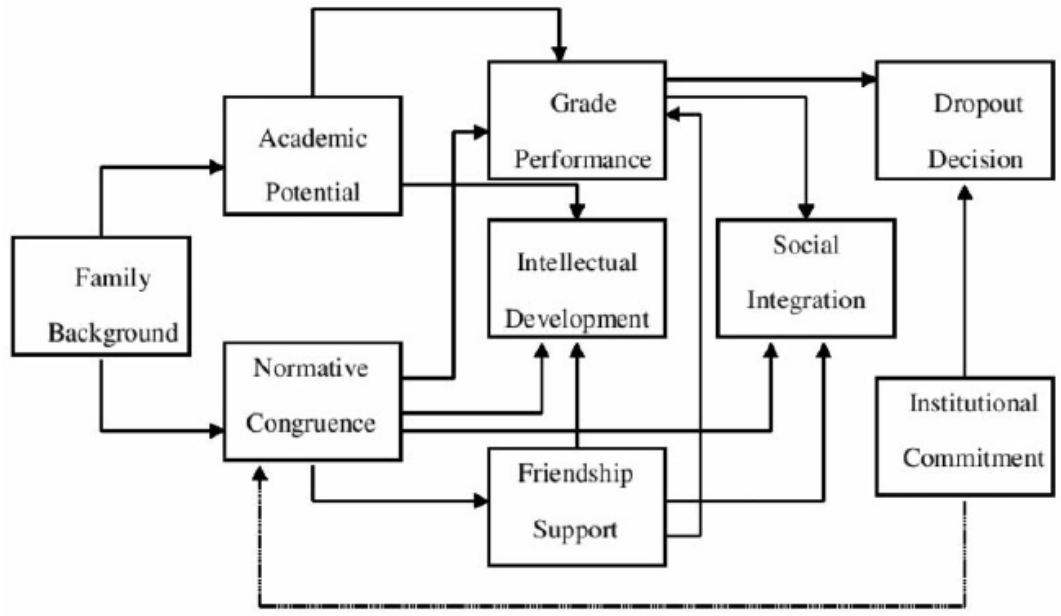
Academic integration looks at the factors listed below that impact on academic performance:

- Grade/mark performance
- Personal development
- Identifying with academic norms and values

4.2 Spady's Sociological Theory

The diagram below illustrates the factors that lead to poor academic performance and therefore increased dropout rates.

Figure 2: Spady's Sociological Theory



Source: Kerby (2015)

Spady's sociological theory was developed in 1970 and focused on factors that lead to poor academic performance and increased dropout. These factors, as illustrated in the diagram above, include family background, academic potential, normative congruence, grade performance, intellectual development, and social support (family and friends) (Stavredes, 2011).

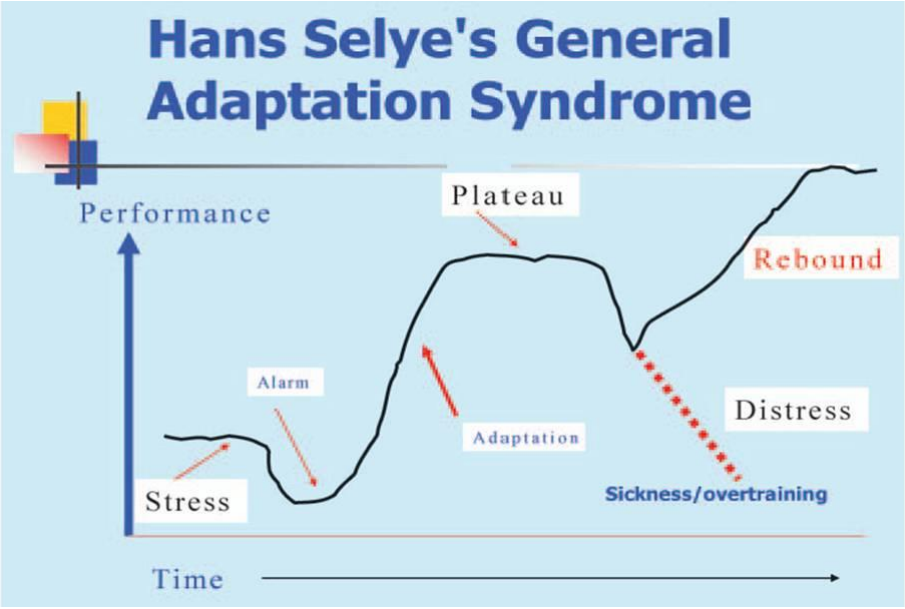
4.3 Bean and Eaton's Psychological Theory

This psychological model of student retention was developed by John Bean and Shevawn Eaton in 2000. The model was largely based on the premise that any given current behaviour is linked to similar past behaviour, values, attitudes, and intentions (Net Industries, 2017).

Bean's model, suggests that there are various background variables, such as a student's high school educational experiences, educational goals, and family support that has an impact on the college or university that a student wishes to attend. This is because Tinto's model explains that after matriculation the student interacts in the academic, bureaucratic and social arena, which has different impacts in the life of the student. It is through these interactions that the student develops a set attitude towards a school. (Net Industries, 2017).

Bean and Eaton's model (2000) clearly states that the current state of wellbeing covered in the wellness model would determine the actions and behaviour of a student. For example, if a student is not open to learning new ideas in school, they will also experience challenges in accepting new ideas at a tertiary level and will not be able to adapt to changes.

Figure 3: The General Adaptation Syndrome



Source: Legg (2017)

Hans Seyle explained the General Adaptation Syndrome model (cited in Lana (2017) was based on three stages: alarm, resistance and exhaustion. The stress model was based on physiology and psychobiology and stated that in when an organism well-being is threatened this leads to a three-stage bodily response, shown in Figure 3 above. The graph above shows the impact of performance and stress over time. When a person is stressed, their performance is poor (Lana, 2017).

4.4 Perspectives on the Theories

All three theories that have been discussed above provide an explanation of the dimensions of the wellness model that describes the impact on academic performance that can lead to dropout among students. This wellness model is emphasised and highlighted again so that the link between the different theories and wellness can be clearly made.

All three theories are interconnected and use a holistic approach to discuss academic performance in terms of the wellness model. Each of the dimensions pointed out above contribute individually in their own way to academic performance. If these dimensions are positive, academic performance is impacted on positively. If the dimensions are negative, academic performance is affected negatively. For example, if a student is sick (a dimension of physical wellness), this student will most likely be on medication and may not be able to focus clearly, leading to poor academic performance. If any one of the eight dimensions are compromised, appropriate interventions should be in place to ensure that the academic performance of students is not negatively impacted. If all of the eight dimensions are impacted on negatively, this will lead to poor academic performance and as a result, lead to the student dropping out.

5. Methodology

The methodology adopted for this research is quantitative in nature. Quantitative research is entrenched in numerical approaches and uses data gathered through various sources such as polls, questionnaires or surveys. Information or data gathered is generalized to explain trends or other occurrences. (Zappia, 2001).

5.1 Sampling

Non-probability sampling was used in this research. The sampling method used was convenience or haphazard sampling. This method was chosen as participants were selected on the basis of availability. Using this method "involves haphazardly selecting cases that are easiest to obtain for [the] sample" (Welman, Kruger, and Mitchell, 2005). A sample of 60 students was selected from a private college in higher education, located in Gauteng.

5.2 Description of Target Population

The target population consisted of students at a private college in Gauteng. There were 60 participants in the target population that consisted of Black Africans, who were between the ages of 18-25-year-old. The target population consisted of 30 males and 30 females.

5.3 Data Collection

The instrument used was a survey questionnaire. The survey questionnaire was administered by the researcher and consisted of both open-ended and closed-ended questions. Open-ended questions were used to allow employees to respond to questions in their own way (Neuman, 2000).

5.4 Data Collection Methods

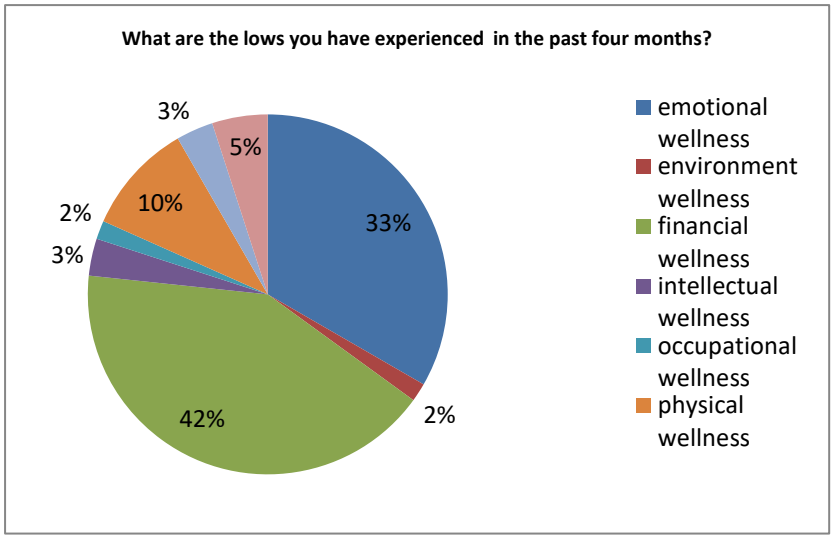
The researcher administered the survey questionnaire to participants. Participants were briefed on the nature of the research and were informed that their participation was voluntary. Participants were assured of confidentiality and that all information that was supplied by them when filling in the survey questionnaire would be anonymous.

5.5 Measurements

The data was analysed using frequency analysis. In quantitative research, frequency analysis focuses on the number of times an event occurs (Neuman, 2000). This was chosen as a simple method of analysing data in this research.

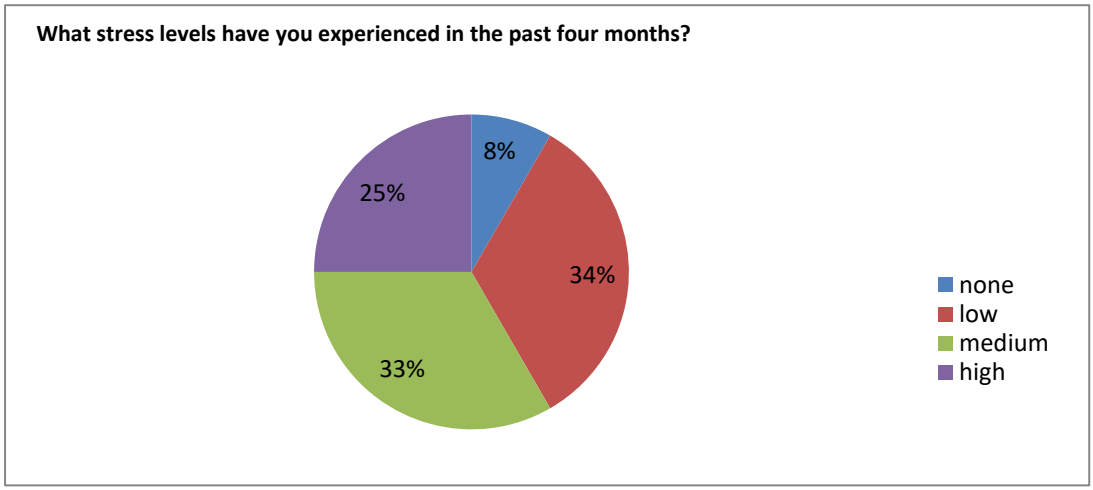
6. Findings/Results

Graph 1: Lows Experienced in the Past Four Months



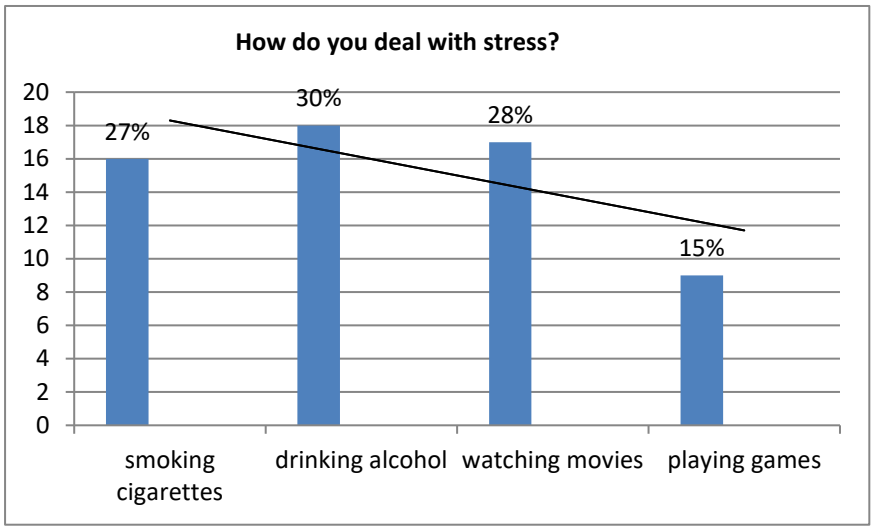
Graph 1 illustrates the lows that were experienced by students in the past four months. By 'low' it is meant that students were experiencing problems/challenges in one of the eight dimensions of the wellness model which had a negative impact on them and hampered their academic performance as a result. A four-month period was considered as each semester is roughly four months and academic performance was measured based on their results. The findings showed that 42% of students experienced financial problems and 33% of students experienced emotional problems.

Graph 2: Stress Levels Experienced in the Past Four Months



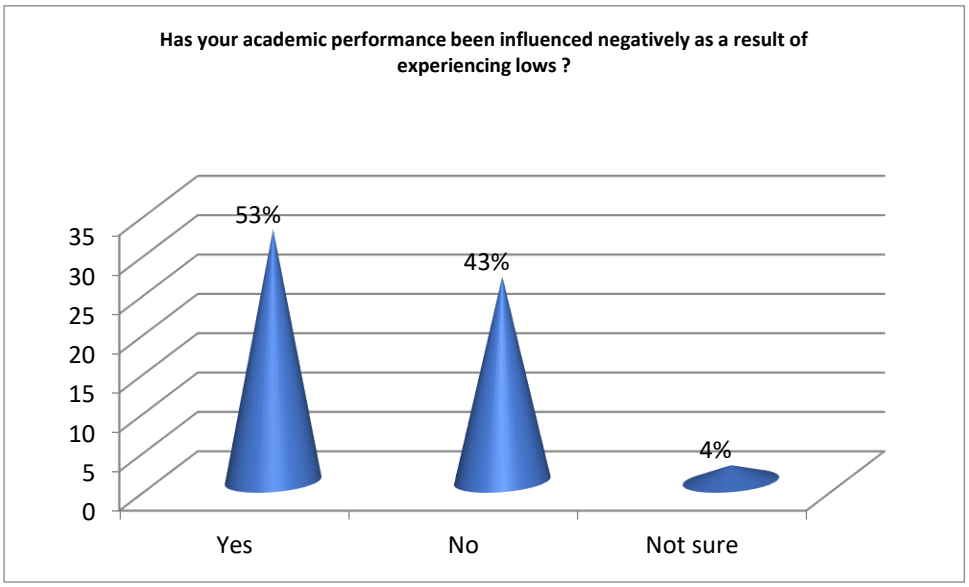
Graph 2 depicts the various stress levels experienced by the students in the past four months. These stress levels range from none whatsoever to high stress levels reveals that students were stressed. 33% of students experienced medium levels of stress, while 25% of students experienced high levels of stress. If stress is not managed in a positive manner this can have adverse effects on academic performance. Selye's definition of stress cited in (Franken, 1994) considers it to be "response-based in that it conceptualizes stress chiefly in terms of the body's physiological reaction to any demand that is placed on it".

Graph 3: Ways in Which Students Manage Stress



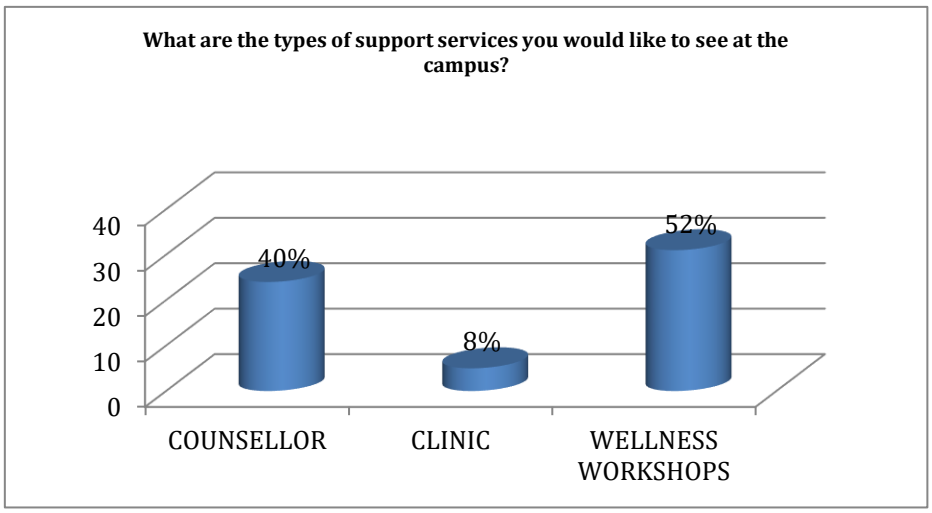
Graph 3 above reveals that the 18-25-year-old students do not manage stress in a positive manner. Very high percentages show that students use negative approaches to deal with stress. These negative approaches include smoking cigarettes (27%) and drinking alcohol (30%). A small percentage of the students manage stress in a positive manner, by watching movies (28%) and playing games (15%).

Graph 4: Wellness Factors and Their Impact on Academic Performance



Graph 4 clearly shows that there is a link between wellness factors and academic performance. 53% of students indicated that their academic performance has been affected because of wellness issues. This is a substantial figure, suggesting that proper interventions need to be put in place to address the issue.

Graph 5: Types of Services Suggested by Students



Graph 5 reveals that there is a support services are required by students. The types of support services that students felt would have a positive impact on their academic performance are clearly seen above. 40% of students suggested that a counsellor should available at the campus and an even larger percentage of students (52%) suggested that wellness workshops would be useful.

7. Discussion

The results of this study indicate that the eight dimensions of the wellness model are clearly compromised.

The perspectives of the theorists whose theories informed in this research (Tinto, Spady, and Bean and Eaton) indicate that student retention and dropout are based on various factors that are linked to the wellness model. If students are performing poorly academically, this also leads to poor retention and high drop rates.

Students identified the following wellness factors as having an impact on academic performance: emotional wellness, environmental wellness, financial wellness, intellectual wellness, occupational wellness, and physical wellness. This was illustrated in graphs 1 and 4 above. These findings address the first research question. This question asked, "what are the wellness factors that impact on student academic performance?"

The students in this study were shown to dealt with stress in a negative manner. This was made apparent in the students' feedback as well as in the statistical analysis. 53% of students indicated that their wellness had a direct impact on their academic performance. This is clearly demonstrated in Graph 4. When students experienced any form of wellness issue during a test/assignment or exam, they did not perform well academically.

Students need to be encouraged to deal with stress in a positive manner so that academic performance is not further negatively influenced. Drinking alcohol to manage stress, for example, further impacts on a student's academic performance. Drinking alcohol may result in students not being able to concentrate, or falling asleep in class, making them unable to study. It is important that all Higher Education Institutions provide support to their students as interventions are required to retain students, curb student dropout, and to support academic performance. The type of support services should be specific to the type of higher education institution as well as to the needs of the students. In this study, students indicated that they wanted access to a counsellor, clinic, and wellness workshops. The majority of these students felt that wellness workshops were essential to improving academic performance. This addressed the second research question that looked at what types of support centres students would like to access in their academic years of study.

8. Conclusion

This study focused on the wellness factors which affect student academic performance at a private college in Gauteng. This research demonstrated that there is a direct link between wellness and a student's academic performance. This means that if a student's wellness is compromised, this has a negative impact on their academic performance.

The recommendation of this study is that there is a need for support services and that these support services must be made available to students at Higher Education Institutions. The support services recommended by the participants of this study included having counsellors at campuses and holding wellness workshops. Since the institution in question has no counsellor or clinic present, a current strategy may be to refer students to organisations that offer this specialised service. These support services play a vital role in a student's wellbeing, which also has a direct impact on their academic performance. Since this study was based on quantitative research, the findings of this study can be generalised to apply to other Higher Education Institutions in South Africa.

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INTERNAL AND EXTERNAL FACTORS THAT INFLUENCE THE RETENTION OF ACADEMICS IN HIGHER EDUCATION INSTITUTIONS IN SOUTH AFRICA

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The purpose of this study is to identify the factors that influence the retention or exit of academics in the Higher Educational (HE) sector. There are various experiences and factors that motivate job satisfaction, and ones that conversely compel one's exit from the industry. There are certain target groups that are attracted to this industry as well as factors that compel academics to leave the industry. These academics will migrate to other sectors should there be too many factors that give rise to dissatisfaction. This study compares the retention situation in HE to similar situations in both South Africa and abroad.

The ability to retain staff who have experience and skills in the sector becomes a problem when staff exit the field of HE. Despite the uncertainty of the economy in South Africa and other countries, the demand for academic staff in HE is on the increase. Recruitment and retention problems have an impact on future employees. Various studies have been conducted on the retention of staff in HE. This paper reinforces the need to further examine the factors that influence the retention (and exit) of staff from the field of HE.

Keywords: *Higher Education, retention, academics, factors, exit*

1. Introduction

In every industry, there are positive factors that attract segments of the potential workforce. There are similarly also negative factors that prevent the retention of the workforce. Various factors influence the procurement of staff, and by extension, their exit. This study examines these influences and makes recommendations to ensure the retention of academics in Higher Education (HE). This study therefore examines the factors that influence the academic's decision to leave HE, as well as the factors needed to retain academic staff.

The study relies on a rational approach by accessing pertinent scholarly works in the field of recruitment and retention in various fields, but with a specific focus on the HE sector. Included are examples from the HE field. Sang, Teo, Cooper and Bohle (2013) state that the academic profession has been highly respected in the past and has also been viewed as a secure work environment. This study discusses the various factors that threaten this status quo.

2. Problem Statement

The Higher Education (HE) sector selects the candidates best suited to the industry, but it does not necessarily retain them. Which factors influence the job satisfaction of academics in HE? What remedies are in place to ensure retention? This is the central focus of the study. Staff satisfaction and dissatisfaction are analysed in the current context of HE.

While Sang et al. (2013) view HE as a secure workplace, according to Shriberg (2002:2), there is little systematic guidance for sustainability for the industry. This paper seeks to address these concerns. According to Sinha and Sinha (2012:1), the issue of employee retention issues is seen as a considerable emerging challenge not only in education, but also in the general workforce.. In light of the shift in the dynamics of the workforce, where employees are not only culturally diverse but also hold different beliefs and views, it is expected that the criteria for retaining the workforce, both in higher education and other industries, will have to be re-evaluated (Sinha and Sinha 2012:1).

Having been employed in HE for a considerable period, the researcher had noticed certain trends, one of these trends being an inadequate sustainability in the retention of staff. By means

of pre-reading, we looked at the background of studies in this field and discovered that although there had been some research published, more extensive and more current research was needed. Our pre-research indicated that although similar studies had been done, it was important to keep the research in this field up to date because of the shifts in education and its dynamic nature. Based on our pre-research, we also perceived a trend in the movement out of the industry.

3. Research Objective

The objective of this research is to identify the internal and external factors that would ensure the retention of staff in HE and which remedial actions could be taken to prevent the constant exit from the industry.

4. Research Questions

The research questions were:

- Which internal factor(s) influence the retention of staff in HE?
- Which external factor(s) influence the retention of staff in HE?
- What strategies are in place to ensure the retention of staff in HE?

These research questions arose out of a perceived deficiency within the field of HE retention trends, discussed in detail in this paper.

5. Literature Review

According to White and Schmidt (2005), systematic literature reviews serve to assess and summarise all available evidence on a specific topic. In a literature review, however, it is also important for the researcher to mention and acknowledge the unexplored. This paper has evaluated past and present scholarly articles with a similar academic slant, but it has also made mention of what may be missing from the available data on the topic and what may be seen as

a potential gap. For example, although there are many proposed models of employee satisfaction, it remains to be seen whether the criteria for employee satisfaction are sufficient. Various employee satisfaction models further neglect to address academics' rising resentment towards student-lecturer evaluations, which they believe places the emphasis on the results of student-lecturer evaluations than on the academic's ability to develop the student as a learning entity and to encourage their academic growth. Furthermore, while there are many studies which examine the retention of students, there are comparatively few which examine the retention of educators and academics in HE.

All of the literature reviewed and discussed in this study relates to issues that pertain to entry and exit from the HE industry, and procurement and retention in HE. Case studies based on the industry are included and compared to provide context. This includes a study on occupational stress in a Chinese HE institution by Sang et al. (2013). The scholarly papers include, but are not limited to, research done in the United States (US) by scholars such as Michael Shriberg (2002) of the University of Michigan, who examined factors that affect sustainability in HE, such as performance and leadership. This included behaviour that appeared to "represent strong positive conditions for success in campus sustainability" (Shriberg 2002:4).

A study by McClenahan, Giles and Malett (2007) looks at work stress among academics, and Viljoen and Rothmann (2009) examine ill health and occupational stress at a university in South Africa, triggered in part by changes in the HE system in South Africa. Netswera, Rankhumise and Mavundla (2005) emphasise the fact that HE's success lies in having highly skilled employees, and Morgan (2017) examines employee engagement, which will be discussed in this paper. In terms of barriers, Shriberg (2002:4) linked the lack of coordination between advocates to "the low prioritisation of environmental campus issues".

In Section 7 of this paper we also discuss the salary structure of academics in HE, which can be regarded as a barrier to the retention of staff. It must be noted that while Shriberg's study (2002:4) pertains to US colleges and universities, our literature also focused on local (South

African) campus conditions. In our discussion, we also use a local (South African) private Higher Education Institution as a case study. Also included in our discussion is a case study by Rajagopoul and Motaung (2013) which examines stress as a contributing factor on poor work performance. The issue of stress bears relevance to our study. Metcalfe (2002) points out that the demand for academic staff in HE is on the rise, making retention even more relevant.

6. Research Method

Primary research consists of research done firsthand by the researcher by means of interviews and surveys. Secondary research relies on data that has already been collected by another, or other researchers. A distinctive difference between the two methods lies in the fact that the research may have been conducted previously. In this instance, the study relies on data already collected by other researchers. This is therefore a secondary study.

Secondary research is advantageous in that it is cost effective and saves a great deal of time. Through secondary resources, data is mostly readily available. The researcher, of course, must be selective in sourcing reliable information, to ensure that the study is valid. Data based on secondary analysis can also serve as a benchmark to compare with other primary studies.

In terms of different research methods, qualitative research allows the researcher to explore and understand the reasons and motivations of quantitative research, whereas quantitative research, as the term implies, relies largely on numeric data or any data that may easily be transformed into statistics. In this case, the researcher used qualitative research.

According to Kelle (2006), the use of methods should at best be influenced by reasonable and relevant research questions, and “not just by methodology and epistemological considerations” (Kelle 2006. Sometimes researchers may find it suitable to combine methods of research. All of these methods have advantages, but for the purpose of this study, qualitative research was more suitable.

This study draws on existing examples from within the HE industry, and reinforces the problem statement by referring to available statistical studies. The study is not limited to South Africa but extends to global trends. Responses and feedback are reiterated in various articles and papers, reinforcing reasons for retention or conversely, the loss of staff. Most of the study's research is qualitative, and while it does not profess to be an empirical study, it leans on empirical examples used by other researchers in their primary studies. Shriberg's study (2002:4) confines itself largely to practical issues derived from relevant literature at campus level, such as staff satisfaction, recruitment and characteristics of typical academic staff at a higher education institution. However, based on the preferred research method secondary research), the issue of research design and sampling does not apply (the study is not empirical).

Organisational decision-making comes into play in the following section, where we will discuss the recruitment process of one particular HE institution as typical of similar colleges in the private sector in South Africa. As previously stated, this research has included both international and local (South African) research and examples in order to provide a balance for the study. The following section discusses the findings of the study and includes factors that give rise to retention in HE.

7. Discussion

The discussion will focus on the recruitment process, characteristics of academic staff in HE, factors that influence recruitment, factors that influence the retention of staff, factors that influence satisfaction, and factors that create dissatisfaction or inform decisions to leave HE. It also focuses on issues such as lecturer evaluation as a cause of dissatisfaction, the need for a business model, and the focus on profit rather than on the satisfaction of employees.

7.1 Recruitment

In recruiting staff in the HE sector, new graduates and experienced people from both high- and lower-level jobs in other industries are selected. According to Metcalfe, Rolfe, Stevens, and Weale (2001:19), people from high-level jobs in business gain entry into higher education at later stages in their career. These recruits are then integrated into the industry. People at lower positions and varying stages of their careers, however, are also integrated into HE.

Another factor that influences recruitment is age, as previous skills would impact the industry´s tendency to hire. Whereas new recruits were limited mainly to fixed-term contracts, older and more skilled candidates tend to have permanent contracts. The Metcalfe et al. (2001:18) study did indicate, however, that there is an increasing (current) tendency to offer fixed-term research contracts.

A hypothetical example is one of the Damelin campuses, a private college with about 17 national (South African) campuses, owned by the Educor group. This college offers both Further Education (FET) and higher education diplomas. We spoke to the general manager (GM) of one of the campuses and studied the recruitment policy of the institution.

As confirmed by the GM, in relation to the higher education qualifications of recruits for private colleges, HR and management would go through the recruitment process as follows: the national office would be notified of a need for academic staff within the campus; the position would be advertised and a recruitment agency would be contacted; candidates would be interviewed and shortlisted; a suitable candidate with a 'one up' qualification would be selected; this candidate would typically be called for a second interview; and the candidate would have to demonstrate practical skills in lecturing. Once appointed, the new academic would go through an induction process over a protracted period. The process may differ or vary from campus to campus, and from institution to institution.

7.2 Characteristics of Academic Staff in Higher Education

The characteristics of staff in HE include, but are not limited to qualifications, skills, and experience. In terms of age, previous skills are taken into consideration. It is logical to assume that older applicants would be more skilled and have more experience, and that this may impact the industry´s tendency to hire them. There is also the issue of the quality of the applicants. Based on my research for this paper, it was noted that in this respect, applicants tended to have a lack of experience and inadequate research records. Metcalfe et al. (2002:39) suggest that it was competence, rather than number, that created a problem in recruitment of academics. Based on the latter, the question of quality relates to the experience and research records of applicants. It is this question of competence (or quality) rather than of the quantity of

applicants, that Metcalfe et al. (2002) suggest creates a problem in the recruitment of academics.

Interestingly, Shriberg (2002:3) focuses more on the lack of structure than individual reasons (for leaving the industry) such as age and rate of pay. His analysis of the problems in the retention of academic staff reflects a lack of systematic guidance for campus sustainability. This lack of leadership differs from institution to institution, but the overall impression is that a strong framework is required to sustain academic growth and nurture the industry. While most universities are government funded, private institutions are 'for profit' organisations and are economically and financially sustained by an income of school fees. In relation to private HE institutions, when positioning their institutions strategically, it is the financial rather than the academic viability that comes to the forefront.

7.3 Factors that Influence Recruitment

In order to select and recruit the right candidate for placement in HE, recruitment and human resources (HR) personnel would typically look for candidates who match the needs of the various faculties - more specifically, graduates, academics and candidates with a passion for research. (Entry to HE is not limited to graduates but extends to other industries as well).
Besides the standard checks and balances that are typical of all HR departments, in HE the candidate would need to be aligned to academic pursuit when applying for a position. According to Metcalfe et al. (2001:18), vacancies sometimes remain unfilled due to the quality of applicants. These vacancies varied according to faculty and subject, and also over a period of time.

7.4 Retention of Staff

In terms of the retention and recruitment of staff, Shriberg (2002:39) factors in the issue of what he refers to as "enlightened self-interest". He suggests that organisational leaders are not only guided by profit, but also by personal values. Considering this, leaders should be analysed not only as drivers of the organisation, but by their personal values. Shriberg (2002), referring to Riordan (1997:3), states that factors that influence these leaders and employees include not only organisational culture, but also their own sense of self. Therefore, it follows that when an

employee´s personal environmental image is different from that of the existing, prominent organisational culture, conflict will arise. Not only will this influence employee satisfaction, but also the organisation´s ability to retain such an employee.

Shriberg (2002:40) referred to organisational factors as environmental factors. Environmental concerns, which would essentially influence the organisation´s stakeholders, should be addressed in order to ensure retention. Shriberg further states that these primary stakeholders include, but are not limited to customers/clients and stakeholders such as suppliers. In higher education, this relates to students, lecturers, assessment officers, the Council for Higher Education (CHE) (in South Africa), potential students, lecturers, payers, suppliers and sponsors, administration staff, and so on.

Interestingly, studies reflect that training pays a key role in workforce retention. However, leaders and heads of departments should acquire the necessary skills and training so that they, in turn, may develop staff (Metcalfe et al., 2002:26). The perception noted by Metcalfe et al. (2002:26), is that academic staff are responsible for their own training and development. However, it must be noted that training opportunities differ from institution to institution. There is a need for management training and awareness for this need exists in HE institutions, as staff development has become a core issue. In Metcalfe et al.´s study (2001), there had been an alarming decrease in retention and recruitment since 1998, with figures differing from institution to institution. Affected subjects included IT, finance, law and economics, as well as medical faculties.

7.5 Factors that Influence Satisfaction

There are many factors in academia that would fuel satisfaction. One of them is remuneration. Metcalfe et al. (2001:18) maintains that this is an important factor in job and career choice. The latter study compared the remuneration of academics in the United Kingdom (UK) with that of qualified employees in other industries and found that remuneration for academics was comparatively low. This factor may impact the number of entries into the industry, as well as the industry´s ability to retain qualified academics. As a result, academics may tend to leave the industry for better remuneration.

Another factor that influences recruitment is age, as previous skills would impact the industry´s tendency to hire. Whereas new recruits were limited mainly to fixed-term contracts, older and more skilled candidates tend to have permanent contracts. The Metcalfe et al. (2002:18) study did indicate, however, that there is an increasing (current) tendency to offer fixed-term research contracts.

7.6 Factors that Affect Dissatisfaction or Inform Decisions to Leave

According to Metcalfe et al. (2005:21), academics in HE institutions typically leave based on their dissatisfaction with any of the following:

- The work component
- Relations with colleagues
- Lack of equal opportunity
- Relations with immediate superiors and managers
- Physical work conditions
- No freedom to act on own initiative
- Being on a non-permanent contract
- Excessive workload
- No opportunity or time for research
- Lack of competitive remuneration
- Lack of opportunities for promotion

7.7 Inadequate Equal Opportunity

Discrimination has been a bone of contention for many decades and is not limited to race. While employers strive to ensure that employment equity is maintained, there are still instances of gender and age discrimination. In HE, age has traditionally not been an issue, and there are many senior researchers, but in selective faculties, there may still be gender discrimination. For example, female employees at South African universities often find that they are being overlooked and replaced by their male counterparts and seldom progress past the level of senior lecturer. By way of example, Moodie (2010:3) maintains that female academics are still taking a backseat to male colleagues at South African universities, especially at senior level. Moodie

(2010:3) believes there are still persistent patriarchal attitudes. In addition, female academics still bear the brunt of the effects of apartheid (with gender bias) and childbearing responsibilities become a major challenge for them. Moodie's study was published in 2010, and at the time of its writing it was found that there had not been much improvement over the preceding decade.

According to Metcalfe et al. (2001:18), discrimination may exacerbate the recruitment and retention difficulties among discriminated groups. This suggests that any disparity in the selection process should be addressed. Whereas previously there was a difference in pay among ethnic minorities, this was no longer the norm (Metcalfe et al. 2001). The latter's study reflected, however, that internal academic staff still saw differentiation and discrimination based on factors such as religion and gender. Although statistically there were changes, the staff's perceptions regarding discrimination in the workplace were still negative.

7.8 Physical Work Conditions

Civil unrest caused havoc in South Africa's Higher Education industry from 2015 to 2016 during the Fees Must Fall campaigns. According to Booysen, Godsell, Chikane, Mpofu-Wals, Ntshingila and Lepere (2010), the Fees Must Fall student protest began in October 2015. It was essentially an uprising against a lack of access to, and financial exclusion from, Higher Education in South Africa. During this period of unrest, while students were protesting against the rising costs of education, many buildings at universities were burnt down. Physically, there was disruption at many campuses, and there was also the threat of violence. There was also a threat of an exodus of academic staff, although management could hardly be blamed for these adverse physical conditions. Academics' work may also be classed as physical, in situations where they may be standing for long periods during lectures, or where they may have an excessive workload etc. According to Clarke, Kenny and Lockley (2015), who did a case study for an Irish country report, "almost three quarters of their respondents (of which the total was 12000) felt that their working conditions were deteriorating." The study was done to show the significance of supportive working conditions.

7.9 Excessive Workload

At both colleges and universities, work is not limited to teaching. According to Houston, Meyer, and Paewai (2006:17), academic staff have to work in a demanding environment, while doing complex work. Due to increased workloads and more and more accountability, stress levels and dissatisfaction increase and the balance between research and teaching loads becomes a challenge (Houston et al. 2006:17). According to a study done by Barkhuizen, Rothmann, and van de Vijver (2014) on academics in Higher Education Institutions, results confirmed that job demands, and a lack of job resources contributed to burnout. It is this burnout and excessive workloads that trigger dissatisfaction in academics and may act as a catalyst for their resignation.

7.10 Lecturer Evaluations

Student evaluations of lecturers are typically done towards the end of a school term at universities and colleges. This is done as a quality assurance measure. The idea is to evaluate teaching performance. According to Kuzmanovic, Savic, Popovic, and Martic (2012), these evaluations are controversial, mainly due to fact that students value aspects of excellent teaching differently. Every student has a different perception of what constitutes good teaching. In the case of negative evaluations, this may give rise to dissatisfaction on the part of the academic. Some students may perceive the academic's methods and quality of teaching as being good, while part of the same group may not. This is determined by the students' preferences, which may not be a sound ground for the assessment of teaching.

It is noted that Lindse (2017), suggests that administrators and reviewers may experience discomfort with making life-altering decisions about other faculty based on student ratings data, and therefore the criteria lecturer evaluations should be subjected to strict scrutiny.

In a study on the misinterpretation and misuse of student ratings data, Linse (2017) argues that when student ratings are used in personnel decisions, it is important that they be used appropriately and in ways consistent with the recommendations of specialists in student ratings research. Student evaluations have become an integral part of quality assurance, and if not done

correctly, may result in incorrect data. Therefore administrators and academic support staff should ensure that all data is reliable.

8. Findings

As a secondary study, this paper has relied on current and past scholarly articles to address the research questions and problem statement. In addition, as stated in Section 5, the paper identifies potential gaps in existing data. The research problem, namely to identify the factors that may ensure the retention of staff in HE, is specific to the study of reasons why staff would leave HE. The paper has shown appropriate examples of why HE staff and academics tend to be dissatisfied. For example, Section 7.6 outlined some of the challenges that face staff in institutions of HE, such as excessive workload and burnout. By referring to literature available on the process of recruitment, as well as the characteristics of staff at HE institutions, the researcher was able to address the research objective/s, namely factors that ensure the retention of staff in HE.

9. Conclusion and Recommendations

In response to the core research problem, namely to identify what factors would ensure the retention of staff in higher education, the study outlined reasons for dissatisfaction among HE academics. In Section 7, this paper touched on the various factors that influence staff retention in HE - a core question based on the research problem. These factors included, but were not limited to lecturer evaluations, a lack of equal opportunity, and excessive workloads. In response to our research question of whether there are there sufficient systems to ensure retention, our study has shown that a great deal of work must be done to ensure retention. Logically, the causes of dissatisfaction must be addressed to retain staff.

The study has aimed to reflect prevalent factors that may influence retention and recruitment. These factors include age, gender and employee dissatisfaction based on issues such as remuneration, excessive workloads and non-permanent contracts. Based on the researcher's perusal of existing literature, as discussed in Section 7.10, one of the factors that may have an impact on academics (and staff) exiting HE is dissatisfaction stemming from students' evaluation of lecturers. It is recommended that the workloads of academic and other staff

should be assessed and addressed, as this would engage with a further discussed cause of dissatisfaction.

To reiterate, in a study by Brewer and Clippard (2002), factors such as emotional exhaustion were used to assess job satisfaction using the Maslach Burnout Inventory. Other factors measured on the Job Satisfaction Scale (JSS) included salary and promotion. The latter factors were mentioned in Section 7. It is significant to our study that Brewer and Clippard (2002), found a significant negative relationship between emotional exhaustion and total job satisfaction. However, it is not clear whether enough effort is done by HE institutions to address these challenges.

Based on our previous discussions throughout the paper, job dissatisfaction may be linked to factors that include those in our discussion (such as burnout, excessive workloads and remuneration) and may be said to be justifiable in regard to the examples of analysis done in this regard, including that by Brewer and Clippard (2002).

As discussed in the introduction to this paper, employee retention is a critical issue in any workforce. Therefore, although this study has focused on higher education, it extends to other industries. Sinha and Sinha (2012:1) believe organisations should adapt their behaviour to the current realities of the work environment. In other words, as economic uncertainties prevail globally, attitudes should be adjusted and the workforce that remains should be sustained.

It is encouraging that some research has been (and will continue to be) done in the field of academic retention in higher education. Suggestions that a lack of structure may be fuelling the issue of retention and recruitment would resonate with many academics (Shriberg, 2002:3). As the industry has gone through many changes, it is expected that a framework has to be revised and implemented in order to ensure sustainability. This implies that there should be collaboration on the part of stakeholders (HE managers) in order to ensure consistency in the industry. Industry leader support is necessary and strong training and strategic plans should be enforced. Issues emanating from employee dissatisfaction should be analysed and addressed. In this way, we would be able to ensure the healthy pursuit of the higher education sector.

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CLASSIFYING SEARCH RESULTS USING NEURAL NETWORKS AND ANOMALY DETECTION

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Searching for something on the internet may not always yield relevant results due to the inability of current search engines to distinguish non-advertisement from advertisement. The purpose of this research was to detect and classify search results from search engines involving advertising or shop sales, so that they may be ignored. Artificial neural networks make use of multiple layers of nodes, receiving search result input at one end, transforming the features, and then outputting a hypothesis at the other end of whether the search result is an advertisement or not. In contrast, anomaly detection algorithms attempt to separate data into normal (non-advertisement) and anomalous (advertisement) data based on a specific parameter value. The problem being solved in this research was search results classification using machine learning algorithms (supervised learning). A manual method was implemented to collect 1GB of search results from the internet and process features, extract common words from results that were similar to advertisements, and then train algorithms to look for these features. The results from this experiment showed that both types of algorithms classified the data well. Both types of algorithms are thus viable for use in this scenario and can be implemented in tandem.

Keywords: *Euclidean distance, pattern recognition, supervised learning, unsupervised learning, Jaccard distance, Gaussian distribution, cosine distance, optimal separation parameters*

1. Introduction

Computer Science is no more about computers than astronomy is about telescopes.

- Edsger Wybe Dijkstra

The size of the World Wide Web has grown exponentially over the past few years. The number of webpages and the amount of content available is unimaginably large. There are thus a wide range of disciplines for which information can be found. These may include online shopping, entertainment, sport, cooking, politics and more. In order to access this information, a system is needed to scan through all available websites and pick out the relevant sites that the person browsing the internet is interested in. The most common systems used for this purpose in current times are search engines. Examples of these include Google, by far the most popular, as well as Bing and Yahoo (Lella 2015).

Searches are based on keywords that the user enters into the search box. For example, entering the word *tennis* would prompt the search engine to return web pages that are related to tennis in some way, and discount any other unrelated pages. However, it is not always possible to convey a person's exact needs through a set number of keywords. In addition, the results obtained by a search algorithm may not be optimal. For example, if a person wanted information, videos, or statistics about tennis, entering only the word *tennis* may also return other types of results, such as tennis equipment shops. Refining this search to a phrase such as *tennis news* may eliminate a number of unrelated pages, but it is still not likely to give completely perfect results. A few pages related to tennis shops, for example, may have been included in the search results.

2. Rationale of the Research

It may therefore be useful to classify each search result that the user obtains in order to determine whether it is relevant or not, which may therefore allow for the result to be removed. This research focused on results related to purchasing and online shopping as being unwanted. The aim of the research was to develop a classification system that would consider a large amount of search data and classify each result as being wanted or unwanted. For this purpose, both a neural network and anomaly detection algorithms were tested on the data to evaluate

their suitability for this task, and if they were suitable, to test which algorithm classified the data most correctly. The methods with which these algorithms were implemented are discussed further in the upcoming Section 7.

3. Research Statement

The successful implementation of artificial neural networks and anomaly detection algorithms required several factors to be considered, as well as a significant amount of data collection. It is thus useful to look at the research as a whole. The following main research question was posed to provide a clear focus and direction for conducting this study.

3.1 Research Aim and Objectives

As stated in Section 2, the aim of this research was to collect search results from the internet and classify them. The classification process relied on selected algorithms that were implemented. Artificial neural networks and anomaly detection were used for training and testing the features extracted from the search results. An attempt was made to classify advertisements from non-advertisements so that they might be ignored by the search engine.

3.2 Main Objectives

The main objective of this study was to investigate the impact of dataset size on the performance of selected algorithms. It is argued that the study provides valuable information for the development of search engine framework capable of removing advertisements from the internet.

3.3 Sub-objectives

- To determine the correlation between artificial neural networks and anomaly detection algorithms in terms of classification.
- To determine the factors that affect the performance of the selected algorithms in terms of classification.

4. Research Question

What are the factors influencing the implementation and performance of artificial neural networks and anomaly detection algorithms for search results classification?

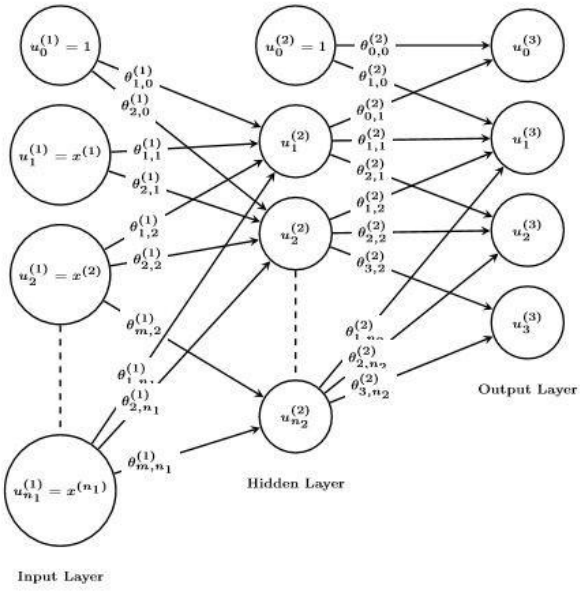
4.1 Sub-questions

- What is the relationship between artificial neural networks and anomaly detection algorithms in terms of categorising the textual dataset?
- What are the factors that affect the performance of the selected algorithms in terms of classifying the textual dataset?

5. Underpinning Theory: Neural Networks and Anomaly Detection Algorithms

The two methods of classification, namely neural networks and anomaly detection, are discussed here. Neural networks are generally regarded as being a major segment of the supervised learning discipline. As with all types of classification in supervised learning, the goal of a neural network is to utilise labelled data in order to train the network to be able to classify any new instances of data that may come in as either being expected or unexpected (Silverman, 2018). This labelled data consists of a vector *X*, corresponding to the various features of a particular object or environment and their values. A vector *Y* is also included, which, in a binary classification problem, classifies each observation as either normal or abnormal, based on the values of the vector *X* at that position (Silverman, 2018). According to Silverman (2018), an example of such a problem would be in banknote classification, where genuine and counterfeit banknotes would be classified differently in the *Y* vector, with different combinations of the features in the *X* vector. After learning a parameter vector, *W*, that multiplies with *X* to minimise the error of classification with already-labelled data, the program would then be able to create labels for new data, and thus determine whether new instances of banknotes are fraudulent or genuine. Neural networks generally have the following structure, as shown in Figure 1.

Figure 1: Structure of a 3-layered Neural Network



Features are input to the system as a layer of nodes. In order to deal with non-linear relationships between the data, the values obtained in the input layer of nodes are then converted using a set of parameters into a new set of features, known as the hidden layer (Jordan and Mitchell, 2015). Jordan and Mitchell (2015) emphasise that this process can be repeated for a number of hidden layers, however, networks with one or two hidden layers are most commonly used for their lower computation times. Finally, at the end of the hidden layers, the features are once again converted into a final output value, which classifies the observation as being either normal or anomalous. On the first run through of this algorithm, randomised parameters are used, which are unlikely to give accurate results (Silverman, 2018). Thus, through a process known as back-propagation, labelled training data can be used to iteratively update each set of parameters, until the algorithm has a reliable set in order to make accurate classifications. To update the parameters, a cost function is developed, which is based on the mean error of the observation in relation to the current classification function (Jordan and Mitchell, 2015). Hence, the algorithm is progressively updated until it is deemed to be suitable to tackle any new data of the same nature given to it. The value of the cost function eventually converges to a minimum, which is when the learning process will be complete.

Neural networks have been used in multiple forms of classification in the literature, some dealing with internet-related avenues. One approach, in a paper by Clark, Koprinska and Poon (2003), deals with the classification of email messages as spam or non-spam. In their research, words from a collection of emails were selected and the most significant words for classification were chosen based on the amount of information gained from each word. The emails and words are then used as a dataset and run through neural network architecture. Learning with this network was stopped when the algorithm started to perform well in classification based on testing data (Clark et al., 2003).

The accuracy of classification was based on the number of emails correctly and incorrectly classified. Clark et al. (2003) found that the algorithm performed sufficiently well and was able to classify a large majority of the emails correctly. By contrast, anomaly detection methods deal with the mapping of input features under a Gaussian distribution. Initially, a dataset that is known to contain *normal* observations is used, with covariances being computed for its various features and their relationships. These covariances give rise to the ranges that the values of the features can lie in in order to determine whether future observations are *normal* or *abnormal* (Chandola, Banerjee, and Kumar, 2009).

Once these parameters have been obtained, the probabilities that each subsequent feature portrays in relation to the distribution can be calculated. In a paper by Chandola et al. (2009), the authors specified that this process can be run several times in order to find the optimal separation parameter, so that classification accuracy is maximal. This can potentially be done with an already-labelled anomalous dataset, as is the case in neural networks, making this problem similar to supervised learning. Thus, the input features chosen should have values separated adequately in order to be able to classify correctly in a large number of cases (Chandola et al., 2009). Another machine learning approach was carried out by Kushmerick (1999). Their work involved the creation of a program that removes banner advertisements on web pages. The proposed system looks at the HTML source of the web pages, paying specific attention to the images that link to other web pages. The specific elements of these sections of code, such as the domains of the current page and the page linked to, as well as combinations of keywords in the image descriptions are utilised as features (Kushmerick, 1999). The C4.5 algorithm is applied to these features in order to locate advertising images. The program then

removes these images as the page is loaded. Kushmerick (1999) reports accuracy levels of over 90% using this approach, thus highlighting its effectiveness.

6. Literature Review

6.1 Web Page Classification

Web pages classification plays a crucial role in data mining and data science. The immeasurable amount of data found on the internet makes it possible to develop and implement robust systems capable of categorizing web pages in real time. We can define web pages classification as being a mechanism that categorizes websites or web pages. This classification is taking into consideration characteristics of labelled data used in the training stage (Onan, 2016). According to Onan (2016), web pages classification could also be utilized in terms of data extraction. This classification process could also be used in web browsing, web link analysis, and contextual advertising. Techniques used in machine learning and data mining have been implemented and applied in the context of web mining, including the classification of web pages (Onan, 2016).

Nowadays, multiple classifiers called 'ensemble learning' are used in machine learning. This type of classification juxtaposes more than one classifier to produce sophisticated classification models. Onan (2016) presents a comparative analysis of four different feature selections (correlation, consistency, information gain, and chi-square-based feature selection) and four different ensemble learning methods (Boosting, Bagging, Dagging and Random Subspace) based on four different algorithms (naive Bayes algorithms, K-nearest neighbor algorithm, C4.5 algorithms, and the FURIA algorithm). The research compares the prediction performance of web pages classification performed by algorithms. The results are surprising, they reveal that ensemble learning can improve predictive performance in web pages classification. Onan (2016) also used a dataset named 'DMOZ – 50', and the predictive performance on this type of dataset is (88.1%). This performance was obtained by juxtaposing AdaBoost and naive Bayes algorithms. This research also reveals that algorithmic juxtaposition is crucial in Web pages classification and data science. The paper endorses the view that ensemble learning achieves sufficient results in terms of accuracy rate.

6.2 Automatic Data Mining and Classification

The major problem of many online websites is the presentation of many choices to the client at a time; this usually results in the strenuous and time-consuming task of finding the right product or information on the site (Adeniyi, Wei, and Yongquan, 2016). Adeniyi et al. (2016) presented a study of automatic web usage data mining and recommendation system based on current user behaviour through his/her clickstream data on the newly developed Really Simple Syndication (RSS) reader website, in order to provide relevant information to the individual without explicitly asking for it. The K-Nearest-Neighbor (KNN) classification method has been trained to be used online and in real-time to identify clients/visitors click stream data, match it to a particular user group, and recommend a tailored browsing option that meet the needs of the specific user at a particular time. To achieve this, the web user's RSS address file was extracted, cleansed, formatted, and classified into meaningful session and data mart was developed. Their result shows that the K-Nearest-Neighbor classifier is transparent, consistent, straightforward, and simple to understand. It has a high tendency of possessing desirable qualities and is easier to implement than most other machine learning techniques, specifically when there is little or no prior knowledge about data distribution.

7. Approach to Classification Algorithms

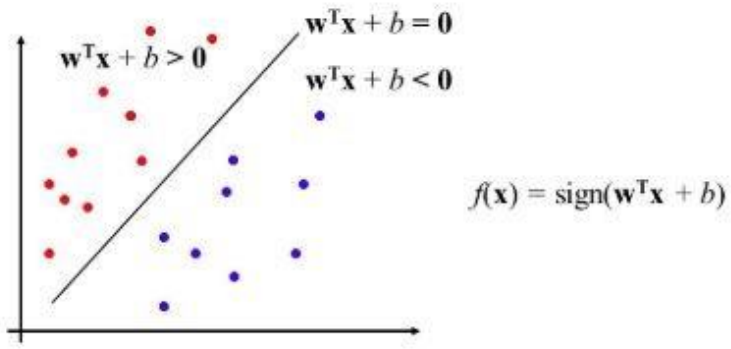
7.1 The Classification Strategy

The selected classification algorithms use a set of features or parameters to characterise each observation (textual data), where these features should be relevant to the task at hand (search results classification). We consider here methods for supervised classification (meaning it is determined into what classes an observation may be categorised) and also provided a set of sample objects with known classes (Steels and Brooks, 2018).

Steels and Brooks (2018) state that this set of known observation is called the *training* set because it is used by the classification programs to learn how to classify observation. There are two phases to constructing a classifier. In the training phase, the training set is used to decide how the parameters ought to be weighted and combined in order to separate the various classes of observations. In the application phase, the weights determined in the training set are applied to a set of objects that do not have known classes in order to determine what their classes are

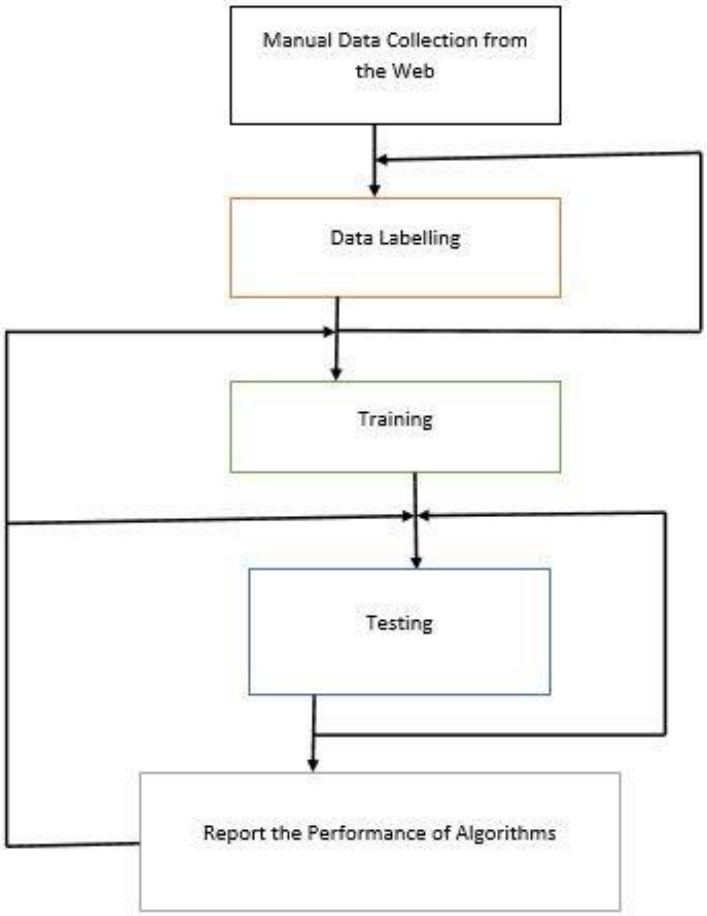
likely to be. If a problem has only a few (two or three) important parameters, then classification is usually an easy problem (Steels and Brooks, 2018). For example, with two parameters, one can often simply make a *scatter-plot* of the feature values and determine graphically how to divide the plane into homogeneous regions where the objects are of the same classes (Figure 2).

Figure 2: Sample Classification Problem with Only Two Features



The classification is however complicated when the algorithm takes into account several parameters. In this case it is very difficult to visualize the data (Steels and Brooks, 2018). The following figure (Figure 3) mimics our research methodology.

Figure 3: Research Methodology



7.2 Quality Appraisal of Dataset

For the creation of the dataset used in this research, text was taken from the search results of a wide variety of search terms and keywords. As the project is looking at classifying search results as advertising product sales or not, search results were generated based on phrases that were either likely or unlikely to generate product sales results. For example, *normal* data may have been obtained simply by searching for *laptops*, while data classified as *anomalous* was obtained when searching for *buy laptops*. Each returned hyperlink, as well as its description in the search results, was placed in the dataset as a single observation (Silverman, 2018). Each observation was separated by a string of % symbols, indicating to the program when to stop reading a particular observation. In order to detect anomalous (advertising) results, the

approach was to generate a list of common words found within the anomalous results. Figure 4 below shows a representation of this.

Figure 4: Common Words in a Search Result About Product Sales

The entire dataset was broken down into individual words using *Python code*, with the most commonly appearing words being identified and recorded. The particular number of common words chosen can be increased or decreased depending on the size of the dataset, or if the results generated are not accurate enough. The logic behind this is that if an observation is to be recorded as anomalous, it should contain at least some of the words commonly associated with the past anomalous observations examined. After building this list of words, training and testing datasets were then built from the obtained data.

A *multidimensional array* was built for the dataset, utilising the previously obtained common words as features, and each record in the dataset as a separate row in the array. By reading the text file containing the observations, each observation was read in one-by-one, using the % tags to separate each observation (Figure 5).

Figure 5: A Sample of the Textual Dataset Used in this Research

```
Dell Inc.: NASDAQ:DELL quotes & news - Google...
www.google.com/finance?cid=153088
Dell Inc. (Dell) is a global information technology company. It is a holding company that
conducts its business worldwide through its subsidiaries.
%%%
Dell - Wikipedia, the free encyclopedia
en.wikipedia.org/wiki/Dell
Dell Inc. is an American privately owned multinational computer technology company based in Round
Rock, Texas, United States, that develops, sells, repairs ...
%%%
Dell Outlet (@DellOutlet) | Twitter
twitter.com/delloutlet
9,212 tweets • 1,328 photos/videos • 1.4M followers. "Take 45% off Dell Outlet Inspiron Desktops
overstock with coupon code sm45%INSPDesktop. https://t.co ...
%%%
Dell - Facebook
www.facebook.com/Dell
Dell. 9,076,532 likes · 3,407 talking about this · 5,760 were here. Since 1984, we've been
delivering technology to fit your life. "Like" our page and...
%%%
Official Apple Support
support.apple.com
Apple support is here to help. Learn more about popular topics and find resources that will help
you with all of your Apple products.
%%%
Apple - The latest on Apple - CNET
www.cnet.com/apple
Check out the latest Apple news on CNET, featuring developments on the iPhone, iPad, Macbooks, OS
X and much more.
%%%
Apple - Wikipedia, the free encyclopedia
en.wikipedia.org/wiki/Apple
The apple tree (Malus domestica) is a deciduous tree in the rose family best known for its sweet,
pomaceous fruit, the apple. It is cultivated worldwide as ...
%%%
Apple - Jobs at Apple
jobs.apple.com
The people here at Apple don't just create products — they create the kind of wonder that's
revolutionized entire industries. It's the diversity of those ...
%%%
Apple on the Forbes Global 2000 List
www.forbes.com/companies/apple
Apple, Inc. engages in the design, manufacture, and marketing of mobile communication, media
devices, personal computers, and portable digital music players.
```

Each record was then compared, word-by-word, to the list of common words generated previously. If any of the words in the observation matched with a common word, this was recorded in the multidimensional dataset array by incrementing the corresponding value in the array. Entire datasets for both normal and anomalous data were read in using this method, with a corresponding targets array being labelled 0 or 1, depending on which dataset was currently being read (Figure 6).

Figure 6: An Example of the Code Used

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as pl
import matplotlib.cm as cm
from projutils_ML import *

targets = {'normal': 0,
           'advert': 1}


def norm_data(data_original):
    data = data_original.copy()
    mean_data = np.mean(data, axis=0)
    std_data = np.std(data, axis=0)
    std_data = std_data + 1e-16
    data = data - mean_data
    data = data / std_data
    return data, mean_data, std_data

def dist_parameters(data):
    rows, cols = data.shape
    mean_vector = np.zeros((cols, 1))
    for i in np.arange(0, rows):
        mean_vector = mean_vector + np.reshape(data[i,:], (cols,1))
    mean_vector = mean_vector / rows

    cov_matrix = np.zeros((cols, cols))
    for i in np.arange(0,rows):
        d = (np.reshape(data[i,:], (cols,1)) - mean_vector) #minus the
mean of each of the features from each of the features of one sample
        cov_matrix = cov_matrix + d.dot(d.T)
    cov_matrix = cov_matrix / (rows-1)

    return mean_vector, cov_matrix
```

The finalised array was then split into a training and a testing dataset for the purposes of the neural network method. The code for the following sections was adapted and modified from the samples given out during a machine learning course at the University of the Witwatersrand, Johannesburg (Celik, 2016). This particular system uses a four-layer total network (with two hidden layers), so three sets of random weights were first generated for the transitions between each layer. *Forward-propagation* is first applied to the network using the following activation function where *W* is the weight vector and *x* is the value of the input for that node (Steels and Brooks, 2018):

$$h(x) = \frac{1}{1 + \epsilon^{-(W_x^T)}} \tag{1}$$

As a result, hypotheses are generated for each node in the hidden layers (to be used as features for the next layer) as well as a hypothesis for the output in the final layer. *Back-propagation* was then applied to update the weights between the output layer and the second hidden layer, the second hidden layer and the first hidden layer, and the first hidden layer and the input layer, respectively. As previously mentioned, this is done to improve hypothesis generation accuracy (Steels and Brooks, 2018). In this research, the neural network algorithm is implemented by propagating the activation function $g(S)$ values from the input layer to the output layer. In Equation 4, $u_i^{(t)}$ represents the activation value of i^{th} node of the t^{th} layer and in Equation 6, $g(S)$ represents the activation function. θ is a specific hypothesis function parameter with a numerical value.

$$u_0^{(t)} = 1, t \in [1, 2] \tag{2}$$

$$u_i^{(1)} = X^{(i)} \tag{3}$$

$$u_i^{(t)} = g(S_i^{(t)}), t \in [2, 3] \tag{4}$$

Where

$$S_i(t) = \mathrm{X}\, uj(t-1) * \theta_{j,i}(t-1) \tag{5}$$
$$j \in n(t-1)$$

And

$$g(S) = \frac{1}{1 + \epsilon^{-S}} \tag{6}$$

In the anomaly detection implementation, the dataset is first split according to whether the corresponding label for each observation was normal or anomalous (Chandola et al., 2009). Mean and covariance factors are obtained from a portion of the dataset only containing normal observations. Following this, the parameter with which to split the data into normal and anomalous was obtained by testing the previously obtained factors on a combined portion of the dataset with normal and anomalous labels. This test was done repeatedly, each time updating the parameter value until the optimal separation is found (Figure 7).

Figure 7: Anomaly Detection Code

```
# -*- IDE: Anaconda-Spyder-Python
"""
Created: Mar 21 16:11:32 2018

@author: Mike Nkongolo Wa Nkongolo

"""
import numpy as np
import pandas as pd
import sys
from collections import *


def create_datasets(training_ratio=0.50):

    #load data
    wordslist = []
    conj = ['and', 'or', 'at', '...', '%%%', 'the', 'for', 'to', 'but',
'your', 'of', 'is', 'a', 'in', 'you', 'with', 'on']
    symbols = '{}()[].,:;+-*/&|<>=~'
    with open('anomalousgoogle.txt') as f:
        content = f. readlines();
    for i in range(len(content)):
         wordslist.extend(content[i].split())
    j = 0
    while j < len(wordslist):
        if wordslist[j] in conj or wordslist[j] in symbols:
            del wordslist[j]
            continue
        j += 1

    mostcommon = Counter(wordslist).most_common(10)
    commonwords = []
    for k in range(len(mostcommon)):
        commonwords.append(mostcommon[k][0])
    print(mostcommon)
```

We applied Kamaruddin, Hamdan, Bakar and Nor (2009)'s approach. The method calculates the similarity rate within the Giyx and SGi text dataset via a dissimilarity parameter. The formula for calculating the dissimilarity rate is as follows:

$$D(G_{iyx}, SG_i) = \frac{n(G_{iyx} \cup SG_i) - n(G_{iyx} \cap SG_i)}{n(G_{iyx} \cup SG_i)} \quad (7)$$

According to Kamaruddin, Hamdan, Bakar and Nor (2009), Equation 7 indicates that the dissimilarity within the textual dataset is the ratio of the size of the G_{iyx},SG_i union, minus the size of their intersection to the size of their union. We based our dissimilarity function on the *Jaccard distance* (Kamaruddin et al., 2009). We do not have to change the sets into vectors to use *cosine distance* or change it into points to use *Euclidean distance*; instead, we represent sets as sets and employ the *Jaccard distance* measure. Using this dissimilarity function, the identical CG_s have a dissimilarity of 0. Completely dissimilar CG_s have a score of 1 in such a way that for G_{iyx}, the SG_i of any performance indicator *i* is:

$$D(G_{iyx},SG_i) = |1\ IF(G_{iyx} \cap SG_i) = \Psi| \quad (8)$$

$$0\ IF(G_{iyx} \cup SG_i) = |(G_{iyx} \cap SG_i)| \quad (9)$$

$$|0 > D < 1\ otherwise| \quad (10)$$

Once the dissimilarity scores *'D'* are calculated, the process is followed by a *threshold definition* (Kamaruddin et al., 2009).

7.3 Evaluating Artificial Neural Networks and Anomaly Detection

The efficiency of artificial neural networks and anomaly detection algorithms was calculated through experiments in the form of test data. We used different measures to assess the performance of the selected classifiers. The terms 'true' and 'false' show whether the classifier prediction or expectation corresponds to real observations or not, thus:

- True Positive (TP) is the number of advertisements observations that are predicted as adverts.
- False Positive (FP) is the number of non-advertisements observations that are predicted as advertisements.
- True Negative (TN) is the number of non-advertisements observations that are classified as non-advertisements.
- False Negative (FN) is the number of advertisements observations that are classified as non-advertisements.

For the artificial neural networks algorithm, we focused mainly on binary classification. In this case, *FN* and *FP* represents a misclassification. This can be seen in the following table (Table 1). Initially, we have a classification algorithm $f(x|\Psi)$. After training, the prediction of x (the input; y is the output) represents normal observations if $f(x|\psi) \geq \Theta$, at a certain level Θ. We suggest that $f(x|\Psi) \in [0,1]$ embodies a probabilistic space if x has a positive score; this implies that $P(+|x) \equiv f(x|\Psi)$. We say that x is abnormal if $f(x|\Psi) < \Theta$ and $P(-|x) \equiv 1 - f(x|\Psi)$. Then, based on the true label of x, we consider four cases in our confusion matrix. We also count the number of their occurrence: *TP*, *FN*, *FP*, and *TN*. For both algorithms, we mainly focused on the binary classification. In this case, the *FN* and *FP* represents a misclassification.

Table 1: Binary Confusion Matrix

		Predicted	
Actual		Normal (Actual)	Anomalous (Actual)
	Normal (Predicted)	TP	**FP**
	Anomalous (Predicted)	**FN**	TN

Our approach is purely supervising to the extent that the goal is to predict class labels for some input data (Silverman, 2018). Simultaneously, we must calculate the error produced by the function that supported the inputs and outputs. Thus, we have minimized the classification error (Onan, 2016). Finally, we implemented and derived the empirical error as follows:

$$Error = \frac{FP + FN}{FP + FN + TP + TN} \tag{11}$$

If the activation function 'g' is a differentiable function, the author would like to show how the 'gradient descent' method applied to the cost function:

$$J = \frac{1}{2N}\sum_{p=1}^{N}\sum_{j=1}^{c}(y_j^p - \hat{y}_j^p)^2, \tag{11.1}$$

may be used to obtain a 'batch-training-rule' for the weights of the network.

$$= \frac{1}{2N}\sum_{p=1}^{N}\sum_{j=1}^{c}(y_j^p - g(\sum_{i=1}^{d+1}\theta_{i,j} - x_i^{(p)}))^2$$

$$= \frac{\partial J}{\partial \theta_{i,j}} = \frac{1}{N}\sum_{p=1}^{N}\frac{\partial}{\partial \theta_{i,j}} g(\sum_{i=1}^{d+1}\theta_{i,j} - x_i^{(p)}(y_j^p - g(\sum_{i=1}^{d+1}\theta_{i,j} - x_i^{(p)})))$$

$$\theta_{i,j} := \theta_{i,j} - \alpha\frac{1}{N}\sum_{p=1}^{N}\frac{\partial}{\partial \theta_{i,j}} g(\sum_{i=1}^{d+1}\theta_{i,j} - x_i^{(p)}) - x_i^{(p)}(y_j^p - g(\sum_{i=1}^{d+1}\theta_{i,j} - x_i^{(p)})) \tag{11.2}$$

Artificial Neural Networks algorithm is given in figure 8:

Figure 8: Network Propagation

Algorithm 1 Artificial Neural Network (Network Propagation)

Require: Randomly Initialize Network Parameters ▷ $\Theta_{d,s}^{(l)} := \Theta_{d,s}^{(l)} - \alpha * \frac{\partial J(\Theta)}{\partial \Theta_{d,s}^{(l)}}$

1: **While** != Converged **Do**

2: ▷ Repeat Until Convergence $\Theta_j := \Theta_j - \alpha * \frac{1}{m} \sum_{i=1}^{m} (h\Theta(x^{(i)}) - y^{(i)}) x_j^{(i)}$

3: **foreach** Training Sample $h_{w,b}^{(x)}$ **Do**

4: Apply-Forward Propagation ▷ $W_1 * x_1 + W_n * x_n$

5: Update-Network-parameters-via-Back-Propagation

6: ▷ $E = \frac{1}{2N} * \sum_{i=1}^{N} ||(y(x) - \hat{y}(x))||^2$

7: **End foreach**

8: **End While**

If the activation function 'g' is the sigmoid function:

$$g(z) = \frac{1}{1+exp(-\gamma z)} \tag{11.3}$$

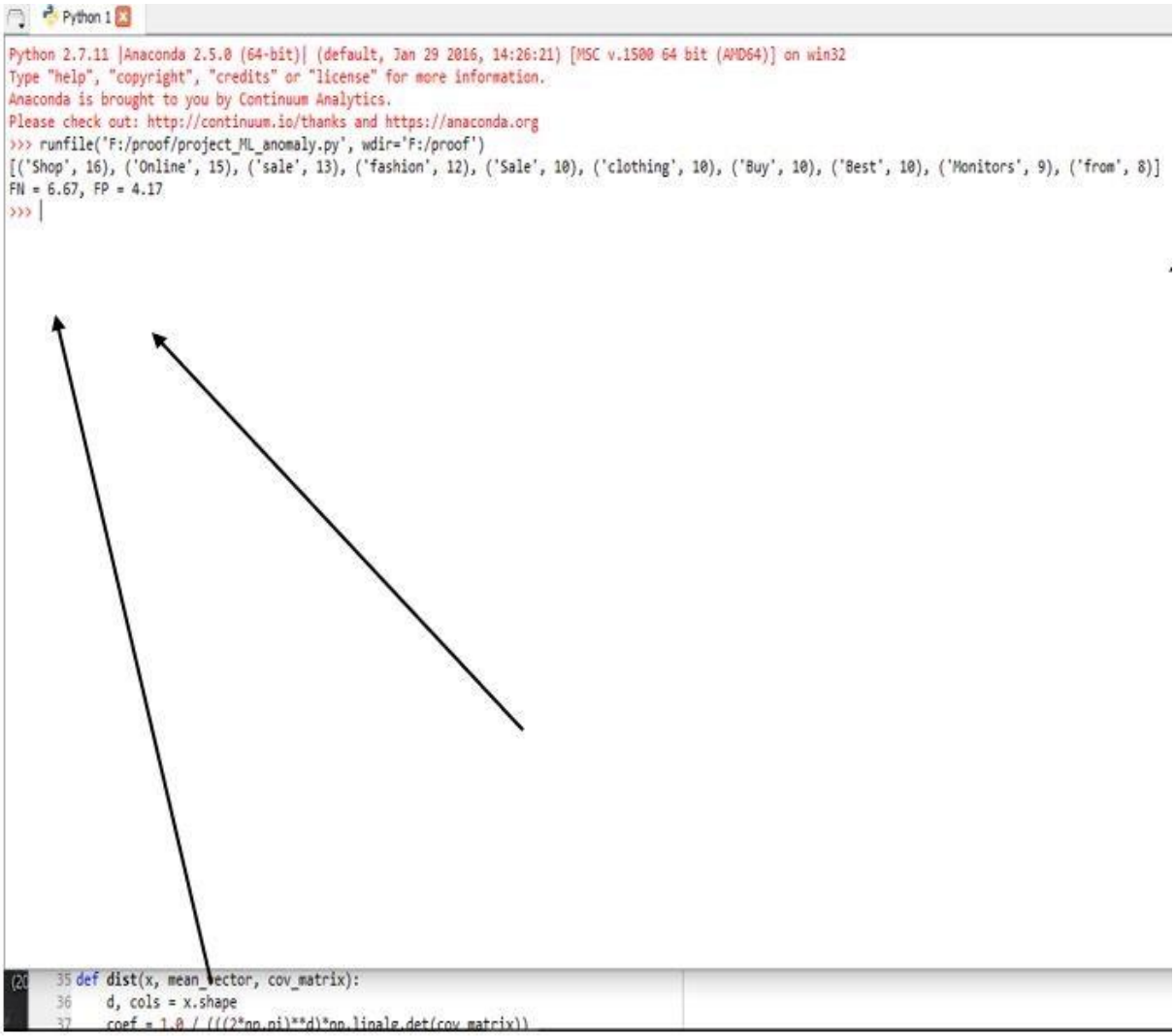
we can simplify the derivation:

$$\frac{\partial}{\partial z} \tag{11.4}$$

in the rule obtained in equation 11.2.

$$\begin{aligned}
\frac{\partial}{\partial z} g(z) = (-1)(1+exp(-\gamma z))^2(-\gamma\, exp(-\gamma z)) \\
&= \frac{\gamma\, exp\,(-\gamma z)}{1+exp(-\gamma z))^2} \\
&= \gamma \frac{1}{1+exp(-\gamma z)} \frac{exp(\gamma z)}{1+exp(-\gamma z)} \\
&= \gamma \frac{1}{1+exp(-\gamma z)} * (\frac{1+exp(-\gamma z)}{1+exp(-\gamma z)} - \frac{1}{1+exp(-\gamma z)} \\
&= \gamma\, g(z)(1-g(z))
\end{aligned} \tag{11.5}$$

Figure 9: Anomaly Detection Results



8. Results

The implementation created for the intake and *pre-processing* of the dataset was found to proceed quickly enough to get results in a reasonable amount of time. This was based on the current amount of data collected for the tests. Obviously, it is expected that the more data is added to the dataset, the longer the code will take to generate results. The neural networks implementation took slightly longer to arrive at results due to *back-propagation* having to be done repeatedly. The anomaly detection algorithm, when tested on the basis of true positives, true negatives, false positives, and false negatives, was found to produce approximately 6.67% false positives and 4.17% false negatives. This is shown in Table 2.

Table 2: Evaluation Metrics for Anomaly Detection (Derived from Figure 8)

False Negative (FN)	**False Positive (FP)**
6.7	4.17

In terms of the neural network, the confusion matrix is given in Table 3. Figure 9 depicts how artificial neural networks produce the confusion matrix.

Table 3: Confusion Matrix for Neural Networks (Derived from Figure 9)

		Predicted
	Normal (Actual)	Advert (Actual)
Normal (Predicted)	31	**7**
Advert (Predicted)	**9**	100

As we can see from the confusion matrix (Table 3), there were 31 samples that were classified correctly as normal and 100 samples classified correctly as anomalous. In contrast, there were 16 samples (9 + 7 = 16) in total that were incorrectly classified. The graph in Figure 10 shows the value of the cost function decreasing with the number of iterations. It can be seen that the cost function reaches a minimum, thus showing that the algorithm was able to converge correctly.

Figure 9: Code Simulation - ANN

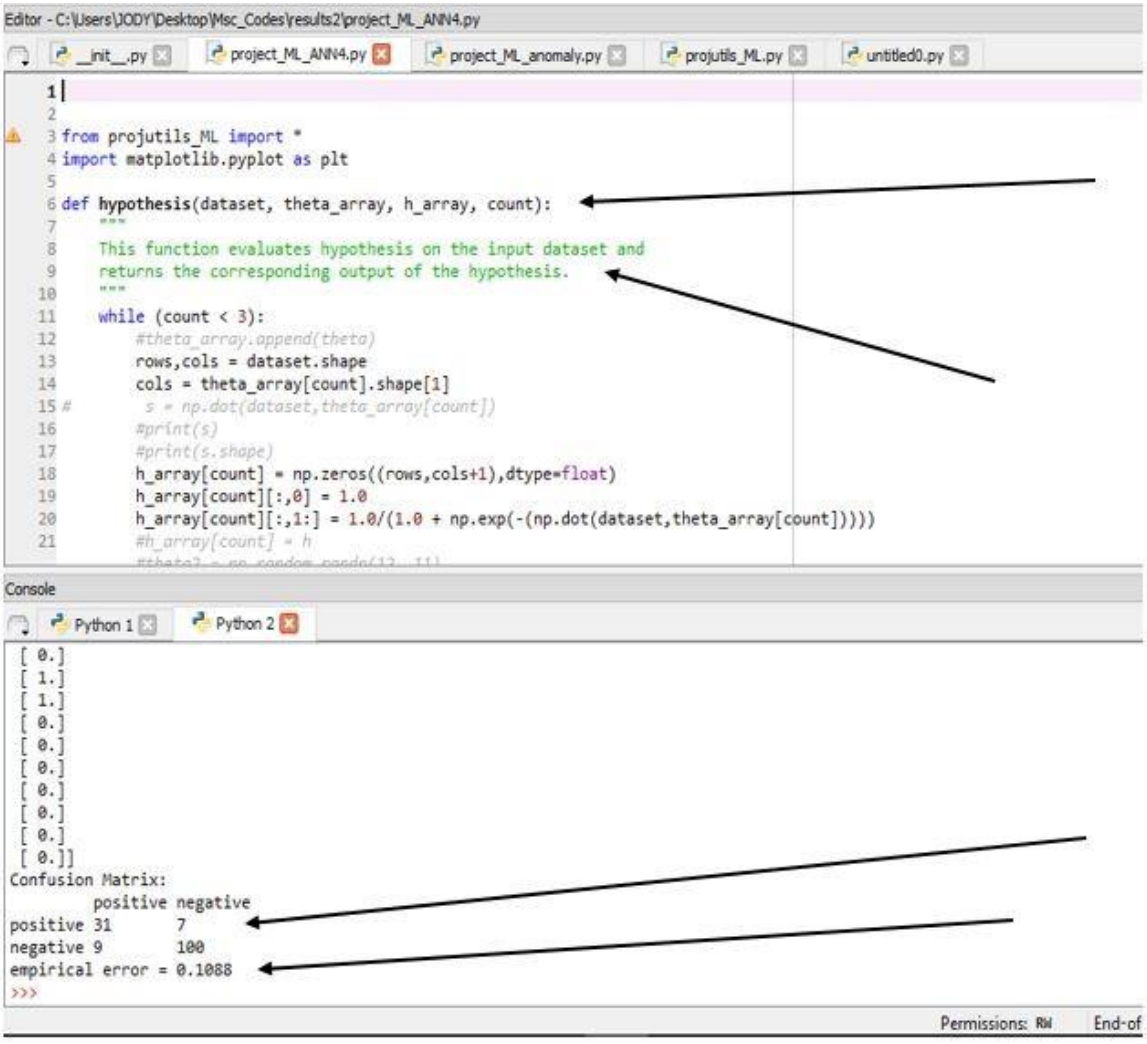
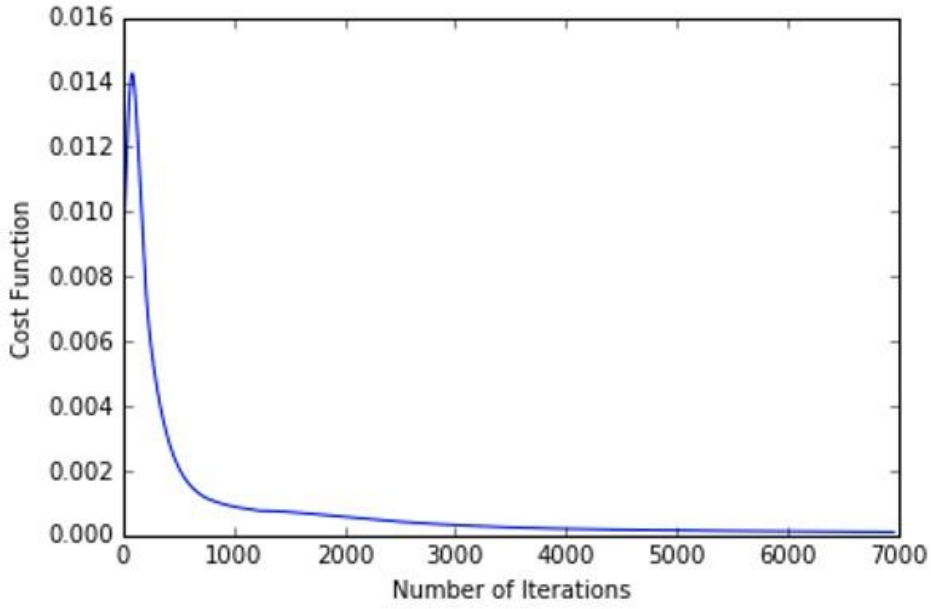


Figure 10: Graph of Cost and the Number of Iterations

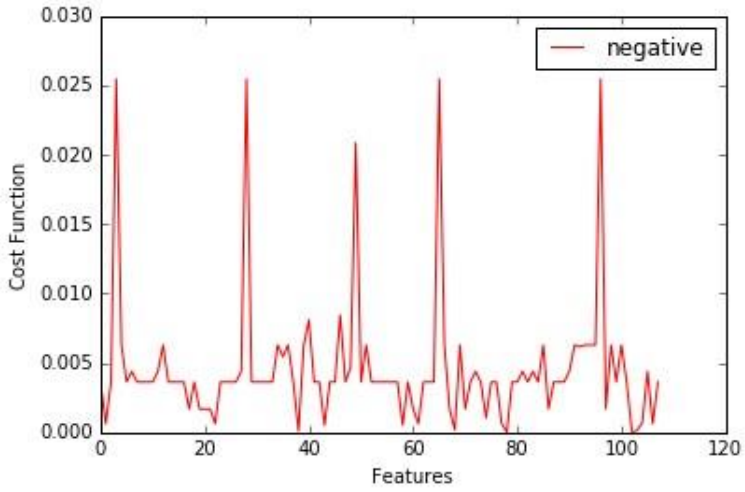


9. Discussion and Conclusion

From the results obtained from the anomaly detection implementation, it can be seen that most of the data was able to be classified correctly. This is likely due to the normal and anomalous data not having too much overlap, resulting in the boundary value being able to separate them properly. Due to the varied nature of the feature data, with features potentially changing as the dataset gets larger, it can be seen that this classification method could possibly have a reduction in prediction accuracy as the sample size increases, due to more observations potentially overlapping. However, a larger dataset could, instead, increase hypothesis generation accuracy as the algorithm would have more data to work with and the boundary between normal and anomalous could be better understood. The quality of the data is thus important in this respect (Figure 11).

Figure 11: Fluctuation of the Cost Function Due to the Size of the Dataset

In this plot, *negative means abnormal advert.*



In addition, for the neural network implementation, it was found that the algorithm only misclassified a minor number of observations, with an empirical error of 0.1088, suggesting a correct classification rate. The vast majority of observations were thus classified correctly, based on this result. The algorithm was thus able to handle the complex relationships between the various features, making use of the hidden layers to account for these relationships. It was largely successful in classifying each search result as either normal or anomalous. Once again, a larger dataset could potentially increase output accuracy for this algorithm as well. A possible limiting factor is that neural networks may suffer from significant slowdowns with larger datasets. An increasing amount of data to process and additional features to consider can exponentially increase the processing time required for the algorithm training to finish. However, since the algorithm tries to find an exact fit for the data, the accuracy of algorithm-embedded hypotheses generated is likely to be high. Thus, an individual considering this algorithm for use may have to look at the trade-off between processing time and accuracy and make a determination in that regard. It can thus be concluded that using both neural networks and anomaly detection algorithms for the purpose of classifying search engine results is a viable proposition. On the basis of common words found in shop-advertising descriptions, the neural network is able to learn a set of parameters in order to compare the text in a given observation to the obtained words and decide whether to classify the observation as normal or anomalous.

Anomaly algorithms can effectively separate observations based on a boundary value and thus determine which search results are normal or anomalous. Therefore, it is clear to see that fast and efficient methods of classification are able to be implemented. Hypothesis accuracy could potentially be increased with larger datasets.

10. Limitations and Future Research

At best, the selected algorithms can only feasibly provide a successful performance based on the quality of the dataset. If there is an insufficient volume of data, the algorithms may fail to perform classification. The question of whether the algorithms can be implemented is relative, depending on the number of times the selected algorithms are able to perform accurate classification. We are referring to the training data utilised for training our classifiers. In future we intend to use a Web Crawler which represents a system functioning as an automated script. This system collects various 'information-data' on the internet, and its collection process is done in a systemic and automatic way. The system analyses keywords used in search results, the type of content of each website and the links that unite them. Finally, the system returns the 'information-data' to the search engine which will list websites containing keywords given by the user. In this research the collection of textual data was done manually. In future, we can utilise a web crawler to automatically collect all the textual data from various sources. This data will remain in an unstructured form, mainly in *JSON*, *CSV* or *XML* formats. We can then apply selected algorithms on the textual data provided by the web crawler. This could enhance the process of textual classification.

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MODELING AND SIMULATIONS OF HYDRODYNAMICS AND MASS TRANSFER PARAMETERS IN AN AIRLIFT REACTOR

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Airlift reactors are a vital part of biological industries involving water and wastewater treatment and cell culturing for various further processing. Some of these industries include bioconversions of organic matter into bio-fertilisers, biogas, and bio-insecticides. These processes are 'greener' and therefore aid in reducing environmental pollution. Another important industry that uses this type of reactor are waste and wastewater treatment plants or facilities. The waste and wastewater industries are of the utmost importance, considering they involve a natural but depleting resource, vital for everyday life.

Despite these applications being of great importance to biological processes and industries, there has been little published data that validates experimental values with simulated values. The current data available is limited regarding the sizes of reactors used and the variations of fluid chemicals used. The project therefore seeks to add to the current available data on modelled and simulated airlift reactors. The project includes the development of an airlift reactor model, which will be able to predict specific hydrodynamic properties. The hydrodynamic properties to be considered are the gas and liquid hold-up in the column and the volumetric mass transfer coefficient. The aforementioned properties are acceptable indicators of the performance of the airlift reactor. A well-designed model translates to a more accurate development for a scale up of the reactor for future desired processes, thus saving on pilot-type costs and reducing the carbon footprint of the future desired project.

The results generated by this project are compared to the averaged experimental values obtained by a similarly performed investigation. The Eulerian-Eulerian multiphase model in Computational Fluid Dynamics (CFD) software is used for the simulation of the airlift reactor as well as the k-ε turbulence model for the fluid flow dynamics. Six runs are conducted in total

and each run consisted of up to 200 iterations. The simulation takes approximately five to twenty-five minutes to reach completion. The gas hold-up is produced by the software and was found to be lower than the experimental data obtained from literature. The reactor model will need to be further refined to obtain results that are more accurate. Refining the model could include changing the reactor dimensions to more closely approximate the dimensions used in the experimental data and further, in generating of a finer mesh.

Keywords: *airlift reactor, fluid dynamics, gas hold-up, mass transfer, Computational Fluid Dynamics (CFD), simulations, hydrodynamic properties*

1. Introduction

There is a limited amount of varied literature involving airlift reactors. This project was conducted in an attempt to add to the currently limited literature database. Research has been done quite extensively on airlift reactors; however, this research is restricted due to the reactor size variations and fluids used in the investigations. The purpose of this project was to develop a model that would be able to predict gas and liquid hold-up in the column of an airlift reactor. The Eulerian-Eulerian multiphase model in the Computational Fluid Dynamics (CFD) software was utilised in the simulation of the airlift reactor. In this model, all phases were taken as being continuous. Column specifics and flow rates from the actual airlift reactor experiments were used.

An efficient model would offer processes which are designed and built with less laboratory or pilot testing-costs being incurred. This research will provide a wider platform for innovative design development without the additional development cost. An efficient design, where liquid and gas hold-up can be minimised, will reduce operational and dead times for processes.

2. Background to the Research

Airlift reactors are commonly used in the biochemical and chemical industries. They are useful in processes which require the uniform mixing of components and efficient heat and mass transfer (Jin, Yin, and Lant, 2006). Airlift reactors are an important class of modified bubble columns, which are used extensively as multiphase contactors in different industries. Airlift reactors are widely used in biological applications. This is because they are able to provide efficient mass transfer and the hydrodynamic conditions needed for the rapid growth of microorganisms (Moraveji, 2012). Airlift reactors can be classified into two types: internal loop and external loop. An external loop contains two conduits which are connected at the top and the bottom. The internal loop contains split vessel or concentric tubes (Sarfraz, 2013). For the purpose of this project, an internal loop airlift reactor is considered.

To achieve proper results in the design of an internal loop airlift reactor, the estimates of the gas and liquid hold-ups and the velocities in both the riser and the down-comer must be accurate. In many studies done on airlift reactors, the primary focus has been on the estimation of the hydrodynamic parameters of the system (Huang, Yang, and Mao, 2010). The geometry of the reactor and the operating conditions influence the frictional losses, which in turn influence the velocities of the liquid in both the riser and down-comer (Lestinsky, Vayrynen, Vecer and Wichterle, 2012).

In previous work conducted relating to modelling and simulations of hydrodynamics and mass transfer parameters in an airlift reactor, it was found that the airlift reactors could be classified into two distinct groups (Sarfraz, 2013):

- External loop airlift reactors, where the down-comer and riser are separate conduits that are connected by horizontal sections at the bottom and top;
- Internal loop airlift reactors, where fluid circulation takes place in one vessel but contain baffles internally which split the column into the down-comer and riser in the column. The driving force for the circulation of liquid is the difference in the hold-up that exists between the down-comer and riser (Ghasemi and Hosseini, 2012).

It was found that the hydrodynamic properties (superficial gas velocity, gas hold-up, superficial liquid circulation, and mass transfer coefficient) of an airlift reactor provide an acceptable indication of the reactor performance. The liquid circulation velocity influences the mass transfer coefficient as well as the turbulence of the fluid (Zhang, S., Lv, Z., Muller, D. and Wozny, G., 2017). This project involves an internal loop airlift reactor that is simulated. The simulation performed is limited in the type and rates of the fluids used as well as in the sizes of the reactor. The limited simulation is done so that the model can be validated using basic fluids (e.g. air and water), before including complex reaction-type fluids.

3. Problem Statement

Prior to the use of mathematical modelling and simulations, and before the project could be developed on an industrial or 'scale-up' magnitude, processes were run as laboratory-scale experiments or pilot plants. These methods cannot always be considered reliable due to physical and chemical processes that change when being considered on a larger scale. On a larger scale, hydrodynamic, chemical, and physical properties tend to deviate from predicted values found by experiments or piloted processes. It is for this particular reason that mathematical modelling and simulations of processes are now run before the actual design is built or piloted. Modelling and simulations can furthermore assist in reducing various industries' carbon footprint and improve their overall operational efficiency.

As the demand and cost of energy increases with a decrease in the economy, the need for sustainable and cost-effective solutions for industrial projects deepens. In the water and wastewater treatment industry, airlift reactors are a commonly used unit operation. As previously mentioned, there exists a gap in published data available on airlift reactors. The need for collecting and unifying simulated results with experimental results therefore still exists (Merchuk, 2003). Further simulation and experimental data verifications still need to be conducted.

4. Research Objectives

The project seeks to contribute to the aforementioned gap in published data on airlift reactors. Further, the project will be conducted such that the simulation results produced can be used for the verification of experimental results. For verification, an airlift reactor model which is able to predict the aforementioned hydrodynamic properties such that there is consistency between current experimental and simulated data needs to be developed and simulated.
The research objectives for this project are as follows:

- To develop a mathematical model of an airlift reactor using a simulation software.
- To run simulations on the airlift reactor and verify the simulation data produced with experimental data.

5. Research Questions

Leading on from the problem statement, the simulation data produced using the airlift reactor model should be verified against current experimental data. The focus of the data verification will include a comparison of the aforementioned hydrodynamic properties. The researcher has therefore formulated the following two research questions to assist in solving the research problem:

- Can the airlift reactor simulation data be verified with previously conducted experimental data?
- How can the model be simulated to enhance efficiency?

6. Literature Review

In industry, it is more economical to use mathematical modelling than testing unit operations or procedures in a laboratory-scale set-up. Laboratory scale set-ups utilise methods which cannot always be considered as being reliable due to physical and chemical processes that change when being considered on a larger scale. Mathematical modelling and simulations of processes are therefore run before an actual design is built or piloted (Deloitte Touche, 2013.)

Mathematical models are starting to play an essential role in different bioreactor processes, such as wastewater treatment. Such a model becomes useful in aiding an efficient process control strategy as well as in predicting how a plant or production unit will perform in future usage. Bioreactors, specifically airlift reactors, are used in the processing of organic materials, such as antibodies, cells, and enzymes. This type of processing has applications in major aspects of civilisation, such as food, healthcare, pharmaceuticals, agriculture, and in the recovery of resources (Cozma and Gavrilescu, 2012).

Due to the sensitive nature of biological agents such as cells and enzymes, the biotechnological industries have experienced a lack of proper implementation in process controls and strategies. These biological agents are particularly sensitive to shear forces and in some cases, may be destroyed by such forces. Cells and enzymes usually require a constant environment and constant oxygen circulation, both of which can be provided by an airlift reactor (Cozma and Gavrilescu, 2012).

The most likely reason for the aforementioned lack of information in published data is the difficulty experienced in measuring key biochemical and physical parameters in such processes. Studies have been conducted on airlift reactors; however, the data cannot be adequately validated due to the operating system's nature and the size of reactors being either 2 meters or 4 meters (Aljabbar, 2010). Airlift reactors are able to accommodate the sensitive nature of biological agents. In airlift reactors, an acceptable indicator of its performance is the measurement and analysis of the hydrodynamic properties. These hydrodynamic properties include superficial liquid circulation velocity, gas hold-up, superficial gas velocity, and the volumetric mass transfer coefficient (Ghasemi and Hosseini, 2012). In this project, an airlift reactor with an internal draft tube is designed using a CFD program.

The Eulerian-Eulerian model used is a macroscopic and general model that is utilised for a liquid and gas phase flow of fluid. The Eulerian-Eulerian multiphase model was thereafter defined, specifying: flow rates, column diameters, temperatures of both fluids. For each phase, there was a velocity zone, which therefore required a continuity equation and momentum balance to describe each phase's dynamics. With this method, an average volume fraction of the individual phases was used and thus it became unnecessary to study each bubble (Moraveji,

2012). The process was then simulated. Results generated from the program were analysed and adjusted accordingly.

An airlift reactor includes a wide variety of gas-liquid or gas-liquid-solid pneumatic contacting devices, which are characterised by fluid circulation in a defined cyclic pattern, through specifically designed channels (Merchuk and Camacho, 2010). The contents of the reactor are usually agitated by a stream of air that is distributed by the sparger. However, other gases may be used in place of air. The reactor types which use other gases in place of air are known as *gas-lift reactors* (Cozma and Gavrilescu, 2012).

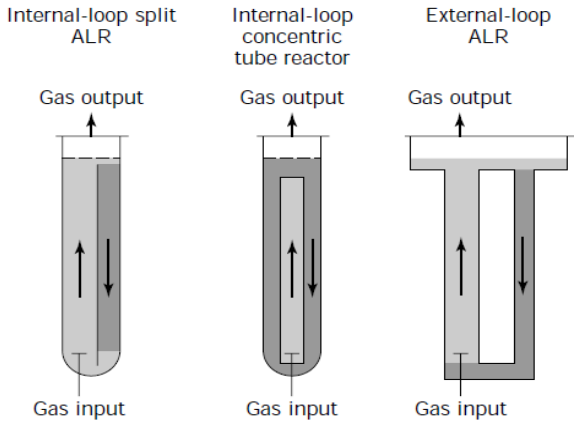
Air is used to facilitate the exchange of materials between the gas and liquid and vice versa. The airlift reactor is relatively similar to a bubble column, which also relies on the pneumatic agitation of its contents (Jin, Yin and Lant, 2006). The bubble column, however, has less of a defined geometry in terms of flow regimes. The bubble column is a basic vessel with air injected at the bottom. It allows for random mixing by the bubbles ascending the vessel. The airlift reactor, however, has distinct zones: the riser; down-comer; base section and disengagement tank (gas separator).

Airlift reactors can be divided into two types (Sarfraz, 2013):

- An internal loop type, in which there are specifically placed baffles which create the channels for fluid circulation;
- An external loop type, in which separation takes place in the distinct zones (conduits).

Both types are commonly used in the biochemical and chemical industries. They are useful in processes which require the uniform mixing of components as well as efficient heat and mass transfer (Jin, Yin and Lant, 2006).

Figure 1: Different Types of Airlift Reactors



Source: Merchuk and Camacho (2010)

An airlift reactor comprises five main sections (Ghasemi and Hosseini, 2012). These sections are as follows:

- **Riser section:** This is the inner gassed section which facilitates gas injection, provided by a device known as the sparger. The riser section also contains the liquid (e.g. water). The flow of both fluids will be primarily upwards.
- **Down-comer section:** This is the outer un-gassed region, which contains de-gassed media and cells. It is situated parallel to the riser section. The flow of both fluids is primarily in a downwards direction.
- **A base section:** The base section is where the riser and down-comer are joined to each other. The base is connected to the sparger, which pumps pressurised air into the reactor.
- **Gas separator:** This section joins the riser and the down-comer at the top and aids in gas disengagement from the liquid. It also promotes liquid recirculation. An efficient design of the disengagement tank has a major influence on the reactor performance in terms of increasing residence times. A longer residence time will minimise the fraction of gas recirculating through the down-comer (Merchuk and Camacho, 2010).
- **Sparger:** An important feature of airlift reactor is the sparger. The sparger, also known as the gas distributor, is responsible for introducing the stream of air into the reactor. There are two types of spargers, namely static and dynamic. Static spargers are ultimately

comprised of porous plates, perforated plates and conduits, as well as a single orifice type, whereas dynamic spargers include venturies and injector nozzles (Šijački, 2017).

The defined parameters of spargers are the location, orifice diameter, and the free area (Šijački, 2017). The design of spargers greatly influences the hydrodynamic properties of the system. These properties are the gas hold-up, the superficial liquid circulation velocity, the volumetric mass transfer coefficient, and the superficial gas velocity (Merchuk and Gluz, 2001).

6.1 Hydrodynamic Properties

The hydrodynamic properties of an airlift reactor provide an indication on the performance of the reactor. These properties include superficial liquid circulation velocity, gas hold-up, superficial gas velocity, and the volumetric mass transfer coefficient (Merchuk and Gluz, 2001).

6.1.1 Superficial Liquid Circulation Velocity

The liquid circulation is dependent on the gas hold-up in the down-comer and riser of the reactor. It also has the ability to change the bubble rise velocity, which in turn will affect the gas hold-up. The liquid circulation velocity has a great influence on both the heat and mass transfer coefficients of the fluid (Huang and Cheng, 2011).

6.1.2 Gas Hold-up

Gas hold-up refers to the volume fraction of gas in the gas-liquid mixture (Merchuk and Gluz, 2001). It is considered as one of the important aspects of airlift reactors that give an indication of the efficiency of mass transfer. This is because a larger value of gas hold-up translates to a larger liquid or gas surface interface for mass transfer, and thus a higher mass transfer rate in the reactor. The driving force for the circulation of liquid in the reactor is the difference in gas hold-up in the riser and the down-comer (Huang and Cheng, 2011).

6.1.3 Volumetric Mass Transfer Coefficient

The volumetric mass transfer coefficient is defined as the gas transfer rate across the liquid-gas interface per unit driving force (Merchuk and Gluz, 2001.) The volumetric mass transfer

coefficient is the product of the specific interface area and the mass transfer coefficient. It is difficult to determine the specific interface area for bubbles of a smaller size; therefore, a general term, k_La, is used (Merchuk and Gluz, 2001.) This is the volumetric gas transfer coefficient. In this case, the gas under consideration is oxygen.

6.1.4 Liquid Levels in the Reactor

Bubble disengagement, as well as the flow of liquid in the down-comer, is dependent on the rising velocity of the bubble, the liquid velocity in the down-comer, and the residence time of the bubbles in the disengagement tank (Merchuk and Gluz, 2001). For a lower gas hold-up value in the down-comer, there will be a higher gas (bubble) disengagement rate. This is because the driving force for the motion of fluid increases, causing an increase in liquid velocity. Ultimately, an increase in liquid level will reduce the gas hold-up amount of gas trapped. This will result in a lower gas circulation rate in the down-comer, which will in turn increase the liquid circulation velocity (Naidoo, Naidoo, Tawona, Makununika, Obwaka and Mohammadi, 2016).

6.2 Mathematical Models of Hydrodynamic Properties and Mass Transfer

The mathematical model of the airlift reactor is simulated and run in CFD software. The model chosen for the particular gas-liquid system was the internal loop airlift reactor. The following is applicable for an internal loop airlift reactor:

6.2.1 The Governing Equations of a Gas-liquid Flow

In the simulation of a bubbly flow with reaction and transport, the Favre averaging two model is most commonly used (Naidoo et al., 2016). The mass and momentum conservation equations are as follows:

$$\frac{\partial}{\partial x_j}\left(\alpha_k \rho_k u_{ki}\right) = 0$$
$$\frac{\partial}{\partial x_j}\left(\alpha_k \rho_k u_{ki}\right) = -\alpha_k \frac{\partial p}{\partial x_i} + \alpha_k \rho_k g_i + F_{ki} + \frac{\partial}{\partial x_j}\left(\alpha_k \tau_{kij}\right) - \frac{\partial}{\partial x_j}\left(\rho_k \alpha_k \overline{u_{ki}` u_{kj}`}\right) + F_{TD} \quad [1]$$

- The subscript *k* indicates to liquid (l) or gas (g) phases.
- α_k; ρ_k and $u_{ki}` u_{kj}`$ refers to the hold-up, density, and Reynolds stress tensor of phase k, respectively.
- F_{TD} refers to the turbulent dispersion force that describes the bubble dispersion and F_{ki} is the sum of interphase forces. These forces include the drag, added mass effect, lift and wall lubrication forces. According to (Huang, Yang and Mao, 2010), the added mass force has little to no effect on simulated results and the simulation becomes unstable if the added mass force is taken into account.

6.2.2 Boundary Conditions

The boundary conditions of a simulation are vital in ensuring that the simulation results achieved are of a real flow (Ghasemi and Hosseini, 2012). For purposes of this project, the following boundary conditions are used:

- An inlet (air) on the sparger;
- A degassing outlet (air) at the liquid surface;
- A pair of wall boundaries for draft tube; and
- An exterior wall for the outer wall, sparger and base tube.

At the air inlet, a boundary condition of the volume fraction was set to 0.25 and the air velocity was set to a normal speed of 0.3m/s. The water stream was set to a normal speed of 0m/s with a volume fraction of 0.75. At the air outlet boundary, the condition on the top of the reactor was set to a degassing condition. For the draft tube boundary, a *Free Slip* condition was used for the gas phase. This was because the contact area with the walls was close to zero for low gas volume fractions. The draft tube is considered a smooth wall that is fluid dependent, with a *Free Slip* condition. The water stream had a *No Slip* condition. In the initial model, only 30% of the full reactor model was designed. This was due to the airlift reactor being rotationally symmetric. The need for a symmetry plane boundary thus arose so that the simulation could run for the entire geometry of the airlift reactor.

7. Research Methodology

It is essential for a researcher to construct a methodology for a chosen investigation or problem, as it provides a clear outline of the work to be completed and the manner in which it should be done. Research methodology, according to Rajasekar, Philominathan and Chinnathambi (2013) can be defined as the "various procedures, schemes and algorithms used in research". According to The Lex-Warrier Online Law Journal (2017), it can be considered an organised and logical way to solve a problem, which entails a "systematic, theoretical analysis of the methods applied to a field of study".

The research methodology used in this research is quantitative. This type of research entails the collection of data in a numerical form, which can be processed in specific orders or in units of measurement. Quantitative data can be used to process data in the form of tables as well as various graphs (McLeod, 2017). In quantitative research, data, on which statistical tests can be performed in order to make statements, is generally expressed numerically (Sampedro, 2013). The statistical tests produce results which are descriptive and can include the median, mean, and standard deviation. These descriptive results are considered the primary advantage of quantitative studies and allow for simple and effective comparisons between data sets (Madrigal and McClain, 2012). Because the project aims to model, simulate, and process the numerical hydrodynamic properties produced by the simulation software for the purposes of comparison between simulated data and experimental data, a quantitative methodology was chosen as most suitable.

In order for the modelling project to be started, the following steps need to be adhered to:

- Identification of the problem
- Defining the model geometry, including meshing
- Defining the iterations
- Processing of results in the CFD software
- Verification

These steps were chosen as the best suited procedure as they follow a logical manner in which a unit operation is modelled and simulated. The steps are further elaborated on in the following 'research design' section.

7.1 Research Design

7.1.1 Identification of the Problem

The first step was to define the simulation goals for the model in the CFD software. The model for the airlift reactor was selected and for the purpose of this project, an internal loop airlift reactor was utilised. The internal loop reactor was chosen because there was a greater amount of literature available as compared to the literature pertaining to external loop reactors (Ziegenhein, T., Zalucky, J., Rzehak, R. and Lucas, D., 2016).

7.1.2 Defining of the Model Geometry (With Meshing)

The domains where the fluid was flowing were analysed. These domains were further broken down into subdomains (mesh). The mesh consisted of geometrical shapes in a three-dimensional plan. These geometrical shapes were hexahedral and tetrahedral.

7.1.3 Defining Iterations

In order for the iterations to be defined, boundary conditions were first specified. These boundary conditions are needed for the physical model. The boundary conditions set for this project are explained fully in Section 7.3.4.

7.2 Data Analysis

The analysis of the simulated data focused on the previously-mentioned hydrodynamic properties. The data analysis is discussed further in sections 7.2.1 and 7.2.2.

7.2.1 Processing of Results

The results from the CFD software were reviewed and sorted for data relevant to the project. This reviewing and sorting was done to ensure that the correct physical behaviour and property conservation of both fluids was being observed.

7.2.2 Verification

The final stage of the project was to observe whether the simulation data could be validated against the experimental data collected by Ghasemi and Hosseini (2012). Comparisons of the experimental and simulated data were used to verify the accuracy of the predictions made by the CFD software. A deviation of below 10% was considered acceptable.

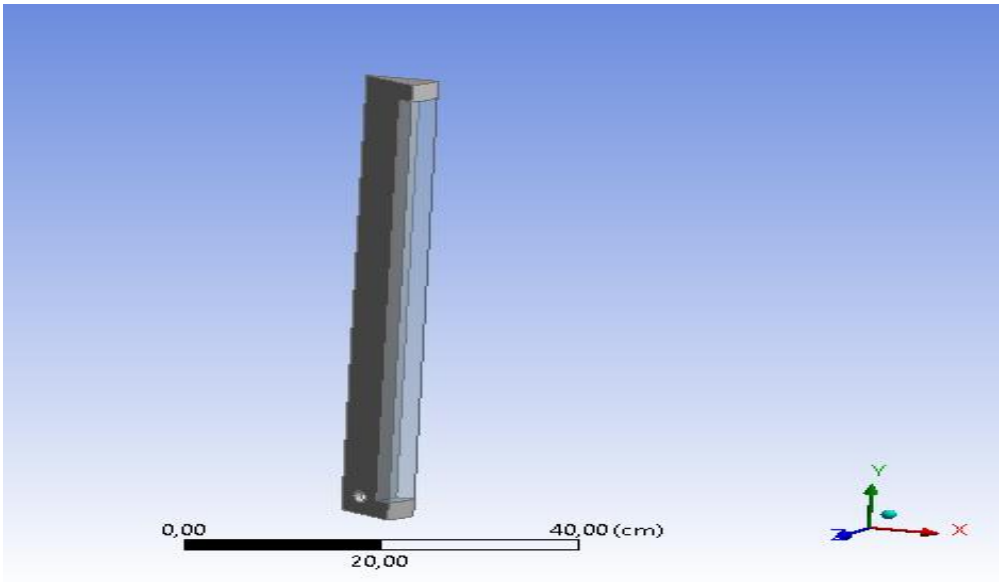
7.3 Equipment and Procedure

The project used Computational Fluid Dynamics (CFD) software. This software requires a 64-bit processor to correctly run the simulation and display relevant, high-resolution data. Sections 7.3.1 – 7.3.4 will expand on the equipment and procedure used.

7.3.1 Airlift Reactor Modelling

A mathematical model of an airlift reactor was generated using CFD software. The generalised airlift reactor model was designed using the specifications of the software's given tutorials. The model used the Eulerian-Eulerian multiphase model for the simulation of the dispersion of air bubbles in water. The air stream was supplied through a sparger at the bottom of the reactor. The rising motion of the bubbles enabled the gentle agitation of the water and the draft tube directed the flow of fluids in a recirculation pattern. Only 30% of the reactor's geometry was simulated (as depicted in Figure 2). This was due to the reactor being rotationally symmetrical. For the simulation runs and results, however, the reactor's entire geometry is accounted for using the symmetry plane boundary.

Figure 2: Model of Airlift Reactor (30% of Reactor Geometry)

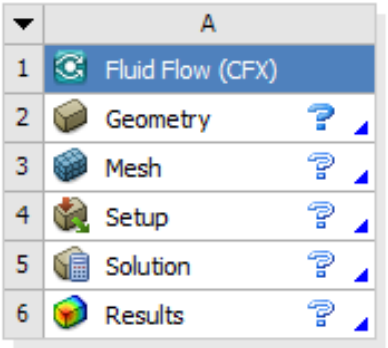


Source: Swanson (2018)

For the first step of the modelling process, it was important to specify the engineering units to be used in the system. The units and prescribed values would ultimately affect the results and may cause variation in the convergence solution.

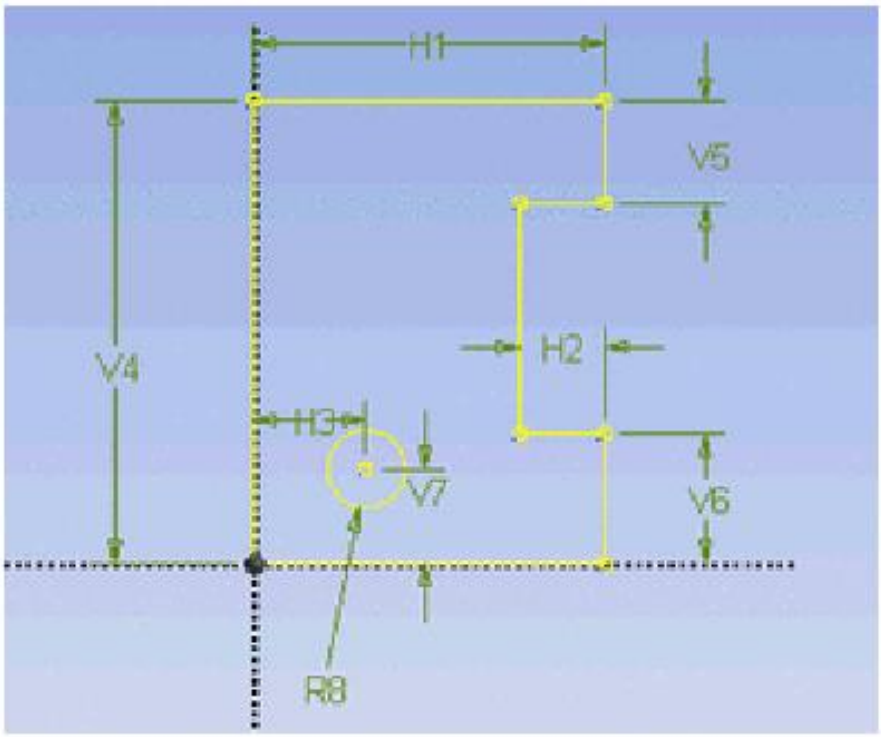
The CFX option was selected in standalone mode, from the CFD menu, for the project. There are five fields that were correctly defined. This was done in order for the simulation to run correctly and provide relevant results (shown in Figure 3).

Figure 3: CFX in Standalone Mode



Source: Swanson (2018)

Figure 4: Sketch of Airlift Reactor in Design Modeller



Source: Swanson (2018)

Under the *constraints* tab, the length of the top and bottom of the reactor were set using the *equal lengths* button. This ensured that the length of both the top and bottom remained equal when modifications were made to any dimensions of the reactor. The sketch was then labelled with the various dimensions as shown in Figure 4: horizontal, vertical and the radius of the circle (which will be the sparger). In the *details view*, there were already values assigned to the dimensions according to the rough sketch drawn. The values were then changed accordingly, with the guidance of the values given in the CFD tutorial:

- Radius of column H1 = 8cm
- Distance between outside of column and draft tube H2 = 2.5cm
- Distance between sparger and axis H3 = 3cm
- Column height V4 = 77cm
- Distance between column top and top of draft tube V5 = 3cm
- Distance between column base and bottom of draft tube V6 = 3cm
- Sparger height above column base V7 = 3cm
- Sparger radius R8 = 0.4cm

The dimensioned sketch was thereafter revolved 30° using the *revolve* tab to create the solid model, as seen in Figure 2.

During the simulation, the gas (air) was injected through the top of the circular hole (through a 74° segment). Since the sketch only accounted for one surface, the circle was broken to allow adequate boundary conditions to be defined (in the meshing stage). The circle was split using the *split* option under the *modify toolbox*. Thereafter, the symmetry of the split was defined using the *symmetry* tab under the *constraints toolbox.* A second solid was generated to create the outer walls of the reactor using a new plane and the *extrude* tab. This was done to ensure that there was a riser, down-comer, and draft tube section in the reactor model.

7.3.2 2D Region Setup

The fluids (air-water) in the reactor needed specific zones or areas in which they were to flow. These, thus had to be simulated after the mesh generation. It was therefore imperative to set up

the various composite 2D regions. This was done by selecting the relevant faces and assigning the correct names to them (singly or collectively). The regions include the: a) sparger (1 face), b) top (1 face), c) column (5 faces), d) symmetry 1 (2 faces), e) symmetry 2 (2 faces) and f) draft tube (1 face).

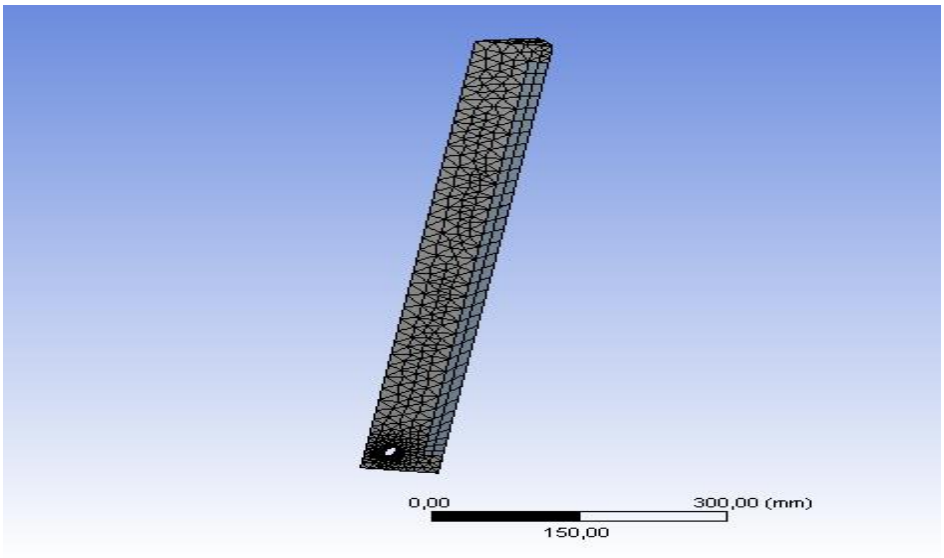
7.3.3 Mesh Generation

A mesh needed to be created before the simulation set up could be performed. The mesh provided a somewhat 'inside view' of the gas-liquid interface inside the reactor, as well as provided a basis for hydrodynamic parameters to be calculated or predicted.

The initial mesh was medium in terms of representation of interface interactions between the water and air bubbles. A finer mesh can be configured in future runs, when the model is defined with different desired specifications. The solution time will be much longer when using a finer mesh as compared to a medium-course mesh.

The medium mesh for this model is depicted in Figure 5.

Figure 5: Medium Mesh



Source: Swanson (2018)

7.3.4 Boundary Conditions

A simulation requires there to be boundary conditions put in place. The following boundary conditions were specified:

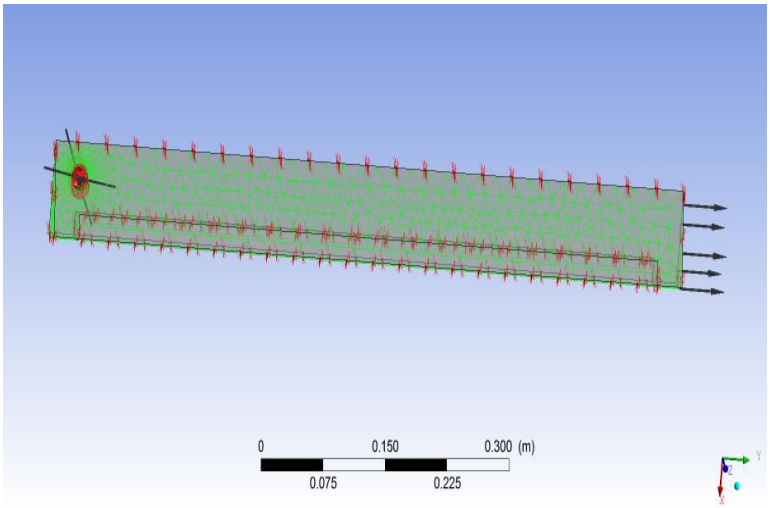
- An inlet (air) on the sparger;
- A degassing outlet (air) at the liquid surface;
- A pair of wall boundaries for draft tube; and
- An exterior wall for the outer wall, sparger, and base tube.

At the air inlet, a boundary condition of the volume fraction was set to 0.25 and the air velocity was set to a normal speed of 0.3m/s. The water stream was set to a normal speed of 0m/s with a volume fraction of 0.75. At the air outlet boundary, the condition on the top of the reactor was set to a degassing condition.

For the draft tube boundary, a *Free Slip* condition was used for the gas phase. This was because the contact area with the walls were close to zero for low gas volume fractions. The draft tube was considered a smooth wall that was fluid dependent, with a *Free Slip* condition. The water stream had a *No Slip* condition.

The model with all of the boundary conditions specified is depicted in Figure 6.

Figure 6: Meshed Model Displaying Boundary Conditions



Source: Swanson (2018)

7.3.5 Computational Fluid Dynamics Solver

The CFD Solver Manager was used to run the simulation and obtain a solution. The solver may or may not take long to complete, depending on the user's system. The *Start Run* tab was selected to run the simulation.

8. Findings and Discussion

The project undertaken consisted of six consecutive runs that were completed using the CFD software. Each run consisted of a chosen amount of iterations. A maximum of 200 iterations were chosen. Initially, 500 iterations were chosen; however, the software lagged after approximately iteration number 300 and thereafter crashed, causing the solution to have an error. This, in turn, caused the solver manager to close with a "Return Code-1" error. Therefore, a value of 200 iterations per simulation was chosen. The time for each simulation varied between five and twenty-five minutes.

The experimental results obtained by Ghasemi and Hosseini (2012) were used as a guideline to observe the hydrodynamic parameters of the airlift reactor. It was noted that a single run or simulation continued until the convergence of the system was reached. This meant that the simulation ran for more than the specified 200 iterations or the convergence of the system was

reached in less than the 200 iterations specified. The simulation will run until the convergence criteria is reached. The convergence criteria chosen for this project is 1×10^{-5}.

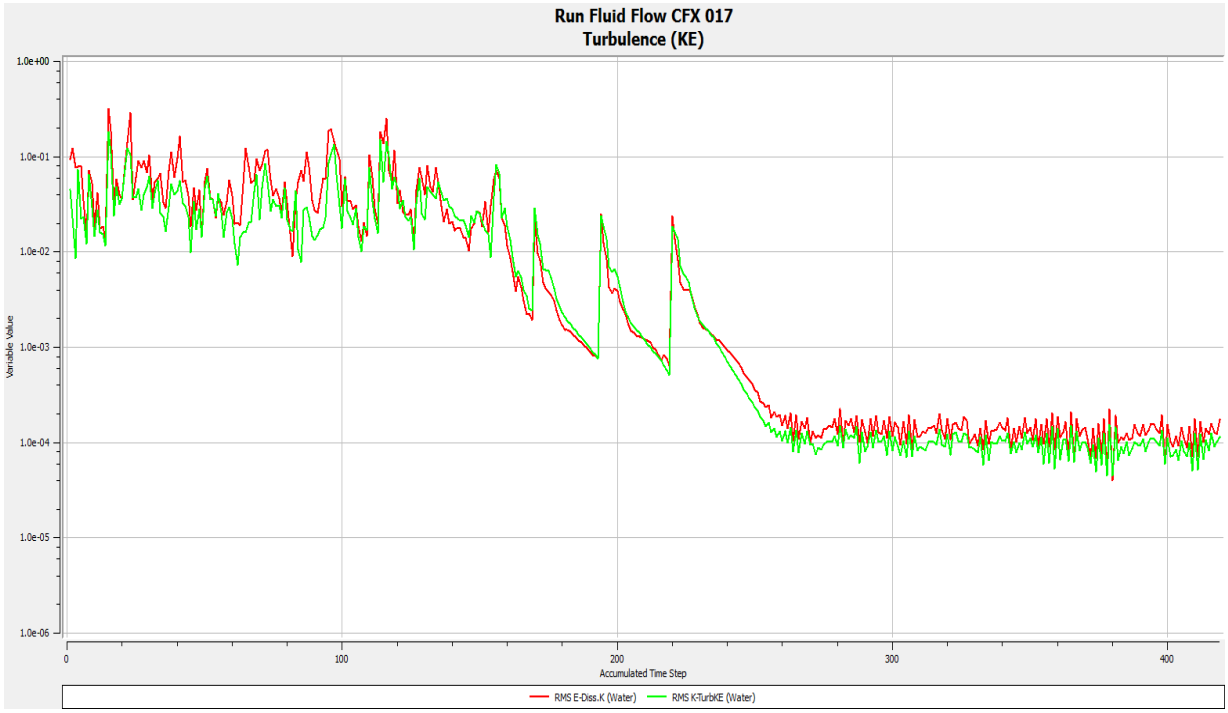
The reactor dimensions used were in close proximity to the values used by Ghasemi and Hosseini (2012). The deviation range of the dimensions was 2 centimetres. The reason for the deviation range is that the CFD software does not allow for a change in the airlift reactor model's dimensional values. When an attempt was made to change the values, the mesh would fail and ultimately, the solver manager also would fail. Therefore, it was decided that the closest dimensions to the dimensions used in the experiments conducted by Ghasemi and Hosseini (2012), would be used.

The Eulerian-Eulerian model was used for the modelling of the reactor and the k-ε turbulent model was used for the mixture of the two phases, air and water. The k-ε model is a two-equation model, which can determine the length scale and the turbulent velocity scale. The simulations were conducted for a velocity (air) range of 0.018 – 0.1m/s. This velocity is in the V direction (y-axis). The velocity in the U (x-axis) and W (z-axis) were kept at zero. This was because the flow patterns are primarily in the V direction and any flow in the other directions can be considered negligible.

The velocity of the water in the reactor was set to zero in all directions to avoid any shear forces. The model would therefore only take into account the density gradient of the fluid motion. The gas hold-up in the column was initially set to zero (i.e. there is no airflow in the column or draft tube) before the start of the simulation. The CFD software set the adaptive time step automatically, however, a convergence criterion of 1×10^{-5} was chosen.

The hydrodynamic parameters considered for the project and the final comparison was selected using averaged values. The CFD software provided these averaged values. The system was considered as being in a steady state for these values. Figure 7 depicts the convergence of the turbulent model of both fluids. The turbulence between the accumulated time step of 0 to 240 was seen as being erratic, with a high oscillation rate. After the 240-time step mark, the oscillation of the graph decreases to an acceptable value. It can be seen that the graph converged at an acceptable oscillation rate and therefore the simulation and the solver manager stopped.

Figure 7: Turbulence Convergence for Air and Water - Run 1



The simulations for this project were created in a CFD software, however only 30% (or a third) of the reactor gemometry was modelled. This could be done because the airlift reactor is rotationally symmetrical and was done to reduce computational or simulation time. A fully developed geometry would cause a significant increase in the lagging of the software as well as a high posssibility of the system crashing. For the initial simulation, a medium-sized mesh was used. This mesh provided lower air volume fractions (gas hold-up). According to Blazej and Markos (2004), the resolution of the mesh will affect the gas hold-up; therefore, the mesh needed to be further refined. The total number of nodes for the default domain (path of fluid flow) was 1,834 and the total number of elements was 5,608. The elements that were divided into the various geometries in order to fit the model are as follows:

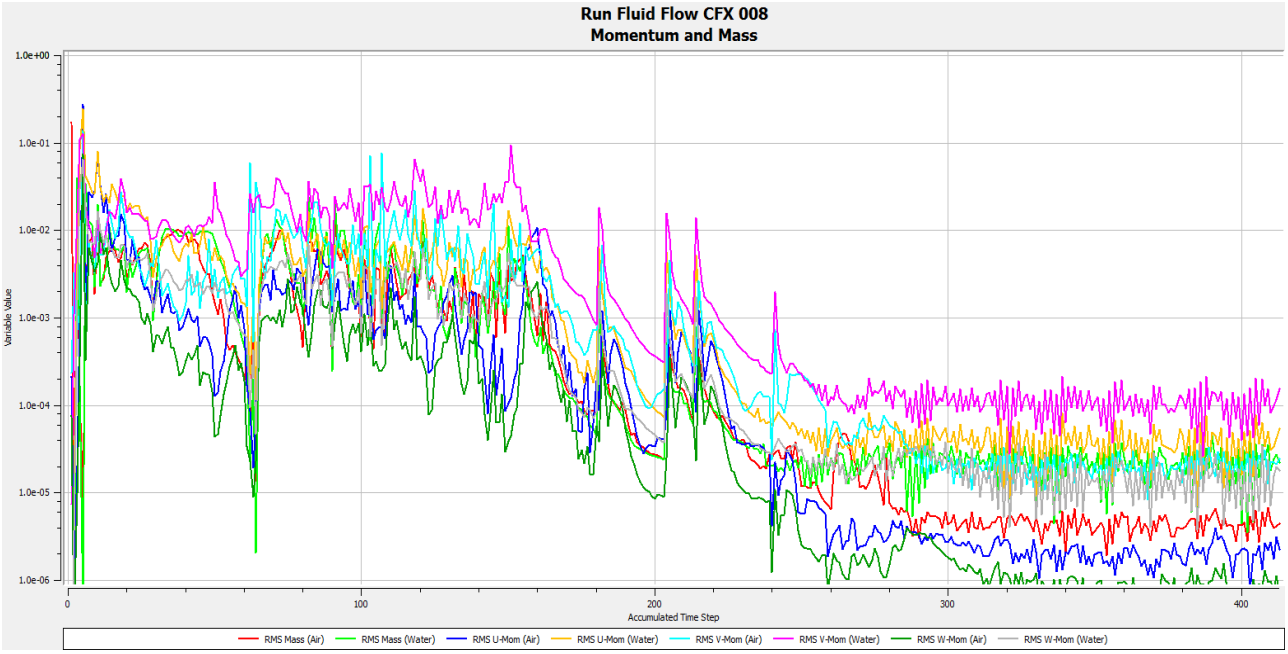
- Tetrahedrons = 5281
- Hexahedrons = 210
- Pyramids = 117

The total number of faces for the model was 2,007. The boundary conditions specified for air and water were as follows:

- There was a *No Slip* condition for water.
- There was a *Free Slip* condition for water.

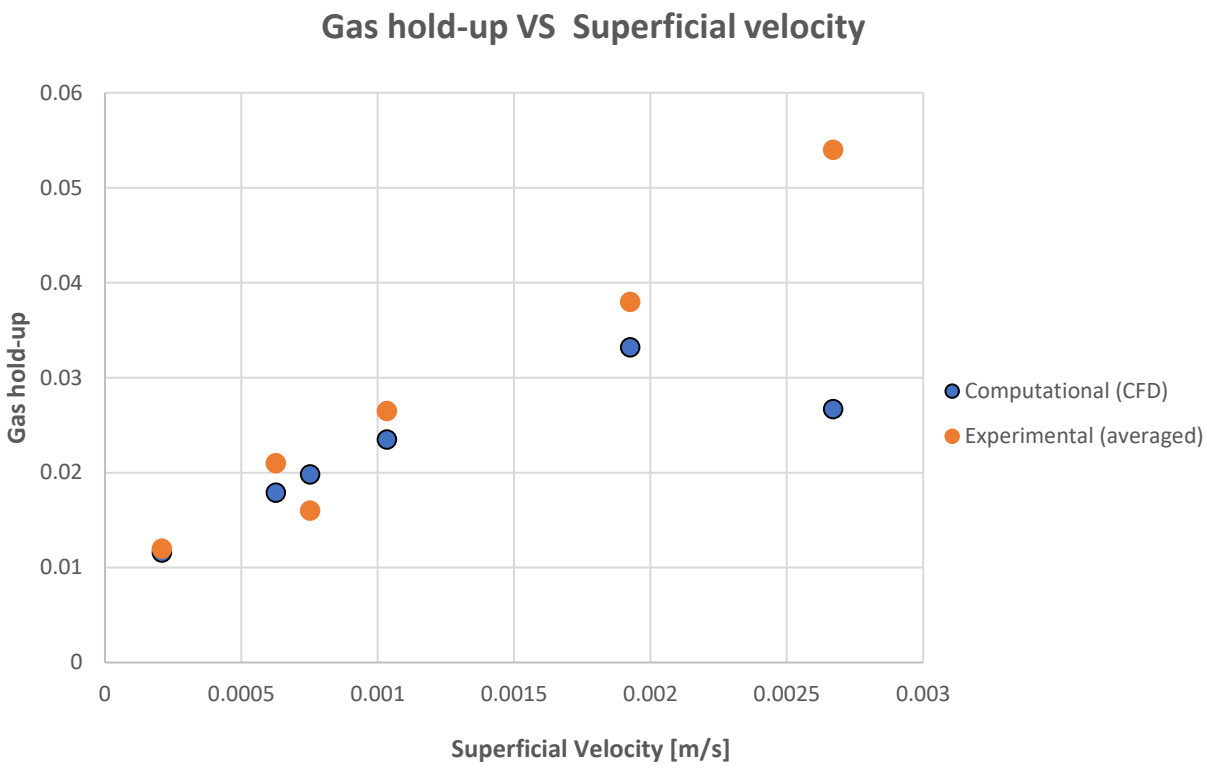
This determined whether or not certain drag and lift forces exerted by the wall were taken into consideration. In Figure 8, similar patterns were observed compared to other simulations done. The system was erratic and took time to stabilise. This irregular pattern could be due to the fact that the mesh could be further refined. It can be noted that the system only reached convergence at a time step greater than 250. The simulation only ended just past a time step of over 400. Therefore, it was seen that the system in this case required more than 200 iterations for a convergence to be observed.

Figure 8: Momentum and Mass Convergence for Air and Water



Source: Swanson (2018)

Figure 9: Comparison between Gas Hold-up Calculated in CFD Software and Experimental Data (Ghasemi and Hosseini, 2012)



In Figure 9, it can be deduced that the gas hold-up increased somewhat linearly as the superficial velocity was increased. A higher air velocity translated to a larger air-water mass transfer surface, thus causing a larger volume fraction of air in the liquid (water) of the reactor to form. A higher gas hold-up would mean a higher mass and energy transfer rate; however, this can have adverse effects. A high rate of coalescence and collapsing of bubbles can cause damage to equipment over time. In the case of cell cultures, the force of the bubble collapse can cause shear force, which may lead to damage and ultimately the destroying of the cell culture. To avoid this, including a disengagement tank was proposed. This would ensure the proper disengagement of the bubbles from the liquid fluid and thus provide improved circulation.

9. Conclusion

The airlift reactor model developed using the simulation software involved specifying conditions that are similar to previously conducted experimental conditions (Ghasemi and Hosseini, 2012). As previously stated, the hydrodynamic properties are the primary focus of the modelling and simulation of an airlift reactor (Huang, Yang and Mao, 2010). Due to physical and chemical processes that differ, and when considered on a larger scale, it is more economical to use mathematical modelling and simulation before a unit operation is built or piloted. From the hydrodynamic properties recorded in the simulation data, the gas hold-up is the property that is quantified and used for graphical comparison. The gas hold-up produced by the software was found to be lower than the experimental data obtained from experimental literature (Ghasemi and Hosseini, 2012). This can be considered acceptable, taking into account the differences between the reactor model dimensions used and the experimental dimensions used. The different dimensions used affected the superficial velocities of both the air and water streams. This, in turn, affects the gas hold-up values obtained from the simulation data. The gas hold-up values produced from CFD simulation results (plotted in Figure 9) depict a fairly similar trend to the experimental data plotted and can be considered acceptable.

The reactor model will need to be further refined in order to obtain results that are more precise. The refining of the model must take into account which hydrodynamic properties are to be considered for further simulations. These results can prove useful as valuable literature for future experimental endeavours.

It can be concluded that airlift reactor simulation data can be verified against experimental data if all of the conditions of the experiment and dimensions of the equipment remain the same. By using the same conditions and dimensions of equipment, simulated data can be analysed further and utilised for the improvement of future projects. This, in turn, will begin to fill the previously mentioned gap in the literature. An efficient simulation process would furthermore reduce the need for pilot plants and would assist industries in minimising both their operational costs and environmental impact.

10. Recommendations

The following changes are recommended:

- Adjusting the airlift reactor model dimensions to more closely approximate the dimensions used in the experimental data.
- Develop a finer mesh to provide results that are more accurate.
- Include a disengagement tank in the model dimensioning for improved liquid circulation and gas disengagement.

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INTEGRATING SOCIAL NETWORKS IN THE EDUCATION SYSTEM: PROS AND CONS

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Present students are investing a lot of energy on the web, particularly on social media. Social sites, which are content management systems, can offer an awesome potential for diversified learning. This exploratory work looks at the advantages and disadvantages of integrating social media into the context of education and learning. This exploratory research seeks to demonstrate the potential opportunities and pitfalls that social media could contribute to the teaching and learning practice. Surveys were conducted in small classroom settings in rural science schools in the Alice zone of the Eastern Cape Province. Students are subjects of both e-learning (with particular emphasis on social media) and traditional teaching techniques. Feedback forms were given to all students to complete. Afterwards, the forms underwent analysis. It came in light that, despite the fact social networks have a an vast opportunity to advance teaching and learning, there are barriers to use of cellophanes at schools and attitudes of educators towards social networks (e.g. many cited that social networks tend to waste valuable time that would otherwise be used on educational engagement, etc.). It is rational that social media can be powerful in changing instruction practices on the off chance that their use is for informative purposes. Social media can be powerful in changing instruction practices if they are used for informative purposes. This study suggests that both teachers and students must explore the opportunities offered by social media for educational advancement.

Keywords: *online social networks, Eastern Cape, rural areas, pros and cons, high school students, academic institutions*

1. Introduction

The rapid development of social networking sites (SNSs) has been apparent in the course of the last four to five years. It is revealing of its entrance into the mainstream civilization and its adjustment into our daily lives. Social networks have brought this new, fresh and different form of communicating using the internet irrespective of whether these are by means of PCs or cell phones. Education is one zone in particular in which people, in general, have conflicting viewpoints about social networks. Some people are supportive of their advantages in the classroom while others criticise them as a futile diversion to both teachers and students.

At the present moment, there are hundreds of social networks that exist online. These sites are attracting millions of individuals. With a surge in the number of individuals who utilise or have access to the web, SNSs are essential for people to keep in touch with one another, be it friends, family etc. (Srivastava, 2012).

Mostly the social networks have attracted the students in the institutions of higher learning. These students use these networks to remain in contact with their offline friends or to enhance existing connections and this is done as an alternative to creating new affairs. This has brought forward an insightful message that social networks can be an achievable medium to realise additional recognition of online learning.

Apart from what is mentioned above, there are different ways in which educators can propel their performance using social network communication instruments that are genuinely appropriate for developing students' performance. Analysts propose platforms such as Edmodo that can enable clients to post classroom materials; share joins, recordings, get to homework and school notices (Rivero, 2011).

These specific parts of 'training particular' long-range social networking sites are potentially the most satisfying to teachers who need the benefits of social network without any problem. These social sites enable teachers to go the additional mile to web conferencing with the web, sound, video, and long range social networking answers for 21st-century instruction and preparing (Rivero, 2011).

Therefore, academic institutions have to assume to adapt to new methods that will take in social networks for academic functions. This will enhance an environment to inspire students' communications because has by all means indicated that it relates very well to students studies. Making use of social networks has brought forward some several positive attributes. In addition to that, it seem to encourage higher acceptance rates among students. Although, an email may be a familiar technology that lecturers in almost all the intuitions have already adopted in facilitating academic communication in the form of message between them as well as their students. However, the planned use may be an acquainted communication tool (Srivastava, 2011).

Finally, high schools who aspire to demonstrate to students that their social networks are "cutting edge" can do so by implementing social media into their teaching and learning environments.

2. Problem Statement

Social media grew tremendously over the3 past years and has affected the way in which individuals communicate every day. In addition to that, social networks among students has become more and more accepted. These sites provide a way to create relations especially for friends that want to interact outside of school. This is to say that social interaction could be an approach that allows people to feel they need an area with a network. This has triggered some concern to economists and teachers and are addressing whether their assessments of students will be influenced by how much time is spent on these areas.

Choney (2010), Mehmood and Taswir (2013), Kist (2008), and Jacobsen and Forste (2011) trust that the service put forward by technology such as the internet may be a standout amongst the foremost imperative factors, which will have an indisputable effect on the educational performance of students. Many parents are concerned about their children's consistent involvement on the social sites such as Facebook on a daily basis. It is against this setting that this analysis of the impact of students' use of social networks in their academic environment is being carried out.

3. Objectives of the Study

The objective of the study was to discover the effects of web-based life on the scholarly performance of high school students in rural environments. The particular objectives of the study are as follows:

- To identify the benefits of using social media.
- To establish why students use social media.

4. Research Questions

- What effect does the use of social networks has on rural based high school students?
- Are there any benefits of these social sites to the when it comes to their performance at school?

5. Hypothesis

- The relationship of students and social networks is directly proportional to each other.
- Students performance can vary based on the time and what they do on these social sites.

6. Literature Review

The authors Abu-Shanab and Al-Tarawneh (2013) carried out a research. In their findings they were looking at the disadvantages and advantages of social networks to students that are studying at a higher institution. The authors used a sample of 206 students completed a survey containing ten advantages and ten disadvantages of Facebook and yielded fascinating results. The aim of the work was on the academic performance however they decide to handle the issue on the just the general view what the social media has on the students.

In education, there are two prevailing streams. In the first, the employment of social networks is viewed as a tool to support activities deemed vital for the aims of academic institutions, instructors, and students. The second stream views social networks as an unhealthy influence on student behaviour and time management. This study explores the connection between

performance and the use of social networks. The subsequent sections review the literature associated with the two streams and the issue of performance associated with students.

6.1 Benefits of Social Networks

Research has emphasised the importance of social networks in influencing young people. A study by Abu-Shanab and Frehat (2015) gathered 302 responses from young people in Jordan and investigated the influence of social networks on social reform. A conceptual model with five predictors of the intention to use social networks were used. These five predictors were: satisfaction, isolation, trust, social participation and intensity of SN use. The results indicated a significant prediction of intensity and isolation only.

Information and Communication Technologies referred to as (ICT), is has acquired enough equipment's that can aid in the academic spectrum. Computers and the internet are getting a lot of attention within the learning and teaching processes. With the appearance of mobile phones, particularly smart phones, it is easier to succeed in students and especially with capabilities of technology. A study utilised three teams of scholars, wherever the assignments and interactions wherever conducted with three levels: 1) ancient ways, 2) enjoyment of phones, and 3) intensive use of smart Phones in performing on mathematical assignments for varsity students (Nasser, 2014). The sample contained fifty-eight secondary students from Qatar. Results indicated a better performance in the smart phone cluster compared to the opposite two teams. The use of Facebook in universities has produced improved results.

6.2 Drawbacks of Social Networks

The negative influences of social networks on students' performance area unit reported in investigation, wherever a study by Haq and Chand (2012) used a sample of 384 students and ended that Facebook use has an adverse influence on student educational performance. The study noticed that males and females spent equal time on the net wherever females used Facebook additional; however, males had additional friends than females. The necessary distinction was that Facebook use had an adverse influence on males' performance than females. The authors accounted such adverse performance because of males pay longer on

sports and games activities than females that caused a loss of your time and a profane influence on performance.

Relating to the work outlined in the previous section, the development of social absorption and educational accomplishment (Gafni and Deri, 2012), concluded that exploitation of Facebook by students consumes times, and so negatively influencing educational performance. Victimization of mobile phones for texting and social network access additionally was explored to visualize if it is associated with the engagement level in schoolrooms, wherever analysis indicated that engagement is closely associated with teacher's style and management. Additionally, the utilization of social networks and mobile texting was not associated with lower performance results (Paul and Gelish, 2011). Such issue emphasizes the distraction that social media cause, however to not the extent of risking educational performance.

7. Methodology

The survey instrument used in this study was a questionnaire. The instrument was validated, and surveys were distributed to 40 science educators, 251 students on the school 150 learners in 5 different schools, and lastly, 75 members of the community. Responses from both educators and learners were examined.

7.1 Research Design

There are two general methods of research. These are in particular quantitative and subjective research methods.

7.2 Quantitative

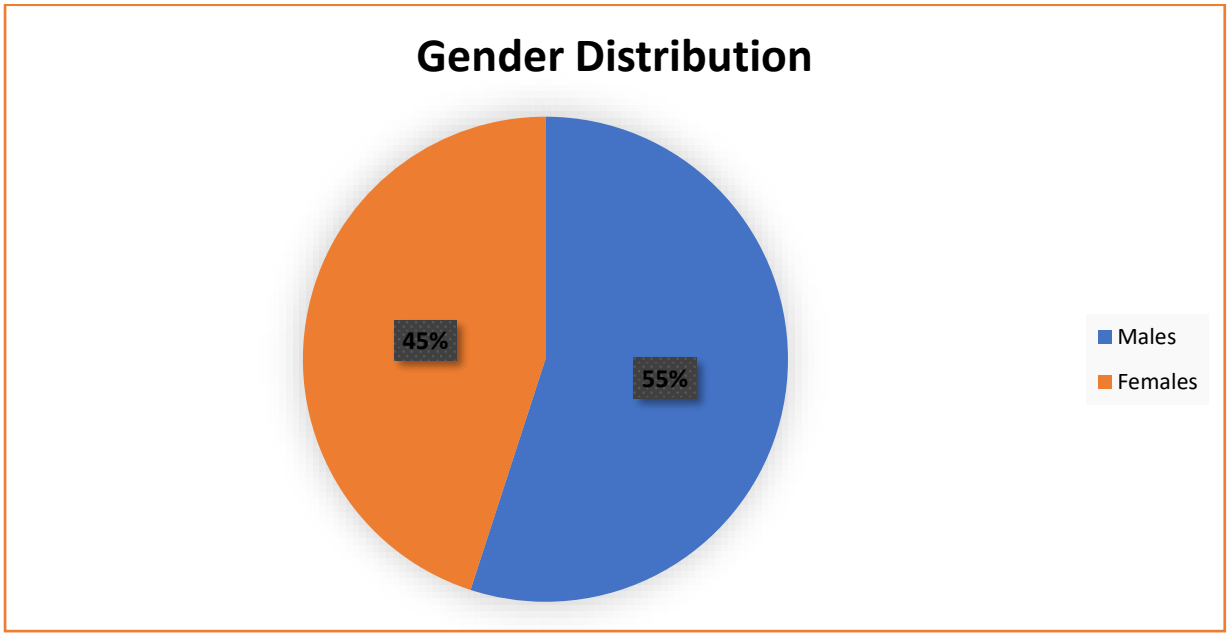
The standard for this exploratory work is quantitative. Particularly in surveys, where the majority of the work depends on numbers and measurable calculations, the quantitative method is constantly preferred because it is the one that gives correct and precise results. On the following section the results of the exploratory work are outlined in detail.

8. Results

The responses obtained from the respondents were carefully analysed. The results revealed that the majority of learners are technologically advanced in terms of gadgets and that they are accessing social sites using iPads and computers. Before processing the surveys, the general information of the students and teachers is concluded according to the following questions:

- How many students and teachers use online social networks?
- Which grade is using these sites more often and which site is the most popular?
- Why do both teachers and students use these social sites and who do they chat to most of the time?
- Do these sites help them achieve their specific tasks and how long do they have been using them?

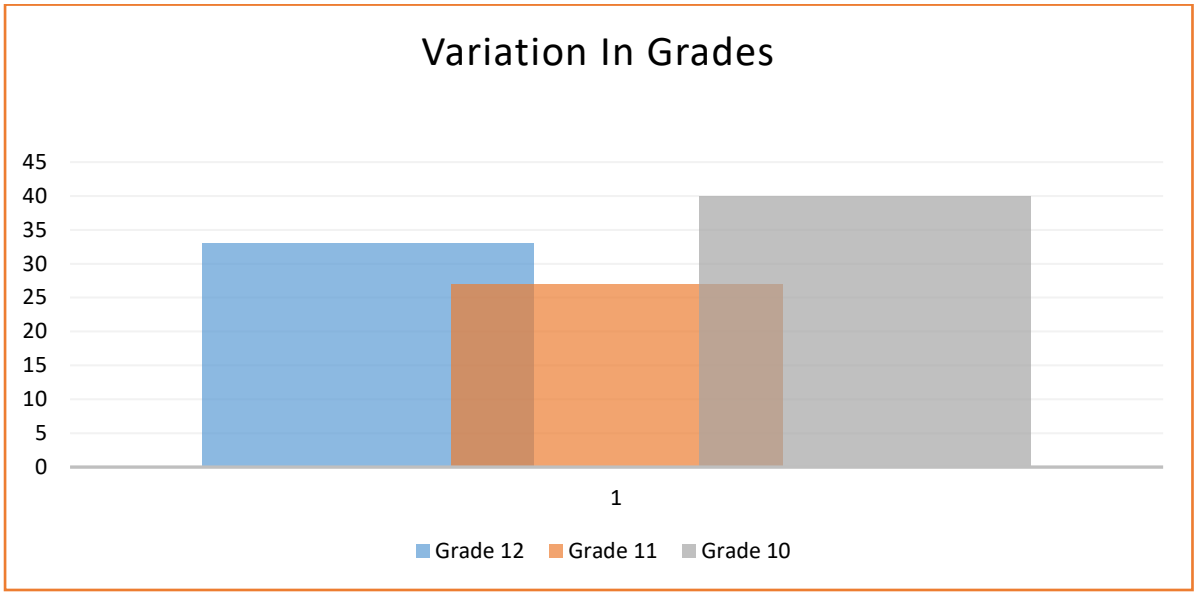
Figure 1: Gender Distribution



Males	Females
55	45

From **Figure 1**, we can deduce that males are using these social sites more than females. The **Figure1** only shows the gender distribution occurred to carry out this research work.

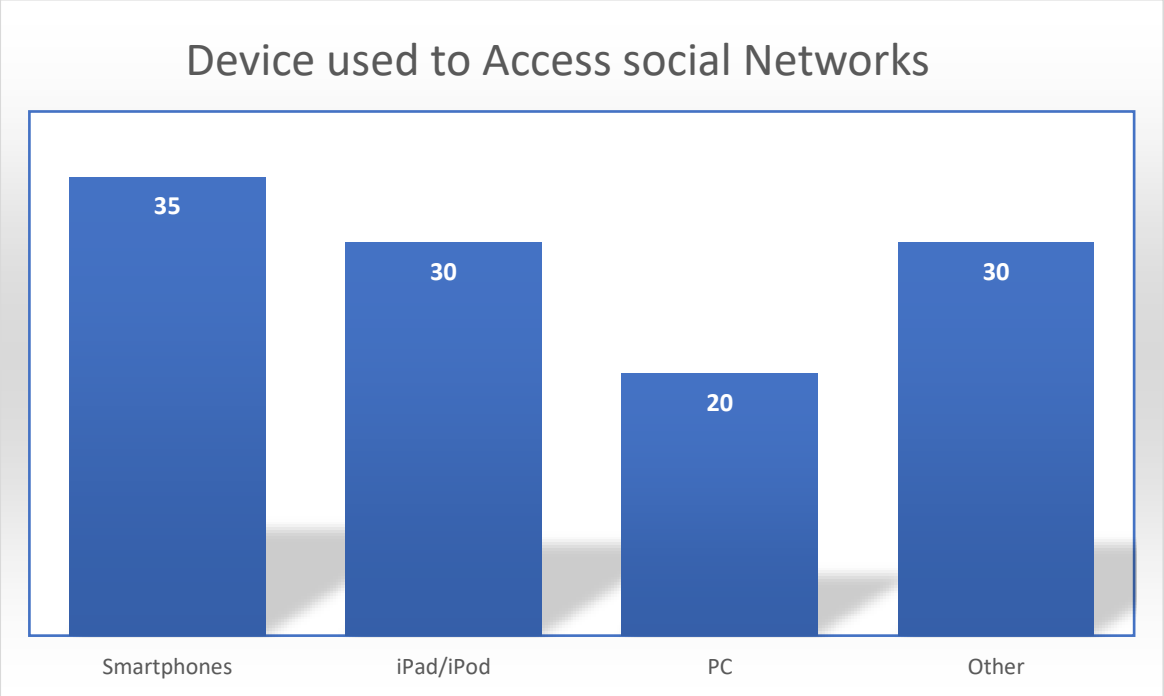
Figure 2: Variation in Grades



Grade 12	Grade 11	Grade 10
33	27	40

Figure 2 shows that among all the grades (ranging between Grade 10 and Grade 12), the class that uses social networks the most is Grade 10.

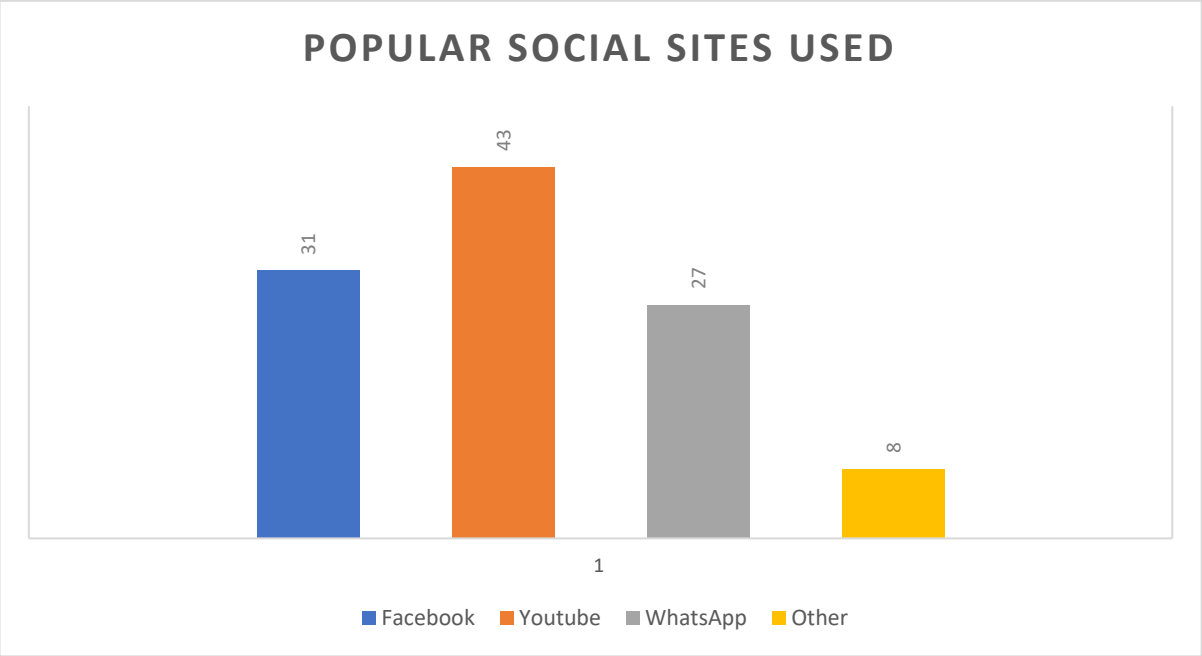
Figure 3: Devices Used to Access Social Networks



Smartphones	iPad/iPod	PC	Other
35	30	20	30

Figure 3 shows some of the devices that the students and teachers use to access social networks. **Figure 3** suggests (35%) of the time, the students and teachers are using devices like smartphone, which are the most used devices in this survey.

Figure 4: Popular Social Sites



Facebook	YouTube	WhatsApp	Other
31	43	27	8

Figure 5: Reasons for Using Social Networks

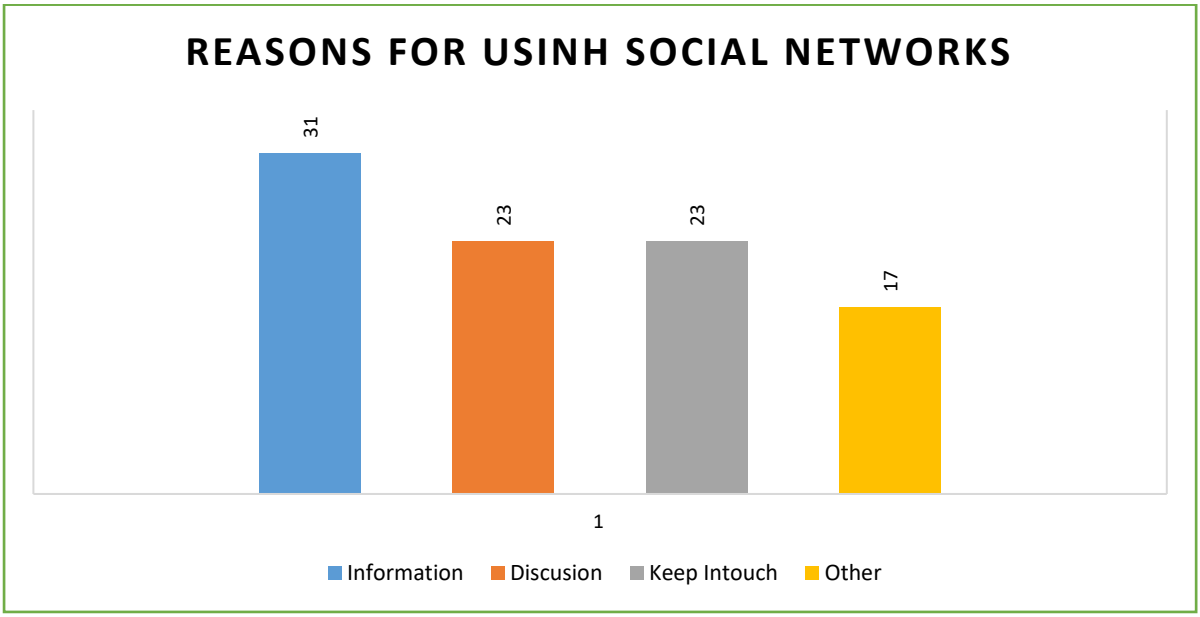


Figure 5 illustrates one of the most interesting findings that we have come across in this research. The figure demonstrates that the students use social sites for a variety of reasons, including the aspect of getting information online like (asking about a particular topic, asking for support materials etc.) which most of students do in these online networks. For the purposes of this research, it is interesting to note that the students indicated that they go online to access information by asking about a particular topic or asking for support materials.

There is huge number of key findings that concluded after the processing of the research data. 50% of the high school students have one or two social applications on their devices (e.g. personal computer, smartphone, or iPod etc.) other findings were that most students spend more than two hours on one social site daily, whether for schoolwork or for socialising. Sixty percent of the students have been assisted by the presence of these social sites in aiding them to achieve a specific task in the class.

70% of both students and teachers have agreed that the existence of social sites in their daily lives has significantly affected the way they study and perceive social sites as a helpful tool.

9. Conclusion

This work was trying to look at the performance of the students through the use of social media. This work was also attempting to look at both disadvantages and disadvantages of when his type of technology has bas been put into the education environment. The work is has produced quite promising results and with that seeming positive, there is a lot happier online which might be of danger to students as the internet is not a complete secure place. This work concluded that that the use of this technology in the education system can only show sufficient results especially when there is proper guide as to how when the students can use the social sites in the classroom.

10. Recommendations

With all the work that has been done which is evident in the literature that was carried out in thus work. In addition to that, what has transpired with the work that was carried out is that the findings did portray advantageous ways of how and when to use the social networks in the teaching and learning environment. One of the key advantages was to find that fact that the use of social media in the classroom can aid the teaching process, because while the students are

in class, if there is concept that they do not understand they quickly go online and find the relevant information. It is recommended that though this type of technology can be beneficial, proper monitoring and corporation, which will include, the student, parent and the teacher should be put into practice.

With time and the right technique, social networks such as Facebook may perhaps really become a valuable instrument for the educational system in the digital age. The paper recommends the good use of this technology achieving all advantages.

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A FRAMEWORK OF INTRAPRENEURSHIP DEVELOPMENT FOR CORPORATE ENTREPRENEURSHIP: A CASE STUDY OF ORGANISATIONAL DEVELOPMENT

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This study's intention is to better understand the complex internal workings of organisational dynamics by discovering what factors motivate employees to perform intrapreneurially in the business industry (McDowell). This study examined the antecedents and consequences of intrapreneurial activity in order to create an intrapreneurial framework for corporate entrepreneurship. Supporting the objective of this research, Chimucheka, as cited by Francisc, García-Rodríguez, Gutiérrez-Taño and Ruiz-Rosa (2017), indicates that entrepreneurial education has become one of the critical components of the tertiary education curriculum in South Africa. The need for specific research is evident from the limited data available regarding intrapreneurial motivation from the individual perspective within the business community. The basis of this study lies in understanding why intrapreneurs are motivated to innovate, look for opportunities, initiate risk-taking behaviour, undertake new, unproven intrapreneurial endeavours, and if the behaviour is repeated (McDowell, 2017).

The study adopted a quantitative method on a company case study. "Data was collected using survey method. A self-administered questionnaire was distributed to 30 participants." This kind of methodology intended to explore the reasons for the lack of innovation in the South African workforce. The research population of this study was obtained from a sample of employees in the education institution under discussion. The information was analysed utilising an adaptation of Version 25 of the Statistical Package for Social Sciences (SPSS) computer program.

The results suggest that a resistance to new ideas and processes, an absence of research and development departments in most organisations, noncompliance with innovative polices, and misunderstandings all demoralise the culture of intrapreneurship and innovation. These outcomes bolster the central thesis of this study, namely that polices and processes; a lack of communication; poor mind-sets, attitudes, and old habits inhibit intrapreneurship and innovation.

This study looked beyond the common barriers to creativity and innovation that weigh against the culture of intrapreneurship in the South African workforce. The abovementioned is applied by exploring common reasons for the abovementioned barriers. This paper further unpacked the standard descriptions of barriers to creativity and innovation in an attempt to find solutions for overcoming the challenges of this subject matter.

Considering the challenges mentioned above, it is to be trusted that this project would bear some significance to the South African workforce, intrapreneurial individuals, organisation managers, and academics in general, and be valuable to all those seeking improvement in corporate entrepreneurship.

Keywords: *intrapreneurship, development, corporate entrepreneurship, culture, innovation, creativity*

1. Introduction and Background to the Study

Tengeh, Iwu and Nchu (2015) argue that South Africa is confronted by the challenge of a high rate of unemployment. Muofhe and Du Toit (2011) support the abovementioned statement by indicating that South Africa is witnessing a high rate of unemployed graduates who are unable to secure jobs within the corporate sector. According to Chimucheka (2013), entrepreneurial start-ups are being encouraged as a solution to this challenge. The education of future entrepreneurs can be viewed as a catalyst for constructing individuals into entrepreneurs (Ibarra and Petriglieri, 2010), allowing them to re-story their lives and personal circumstances (Harmeling, 2011).

Chimucheka (2013) further argues for the development of initiatives that encourage entrepreneurial intent, especially within a South African context, Chimucheka (2013) concludes by suggesting that entrepreneurship education in South African society may solve the socio-economic challenges faced by ordinary citizens.

McGowan and Hu (2008) state that developing organisations actively search for means to improve, and that the concentration is for the most part outside of the organisation. Businesses purchase, consolidate, or work together with reputable inventive organisations to build market share and competitiveness, as they commonly think that it is challenging to make such radical developments in-house. According to Aksay (2011), intrapreneurship puts the general populace of the organisations in a position to support them in developing and scaling their initiatives. This paper intends to provide a manual for standardising intrapreneurship, with the goal that it becomes a part of organisational culture. It is at exactly that point that the process of constant development can take place, empowering the organisation to develop, while retaining entrepreneurial scholars inside within the organisation.

A key supposition in these developments is that entrepreneurship education increases students' career prospects and employability, either by empowering them to become independently employed people or through expanding their potential as more enterprising employees. Many efforts are therefore being made to advance entrepreneurial education in the formal school curriculum (Chimucheka, 2013).

1.1 Intrapreneurship and Entrepreneurship

Demirel and Tikici (2004) argue that the basic difference between *intrapreneurship* and *entrepreneurship* is that entrepreneurship is inventive action that is done through another firm (a start-up), built up fundamentally for that reason, whereas intrapreneurship is characterised by inventive movement that occurs inside a vast, built-up firm.

An “entrepreneur assumes the risk of the venture, generally by investing his or her own capital and reputation and by forsaking a guaranteed income, whereas an intrapreneur is commonly

thought of as an employee inside a large corporation who stays in-house to pursue her idea rather than leaving to form a start-up" (Darian, 2016). Pinchot (2015) defines an intrapreneur as a person who creates innovation of any kind within an organisation.

This research examined how intrapreneurship (entrepreneurship within an existing organisation) relates to organisational culture and policy compliance. By discovering the mechanisms and tools needed to encourage intrapreneurship to occur, we can learn how to optimise intrapreneurial behaviour. This study informs those individuals who desire a better understanding and increased knowledge of the intrapreneur's characteristics and self-conduct in the business industry.

2. Problem Statement

The majority of the South African workforce, particularly young graduates, lack intrapreneurial skills and therefore struggle to develop and improve the processes of the companies for which they work by applying their knowledge and skills to create innovation and competitiveness.

3. Research Objectives

- To analyse the impact of intrapreneurship on corporate development;
- To identify barriers to innovation in the workplace; and
- To provide a guide to institutionalising intrapreneurship so that it becomes an integral part of an organisation's culture.

4. Research Question

The research question to be answered in this paper is as follows: What are the barriers to the development of intrapreneurship in corporate entrepreneurship?

5. Literature Review

5.1. Defining Innovative Culture

Inventive culture, according to numerous specialists, scientists and academicians, is one of the ‘hot issues’ in regulatory science (Aksay, 2011). Uzkurt and Sen (2012) characterise inventive culture as the "sort of culture that has the imagination, introduction and dynamism properties”.

5.2 The Spirit of Intrapreneurship

When corporate entrepreneurship as scholarly dialogue began to build the conceptual framework of intrapreneurship relatively little difference between entrepreneurship and intrapreneurship evolved. Initial discussions only differentiated the two concepts based on self-gain versus organisational gain (Bergelman, 1983; Hisrich, 1990; Courmanopolis, 2015).

“Hammann (2006) asserts research concerning intrapreneurship concentrates on the organizational perspective and omits the individual aspect of intrapreneurial behaviour”. As the dialogue continued to develop and mature, corporate entrepreneurship began to be contrasted with individual intrapreneurial behaviour within the organisation as a separate phenomenon (Bann, 2007). “However, disagreements still exist where scholars continue to define differences between intrapreneurial behavior and intrapreneurial intentions contrasted with entrepreneurial behaviors and entrepreneurial intentions (Douglas and Fitzsimmons, 2013; Ravindra and Saiyed, 2012; Rekha, Ramesh, and Bharathi, 2014).”

Table 1: Benchmarking of Entrepreneurs and Intrapreneurs

	Entrepreneurship	**Intrapreneurship**
Basic patterns	Independence, creativity, opportunity and money	Independence and increasing company rewards
Time management	Achieving growth plans for 5-10 years of the firm and maintaining continuity of the activities	Following the plans that are considered as necessary according to urgency, between traditional managers and entrepreneurs
Activity	Being directly included	Being directly included without delegating
Role	Not attaching importance to status symbols	Not attaching importance to traditional firms' status symbols, desire for independence
Servicing	To themselves and to clients	To themselves, clients and sponsors

Source: Hisrich and Peters, 1995: 541(Demirci, 2007: 17)

5.3 Dimensions of Intrapreneurship

Due to its unique features, intrapreneurship is investigated in different models and formats. Lumpkin and Dess (1996) indicate that there are four dimensions in intrapreneurship. These consist of the following:

- **Innovation:** According to Miller and Friesen (1989), innovation may take place as a change in technology, service, or product. For organisations to prioritise innovation, having creative and innovative members plays a significant role.
- **Risk taking:** Covin and Slevin (1991) define risk taking as the "execution of speculation choices and key points under dubious conditions". As far as business enterprise, dangers are given choices, with respect to vulnerability and business under hazard, towards new item, market, process and endeavours (Cornwall and Perlman, 1990).

- **Proactivity:** Lumpkin and Dess (1996) define proactivity as "taking initiative through following and understanding new opportunities." Miller and Friesen (1983) highlight the need for proactivity this way: "rather than following competitors, being an Intrapreneur means being a leader among them."
- **Autonomy:** 'Autonomy' refers to the propensity of individuals to independently present a thought, vision, and development. To enhance business undertakings and advancement, rebuilding hierarchical capacities and strategies that help self-assurance and require overseeing steps ought to be considered.

5.4 Relationship Between Innovative Culture and Intrapreneurship

The modelling of certain behaviours and attitudes by employees constitutes an important factor in creating a long-term intrapreneurial organisational culture. According to Hult (2003), intrapreneurship is a process that is affected and fed by organisational culture. Guney and Nurmakhamatuly (2007) argue that organisational culture is one of the most important aspects of business. Intrapreneurship and entrepreneurship are therefore similarly affected by cultural values and facts. To cultivate the values of entrepreneurship in organisations, a culture that supports and develops those values must be tangibly present. According to Oktem (2003), in an ideal organisational culture, individualism moves to the foreground and the activities of entrepreneurs and intrapreneurs are regarded as considerably more significant.

Oktem (2003) recommends that an organisation which aims to espouse a creative and innovative labour force, must first develop its organisational culture through a plan. According to Chang and Lin (2007), a flexible and external-oriented organisational culture is more effective than other organisational cultures, and members of an innovative culture have a role to play efficient role in [e.g. identifying opportunities] in conditions that require sudden and necessary changes. Otitis (1998) states that the relationship between entrepreneurship and culture emerges from taking risks and utilising creativity and innovation. The importance of intrapreneurship stems from the fact that it increases the capacity of firms to innovate. Innovation can act as a defence against interior and exterior factors. It can also be used to describe an organisational process that activates production factors (i.e. labour and material).

5.5 Breeding Talent

According to Amabile and Khaire (2008), creativity has always been at the heart of business, but until now, it has not been at the top of the management agenda. By definition the ability to create something novel and appropriate, creativity is essential to the entrepreneurship that gets new businesses started and that sustains the best companies after they have reached global scale.

5.6 Reassuring and Supporting Collaboration

As leaders look beyond the top ranks for creative direction, they must combat what Diego Rodriguez, a partner at IDEO and the leader of its Palo Alto, California, office calls the "lone inventor myth." Though past breakthroughs sometimes have come from a single genius, the reality today is that most innovations draw on many contributions (Amabile and Khaire, 2008).

According to Johansson (2013), author of The Medici Effect, described his finding—"based on interviews with people doing highly creative work in many fields—that innovation is more likely when people of different disciplines, backgrounds, and areas of expertise share their thinking".

5.9 Gaining a Competitive Advantage

According to Bostjan and Robert (2001), "intrapreneurs do not operate on the well-established paths of a company: they perform at the edge, circumventing the company's comfort zone, scouting for previously unknown opportunities and markets, and collecting valuable insights into the competitive landscape. Employees working in this kind of environment identify blind spots, the opportunities and threats which are unseen and might otherwise be missed, and then exploit them".

5.10 Intrapreneurship and Its Direct Impact on an Organisation (Bostjan and Robert, 2001)

5.10.1 Environment

- Dynamism and technological opportunities
- Industry growth and demand for new products
- Favourability of change and competitive rivalry

5.10.2 Organisation

- Communication and organisational support
- Environmental scanning and formal controls
- Competitive-related values and person-related values

5.10.3 Intrapreneurship

- New business venturing and innovativeness
- Self-renewal and pro-activeness
- Openness to new ideas

5.10.4 Performance

- Growth and profitability
- Assumptions cloud

5.11 Barriers to Creativity and Innovation in an Organisation

5.11.1 Resistance

- **Cause:** Human nature often leads people to resist new ideas and concepts due to discomfort when confronting potential change agents. Difficulties that arise in measuring returns on

investment often cause management and leadership to resist creativity, as this is tantamount to embracing uncertainty.

- **Impact:** Convictions and old habits.

5.11.2 Judgement

- **Cause:** Fear of a new idea is frequently viewed as criticism and, from time to time, as harsh judgment. Individuals deride and criticise what they do not understand.
- **Impact:** Employees who have unique views are hesitant to share them, as they assume no one will take them seriously, and are consequently afraid of ridicule or the implication of failure.

5.11.3 Hard Work

- **Cause:** Implementing new ideas frequently and routinely requires an extensive measure of exertion and time to deliver results; numerous associations and representatives are hesitant to contribute the important time and push to finish an inventive task.
- **Impact:** Negativity grabs hold even before beginning a venture or an undertaking is evacuated before it even begins. A nonattendance of trust in the potential result of an innovative procedure can without much of a stretch frustrate or abolish what might have been the next great idea.

5.11.4 No Process

- **Cause:** Organisational staff, more often than not, have thoughts they are anxious to share, yet all they see is a dusty proposal box with few or no different channels to enter their thoughts.
- **Impact:** Past hierarchical experience demonstrates representatives that thoughts put in the proposal confine vanish to a dark opening, so workers do not try to submit anything, as they in the end feel no solid motivation to get included.

5.11.5 Misunderstanding

- **Cause:** Within an organisation, delegates who are not innovative in their work frames can misconceive creativity. At times administration will have little information of the kind of work it takes to deliver imaginative activities.
- **Impact:** An imperfect impression of what is inventive can result in working environment clashes that ruin profitability and flatten imagination or induce an upsetting or illogical workplace for a few representatives.

6. Methods and Materials

A quantitative research approach for a company case study was adopted in this study, where a self-administered questionnaire was distributed to the participants of the institution under discussion. Self-administered questionnaires were used because they have a comparatively high response rate. For validity and reliability, the questionnaire was pre-tested before it was used to collect data. While the survey questionnaire was the essential instrument used to collect data, the inclusion of literature provided scope for the benefits that accrue with knowledge of others pertaining to this subject. The intention behind doing so was to capitalise on the strengths inherent in both primary and secondary research data sources. Both primary and secondary data were used to conduct this research. The researcher used simple random sampling, a probability sampling technique in which each employee had a known and equal chance of selection to select respondents from the sampling frame which was constructed using the lists employees from all different departments of the institution under study.

According to Cooper and Schindler (2006), “simple random sampling is the purest form of probability sampling”. Validity refers to whether an instrument actually measures what it is supposed to measure given the context in which it is applied. The researcher used the following steps to ensure the validity of the study as pointed out by Cooper and Schindler (2006: using a statistician and a panel of experts to evaluate the research instrument for conceptual clarity, pre-testing the research instrument in a pilot study, using self-administered questionnaires which generally have a high response rate, and comprehensively reviewing the literature for theoretical constructs and empirical conclusions. Babbie and Mouton (2002) point out that

reliability is concerned with the consistency of measures. The collected data was analysed by the statistician of the institution under study using the statistical package, SPSS (Version 25).

Ethics were just as important for the successful accomplishment of this research work, therefore the researcher sought consent from the participants of the study and from the institution for which this research work is affiliated. This included not deceiving participants, avoiding misidentification of the researcher, ensuring confidentiality and transparency, communicating the purpose of the research to the respondents, and seeking their consent. This helped to reduce potential research errors that could have arisen because other people who were

supposed to be part of the research would have refused to participate.

7. Target Population, Sample Size and Sampling Strategy

The population of this study was comprised of staff from the Finance Department, academic department, and Information Technology department in a tertiary education institution. The population size of interest from which the sample was drawn contains an aggregate of seventy employees from which the thirty-employee sample for this study was drawn. Participants chosen were all surveyed with one questionnaire, specifically formulated to extract the relevant information from each of them accordingly. A probability sampling technique was employed in the study as explained above. With this sampling technique, the researcher ensured that every individual from the company under study had an equal opportunity for selection.

8. Research Results

The results of this research are discussed by referring to the following aspects:

- The absence of research and development departments in most organisations as a barrier to intrapreneurship.
- Top management being receptive to the ideas and suggestions of employees.
- The South African tertiary curriculum fostering innovative thinking which leads to the development of intrapreneurship.

- The level of an organisation's technological capacity as a determinant of the level of its corporate innovation.
- The internal factors contributing to a lack of intrapreneurship and innovation in an organisation.

Table 2: Top Management is Receptive to My Ideas and Suggestions

Top management is receptive to my ideas and suggestions			
	Frequency	Valid Percentage	Cumulative Percentage
Agree	8	26.7	26.7
Disagree	22	73.3	100.0
Total	30	100.0	

The table above shows that only eight people (26.7%) admitted that top management is receptive to their ideas and suggestions. The majority of the 22 participants (73.3%) indicated that top management is not receptive to their ideas and suggestions. The majority of the respondents believe that should the top management of organisations be receptive to employees' ideas, the culture of intrapreneurship would improve.

Table 3: The Absence of Research and Development Departments

The absence of research and development departments in most organisations is a barrier to intrapreneurship			
	Frequency	Valid Percentage	Cumulative Percentage
Agree	28	93.3	93.3
Disagree	2	6.7	100.0
Total	30	100.0	

The table above indicates that 28 participants (93.3%) indicated that they believed that the absence of a research and development department in most organisations was a barrier to intrapreneurship, while two participants (6.7%) believed it was not. These results demonstrate that the majority agree with the statement above, therefore the solution to this would be that the South African industry and academics equally come together and invest in the research and development of its citizens, which will result to the South African workforce experiencing a completely new prosperous business millennium.

Table 4: The South African Tertiary Curriculum Fosters Innovative Thinking, Which Leads to the Development of Intrapreneurship

The South African tertiary curriculum fosters innovative thinking, which leads to the development of intrapreneurship			
	Frequency	Valid Percentage	Cumulative Percentage
Agree	18	60	60
Disagree	12	40	100.0
Total	30	100.0	

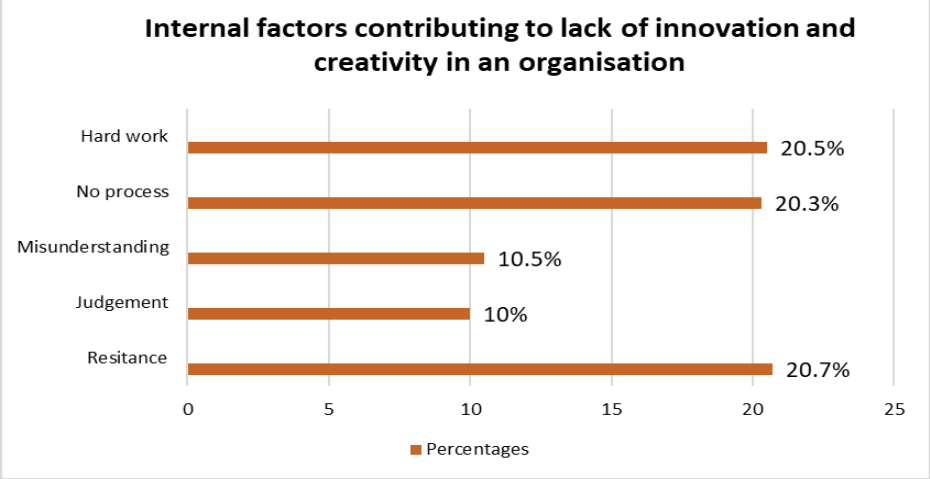
The question pertaining to the South African tertiary curriculum fostering innovative thinking, leading to intrapreneurship development, resulted in 18 participants (60%) indicating their agreement with the statement. The other 12 participants (40%) indicated that they disagreed with the statement. These results suggest that, when and if the South African education department recreates the tertiary curriculum in such a way that encourages innovative thinking, the country's infrastructure and the quality of thinking and knowledge and skills application of its employees will be geared towards the development of intrapreneurship.

Table 5: The Level of an Organisation's Technological Capacity Determines the Level of its Corporate Innovation

The level of an organisation's technological capacity determines the level of its corporate innovation			
	Frequency	Valid Percentage	Cumulative Percentage
Agree	20	66.7	66.7
Disagree	10	33.3	100.0
Total	30	100.0	

Table 5 indicates that the majority of the participants (77.7%) agreed with the statement that an organisation's level of technological capacity determines the level of its corporate innovation, with only 33.3% disagreeing with this statement. These findings suggest that most participants of this study believe that there is a synergy between the technological capacity of organisations and the level of their corporate innovation.

Figure 1: Internal Factors Contributing to a Lack of Innovation and Creativity in an Organisation



According to Figure 1, the majority of respondents (20.7 and 20.5) attested that resistance and hard work are barriers to creativity and innovation. Only 20.3% of the respondents indicated that the lack of process is also one of the most prominent barriers to intrapreneurship development. Lastly, a minority of respondents (10% and 10.5%) indicated that judgement and misunderstanding are factors contributing to a lack of innovation in an organisation.

11. Summary and Discussions

The results of the questionnaire suggest that a resistance to new ideas and processes, the absence of research and development departments in most organisations, a lack of hard work, a noncompliance with innovative polices, and misunderstandings all undermine a culture of intrapreneurship and innovation. These results support the main thrust of the literature reviewed in this study: that policies and processes, a lack of communication, antiquated mind-sets and attitudes, and old habits bar intrapreneurship and innovation. These barriers are physical, habitual, procedural and psychological.

12.1. Culture of Innovation

The effects of innovation impact organisational cultures in many industries (Wahba, 2016). McDowell (2017) states that "Organizational culture is a prominent topic of discussion in literature and raises issues concerning how to optimize creative behavior inside the existing infrastructure through organizational change."

"Since innovation requires change, the capacity of organisations to change their cultures, institutional norms, and long- held beliefs can be a daunting task for the leaders of organisations. The capacity for organisations to change into an innovative culture has been identified with characteristics conducive of trustworthy leadership combined with trusting followers. Without the interrelationship of leader-follower trust, organisational change in favour of innovative cultures is much less likely to occur" (Judge, Bowler, and Douglas, 2006).

12.2 Managing Resistance to New Ideas and Change

12.2.1 Explicit Resistance

New ideas often meet with resistance. Since innovations threaten the status quo, resistance is a normal reaction. As Niccolo Machiavelli explains, “There is nothing more difficult to carry out, nor more doubtful of success, nor more difficult to manage, than the creation of a new system”.

Explicit resistance comes in the form of open criticism. It is easier to manage because it is visible. Below are a few reasons for explicit resistance to innovation and creativity:

- Not needed in the marketplace or in the business
- Too risky
- Too expensive
- Bound to fail
- Not technically feasible

12.2.2 Hidden Resistance

Managing hidden resistance is a greater challenge. Since it is generally passive, it is more difficult to recognise. It often surfaces during the action phase of a project**.** Causes of hidden resistance:

- Fear of the unknown
- A belief that innovation is not necessary
- Personality conflicts
- The desire to protect oneself from risk or uncertainty
- An assessment or understanding that differs from yours
- Lack of rewards for innovating or accepting change
- Fear of disruption of organisational order or company culture
- Concern about workload or available resources

12. Conclusion

Intrapreneurship development escalates in importance as a dimension worthy of thorough and proper examination. The study is based on grounded theories that contributed to the body of knowledge of entrepreneurship providing rich and in-depth data. The collected data and theoretical framework demonstrated the need for a protective and nurturing environment where voluntary intrapreneurship can occur.

13. Implications

Most organisations would concede that the South African workforce does indeed lack an intrapreneurial culture, so numerous organisations look outside their own organisation to find radical innovation. Given the overarching need for innovation and creativity in today's businesses, any research that sheds light on the 'what, where and how' of developing an intrapreneurship culture for the emerging corporate entrepreneurship would be welcome. Hence, it is hoped that this paper will be of benefit to South African businesses. In particular, it is anticipated that this paper may spur innovation through the development of intrapreneurial cultures within South African organisations. In addition, the study has the potential to bring academic institutions and the industry into closer alignment while simultaneously contributing to the growth of the South African economy through the development of innovation, creativity and intrapreneurship, particularly among the youth of South Africa.

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EFFECT OF TRIPLE *Talaq* INVOCATION ON DEVELOPMENT OF WOMEN'S RIGHTS IN NIGERIA

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Article 6 of Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa (Maputo Protocol) enjoins State Parties to ensure that men and women enjoy equal rights and are regarded as equal partners in marriage. To this extent, State Parties have the obligation to enact laws to guarantee that the rights of women in marriage and family are promoted and protected. Article 7 of the Protocol further enjoins State Parties to ensure that separation, divorce and annulment shall be effected by judicial order with men and women having equal rights in seeking separation, divorce and annulment of marriage. Consequently, Nigeria enacted the Violence Against Persons (Prohibition) Act (VAPPA) in May 2015 to domesticate the provisions of the Maputo Protocol. While majority of the provisions in the Protocol are expressly criminalized and prohibited in VAPPA, the Act did not expressly address the rights of women in matrimonial causes in Nigeria. The Matrimonial Causes Act (Cap M7, Laws of the Federation of Nigeria, 2004) applies exclusively to parties of statutory marriage to the exclusion of parties to customary law and Islamic law marriages in Nigeria. The invocation of triple talaq, which is a pronouncement thrice by a husband to divorce a wife is a valid means of bringing an Islamic marriage to an end. This study investigates the prevalence of the invocation of triple talaq in Nigeria. The study further investigates the extent to which the invocation of triple talaq impedes the realization of women's rights in matrimonial causes in Nigeria as advocated by the Maputo Protocol, to which Nigeria is a party. The method adopted in this study is the qualitative approach through the use of survey. Participants were randomly selected across the six geopolitical zones of Nigeria and the survey was administered using survey monkey, an online tool, to collect and analyze data. The data was analyzed through the use of statistics frequency. The article makes recommendations as appropriate on the rights of women and religious demands in Islamic law divorce in Nigeria.

Keywords*: Islamic law, triple talaq, Women's rights, Islamic divorce, Nigeria.*

1. Introduction

The social system of Islam has been said to be a very simple one with the religion being a perfect way of life with the Almighty Allah desiring ease and not hardship for his followers (Qur`an 2:185). While the Islamic law on divorce is simple and kept moderate, discussants of the discourse have deviated from the prescribed simple form of the law but have rather made the law harsh and severe which has caused Muslims hardships in their social life (Pirzada, 1996).

The discourse around triple talaq has generated a lot of controversies with many scholars agreeing on the validity of invocation of talaq but with diverse opinion on the validity or legality of triple talaq, which instantly brings a marriage to an end without the option of revocation. There is a consensus on the fact that divorce at the instant of the husband is not effective and final until after the invocation of a third talaq. However, the manner of invocation of talaq to attain finality in divorce has caused a lot of Nigerian women hardship and made them vulnerable to divorce, even when they are ready and willing to put in their best to ensure that their marriages succeed.

This article seeks to examine the constitutionality of triple talaq against the protection of women's rights in Nigeria. The article investigates the prevalence of the practice of triple talaq across Nigeria and the available options of invoking talaq without infringing on women's rights while at the same time respecting the right to freedom of religion.

2. Problem Statement

Both verbal and written talaq are popularly practiced in Nigeria with the most accepted practice being the written form of talaq invocation. In the case of Amina Mustatapha Haye v. Bashiru Zamfara, (CV 165/12 (Unreported) Upper Shari'ah Bompai, Kano.) the written talaq by the Respondent addressed to the Petitioner was held to be a valid talaq. There appears to be a consensus that written talaq is preferred to verbal or implied talaq because it brings about certainty in the waiting period and gives validity to the divorce without having to prove the existence or otherwise of the state of mind of the husband as at the time of the invocation of talaq (Salaudeen, 2015).

Triple talaq is common across Muslim communities in Nigeria with husbands pronouncing talaq three times at one sitting and usually in a state of anger (Salaudeen, 2015). On whether triple talaq pronounced in a state of anger amounts to one talaq or three, the courts have repeatedly (Naima Ahmed Gwammaja v. Danladi Haruna, CV/787/13 (unreported) Waje Shariah court No.7 Fagge, Kano; Habiba Muhammad Tisama v. Abbas Idris Tisama CV 27/12 (unreported), upper Shari'ah Court, Bompai, Kano) held that such invocation of triple talaq will be counted as three talaqs and brings the divorce to a final state.

A high incidence of conditional talaq has also been reported in Nigeria such that the husband exerts his authority by placing a condition on the wife, a breach of which leads to a divorce. An example is for the husband to utter a statement such as 'if you stem out of this house, consider yourself as divorced' While this form of divorce is in line with Islamic law requirement, call for caution in conditional talaq has been made.

The end result of this form of divorce of Nigerian Muslim women is that many women are left homeless without means of survival and this has contributed to the poverty rate which manifests in the high number of women and children beggars on the streets of Nigeria. This in turn has its toll on Nigeria's commitment towards the sustainable development goals of achieving equality. It is against this background that this study investigates the prevalence of triple talaq and its effect on women's rights in Nigeria.

3. Research Objectives

The specific objectives of this study are to:

- Investigate the prevalence of the invocation of triple talaq in Nigeria;
- Determine the extent to which triple talaq invocation impeded realization of women's rights in Nigeria;
- Assess the constitutionality of triple talaq invocation in Nigeria;
- Make recommendations on the invocation of talaq in Nigeria.

4. Research Questions

- Is the pronouncement of triple talaq constitutional in Nigeria?
- What is the prevalence of triple talaq invocation in Nigeria?
- How can women in Nigeria be protected from invocation of triple talaq?

5. Literature Review

In the Nigerian context, marriage is strictly a union of one man to one woman or more, depending on the type of marriage contracted (Adelakun-Odewale, 2014). As such, a union between persons of the same sex is strictly prohibited in Nigeria (Section 1 of Same Sex Marriage (Prohibition) Act, 2014) and where such marriage is solemnized outside Nigeria, it cannot be recognized in Nigeria. Thus, the concept of marriage in Nigeria connotes 'a legal union entered into between persons of opposite sex in accordance with the Marriage Act, Islamic Law or Customary Law.' (Section 7 of Same Sex Marriage (Prohibition) Act, 2014). A single approach cannot be adopted to define or explain marriage in the Nigerian context. The definition of marriage will be governed by the nature of the marriage and the laws guiding the formation of such marriage. It suffices therefore to state at this point that for a union to qualify as marriage in Nigeria, the parties involved in the contract must be of opposite gender.

However, with advancement in medical technology that now makes it possible to carry out a Sex Reassignment Surgery (SRS) on a transgender person's physical appearance to make him or her have the features and functions of the gender that they socially identify with, the requirement of opposite sex parties may pose a challenge in Nigeria. Although at present, there is no such case before the Nigerian courts, the English court in Corbett v Corbett (1971, p. 83) failed to recognize the new gender of a person that had a sex change operation. However, the Australian court in Re Kevin (2001, Fam. CA 1070) refused to follow the decision in Corbett and opined that it will be wrong to insist that a person's sex depends on a single factor of chromosome or genital sex but all relevant matters needs to be considered. The court thus held that a person's sex for the purpose of marriage is to be determined as at the date of the marriage and not otherwise.

Statutory marriage is regulated by the Marriage Act (Cap M6 Laws of the Federation of Nigeria 2004). Statutory marriage is strictly monogamous in nature and any departure from this without judicial separation or death of either party amounts to a crime punishable by five years' imprisonment (Section 39 of the Marriage Act Cap M6, LFN 2004). Thus, statutory marriage has been defined as the voluntary union for life of one man and one woman to the exclusion of all others until divorce or death. (Hyde v Hyde (1886) LRIP&D 130 at 133) There are prescribed rules and formalities to be adhered to for a marriage to be valid under the statute and when these prescribed rules are not complied with, without any permission for non-

compliance, such a marriage is defective and only qualifies as a customary law marriage and not a statutory marriage in Nigeria.

Customary law marriage on the other hand is a union for life of one man and one or more women (Nwogugu, 2014). Customary law marriage is contracted according to native laws and customs (Osondu, 2012). As such, the requirement for a valid customary law marriage differs across Nigeria. This is due to the fact that Nigeria is a multi-ethnic society with diverse cultures and the customs of the people are as varied as the number of ethnic communities.

A distinct feature of customary law marriage is its polygamous nature. This does not connote that a man's decision to marry only one wife disqualifies the marriage from being a customary law marriage, rather, the capacity of the man to take as many wives as he wants is what makes the marriage customary in nature. This differs from statutory marriage where a man cannot marry another woman unless there is divorce or death of the wife. Customary law also differs from Islamic law marriage in terms of the restriction on the number of wives that a man of Islamic law marriage can take.

5.1 Formation of Islamic Law Marriage in Nigeria

Islamic law marriage has been defined in its primitive sense to mean carnal conjunction, while it has been defined in legal sense to mean a contract used for the purpose of legalizing offspring Al Marghinani, 1982). The formation of Islamic law marriage in Nigeria is similar to what obtains in every Islamic law marriage globally. The doctrine of Islamic law marriage contract is governed by the doctrine of Shari`ah which derives its sources primarily from the Qur`an and Sunnah (Doi 2006). Just like any other form of marriage in Nigeria, there are requirements to be met before an Islamic law marriage can become valid. The major requirements of a valid Islamic law marriage are offer, acceptance, consent, dower, witnesses and prohibition of consanguinity and affinity relationships. The focus of this article will only be on triple talaq.

5.2 Dissolution of Islamic Law Marriage by Talaq

There are various ways to bring a marriage to an end under Islamic law but the focus of this paper is on talaq. Islamic law discourages divorce except in circumstances where it is inevitable; rather, the law recommends forbearance (Abdullah, 1989), patience, self-restraint

and continuation of marital relationship even in the face of disagreement because divorce is reported to be the most abominable to God of all the things permitted in Islam (Sabiq, 1975).

Since divorce is allowed as a matter of necessity in Islamic law, the Qur`an recommends attempts at reconciliation before divorce. The manner of reconciliation will depend on the source of the dispute. If the source of the conflict arises from the husband, Islamic law requires the parties to resolve their differences amicably (Qur`an, 4:128). However, if the source of the conflict is as a result of the wife's disobedience, Islamic law recommends certain disciplinary measures to make the wife obedient (Qur`an, 4:34). Where the source of the dispute is unknown, Islamic law requires the appointment of two arbiters from both sides of the spouses' family to look into the conflict with a view to reconcile the couple (Qur`an, 4:35). Where these measures at reconciliation fails, the spouses are allowed to divorce (Qur`an, 4:130).

Talaq is a noun derived from the Arabic verb – Yutalliq, which literally means to free or to untie. Talaq has been described as the husband's unilateral repudiation of his wife (Moller, 2014). The concept of talaq evolved from the Arabs of the pre Islamic era who used the concept to mean separation of the wife from the husband after which Islam adopted and reformed the practice. Talaq has been described by the Maliki School as a rule that terminates the lawful enjoyment of a wife by her husband. To the Shafi'i school, talaq means to untie the knot of marriage contract with the use of certain words that connote separation or having similar meaning.

Islamic scholars differ in their view on the permissibility of talaq. The majority are of the view that talaq is only permitted when there is a cogent reason for it and should not be a tactic to change women as and when men like (Gurin, 2014). In this regard, talaq is classified into four classes – wajib (obligatory), haram (forbidden), mubah (permissible) and mandub (recommended). The obligatory talaq is the one effected by two arbiters, who try to reconcile the parties and if the arbiters are of the opinion that divorce is the only suitable way to end the conflict between the couple. Talaq is also said to be obligatory where the husband vows to abstain from sexual intercourse from the wife and thereafter waits for four months without sexual intercourse with the wife (Qur`an, 2:226-227; Sabiq 1975, p. 243).

Forbidden talaq is the talaq implemented without any justifiable reason. Thus, where a husband invoked talaq without any reason but just for his own interest, such talaq falls within the ambit

of forbidden talaq. Permissible talaq is a lawful talaq that is invoked out of need such as where the wife is of bad character, which may affect the husband negatively if he continues to live with such wife (Sabiq, 1975). Talaq is recommended where the wife refuses or neglects to perform duties imposed on her by Allah such as salat (prayers). The husband must have tried all means within his powers to make the wife fulfil such duties but such efforts must have proved abortive or if the wife is unchaste.

For talaq to be valid, it has been posited that there must be four elements which are: the capacity of the husband who pronounces the talaq, the wife who is the subject of the talaq, the intention to divorce, and the formula for pronouncing talaq. For a talaq to be valid, the husband invoking talaq must have the legal capacity, that is, he must be of age, sound mind and the invocation must be voluntary. Where the husband is found wanting on any of the requirements of capacity, such talaq invoked is ineffective and invalid (Aliyu, 1996). This is based on the assertion that every divorce, except the coerced, is permissible. As such, where a husband invokes talaq in a state of involuntary intoxication, the talaq is ineffective because the state of intoxication is against the husband's will and he will be deemed to have acted under the influence of intoxication.

The paramount consideration in the invocation of talaq is the communication of the husband's intention to divorce his wife. This intention could be conveyed orally, in writing, by proxy or by gesture. Talaq can also be implied from the expressions of the husband to his wife. On the finality of talaq, the invocation of talaq is a single divorce at the first instance which can be followed by a revocation and then invoked a second time which could also be followed by a revocation. After the second invocation, a husband may either live with his wife in fairness or separate with her with kindness (Qur`an, 2:229). When talaq is invoked the first or second time, the wife is required to remain in the house with the wife having to observe her waiting period, within which period the husband may reconcile with her. The husband is also required to provide for the wife during the waiting period (Qur`an, 65:1).

A popular formula of talaq practiced by some is known as talaq bid-i which is contrary to the teachings of the Qur'an and the Prophet. This form of divorce entails pronouncing talaq three times at once irrespective of the state of the wife (Sabiq, 1975). All Islamic law scholars agree that this kind of talaq is prohibited and a husband who invokes talaq bid-i commits a sin.

However, there is diverse opinion on the validity and bindingness of this form of talaq with the majority of scholars agreeing that the invocation of the talaq is valid and binding. The four Sunniy Sunni schools agree on this point. The minority view is that while talaq bid-i is religiously forbidden (This includes Ibn Taymiyya, Ibn Qayyim and Ibn Hazm). The Maliki and Hanafi schools of thought are of the opinion that any husband that divorces his wife during menstrual period or post-natal bleeding is under an obligation to take her back and, where he refuses, he should be threatened by means of arrest or beaten. Where he still refuses, he should be detained and beaten; where he still refuses, the judge should act on his behalf with the husband having the opportunity to divorce the wife after the blood flow without having intercourse with her. The Hanafis, however, differ slightly by maintaining that the judge has no right to take the wife back on behalf of the husband but should rather impose punishment on the husband for refusing to take the wife back (Abdul Rehman, 2005).

The idea of triple talaq has been criticized as preventing the opportunity of reconciliation and detrimental to the wife. A third talaq cannot be revoked and it is final and completely brings an end to the marriage and if the husband desires to remarry the wife, she must have married another man who must have consummated the marriage and divorce the wife of his own volition or must have died (Qur`an, 2:230). The marriage with another man must not be arranged in order to enable the couples to remarry but must be a voluntary union between the wife and the second husband.

5.3 Talaq and Women's Rights in Nigeria

Nigeria is a signatory to various international treaties that guarantees and protects women's rights. Nigeria ratified the Convention on the Elimination of all forms of Discrimination against Women (CEDAW) in 1984 without reservations. Nigeria further signed the Optional Protocol in 2000 and ratified same in 2004. CEDAW seeks to achieve equal rights for women all over the world. However, based on the requirement of section 12 of the Nigerian Constitution that no treaty shall have the force of law except if it has been enacted into law by the National Assembly, CEDAW is yet to be expressly domesticated in Nigeria till date.

Of importance, however, is Nigeria's ratification of African Charter on Human and Peoples' Rights in June 1983. Nigeria further signed the Optional Protocol to African Charter on Women's Rights (Maputo Protocol) on 16 December 2003 and ratified the Protocol on 16

December 2004. The Maputo Protocol seeks to combat harmful practices against women and aims to eliminate all differences between men and women as far as possible by guaranteeing comprehensive rights to women on the African continent. State Parties are enjoined to include in their national constitutions and other legislative instruments the principle of equality between men and women and ensure its implementation (Article 2 of the Maputo Protocol). In terms of Article 3 (3), State Parties are further enjoined to take measures to prohibit exploitation and degradation of women.

Specifically, the Protocol (Article 6 (c)) protects and promotes the right of women in marriage, whether monogamous or polygamous. State Parties are implored to enact legislations to ensure that men and women enjoy the same rights in case of separation, divorce or annulment of marriage. Article 7(a) of the Protocol provides that 'separation, divorce or annulment of a marriage shall be effected by judicial order' and 'women and men shall have the same rights to seek separation, divorce or annulment of a marriage' (Article 7 (b)).

The ratification of the Maputo Protocol came with high hopes across Africa on the possibility of achieving protection and promotion of women's rights across Africa. However, more than thirteen years later, the dream of women's rights protection and promotion across Africa is still a mirage. Nigeria enacted the Violence Against Persons (Prohibition) Act (VAPPA) in 2015. While the VAPPA is not solely dedicated to women, many of its provisions echoes the aims of the Maputo Protocol. Particular reference relevant to this discourse is section 9 of the VAPPA. Section 9 of the Act provides that:

'9 (1) A person who forcefully evicts his or her spouse from his or her house or refuses him or her access commits an offence and is liable on conviction to a term of imprisonment not exceeding 2 years or to a fine not exceeding N300,000.00 or both.'

However, the Gender and Equal Opportunity Bill, 2016 which seeks to give effect to the CEDAW and Maputo Protocol, was rejected after passing the second reading at the National Assembly. A basis for the rejection of the Bill is that the content of the Bill was inconsistent with the religious and cultural beliefs and practices of the Nigerian citizens and thus unworthy of being passed as a law in Nigeria.

Nigeria also adopted policies and guidelines that seeks to protect and promote women's rights. However, of all these laws enacted and policies adopted by Nigeria, none specifically seek to guarantee equal rights of men and women in marriage and divorce. The only instance where the idea of equality in marriage manifests itself is the Matrimonial Causes Act (Cap M7, LFN 2004) but in reality, the cultural practices in statutory marriages still recognize the rights of the man as the head of the family to whom the wife must always submit. Thus it is safe to conclude that Nigeria is yet to domesticate CEDAW and Maputo Protocol.

6. Research methodology

The study adopted the doctrinal and empirical methods of research with data gathered by non-identifiers online surveys with representation across the six geopolitical zones of Nigeria. The study used a mix scale approach of descriptive statistics and secondary data. The data collection focuses on both male and female Nigerians of the Islamic faith. The spatial information of the study was obtained from various sources including interviews. This information was thereafter analyzed with basic descriptive statistics and pictorial representation.

7. Result and Discussion

Both verbal and written talaq are popularly practiced in Nigeria with the most accepted practice being the written form of talaq invocation. In Amina Mustatapha Haye v. Bashiru Zamfara, (CV 165/12 (Unreported) Upper Shari`ah Court Bompai, Kano) the written talaq by the Respondent addressed to the Petitioner was held to be a valid talaq. There appears to be a consensus that written talaq is preferred to verbal or implied talaq because it brings about certainty in the waiting period and gives validity to the divorce without having to prove the existence or otherwise of the state of mind of the husband as at the time of the invocation of talaq.

In some parts of the North East, interviews with married and divorced persons revealed that the widely practiced form of talaq is the verbal triple talaq and talaq by conduct. It is popular in this region to invoke talaq by uttering the words 'I divorce you, I divorce you, I divorce you', or by relying on the words 'go back to your house and never come back.' A petition by a wife that the husband required her to go back to her house and a denial of the statement by the wife followed by his claim to have divorced her was held to be a valid divorce as implied divorce

in the case of Bara'atu Suleman Fagge v. Ibrahim Musa Zuma. (CV/1139/13 (unreported) Waje Shari`ah Court No. 7, Fagge, Kano)

However, interview with some married and divorced men revealed that some women actually instigated the invocation of talaq by frustrating the man to divorce them. A particular respondent claimed that women that are tired of the marriage go to the extent of threatening to harm the husband if he refuses to invoke talaq. According to him, 'some women insist on the husband to invoke talaq in order to avoid instigating divorce so that they will not have to refund the dower paid on them.' An instance of a woman who chased her husband around the house threatening to stab him unless he invokes talaq was cited.

Triple talaq is common across Muslim communities in Nigeria with husbands pronouncing talaq three times at one sitting and usually in a state of anger. On whether triple talaq pronounced in a state of anger amounts to one talaq or three, the courts have repeatedly held that such invocation of triple talaq will be counted as three talaqs and brings the divorce to a final state. (Naima Ahmed Gwammaja v. Danladi Haruna, CV/787/13 (unreported) Waje Shari`ah Court No.7 Fagge, Kano; Habiba Muhammad Tisama v. Abbas Idris Tisama CV 27/12 (unreported), Upper Shari`ah Court, Bompai, Kano.) Among those interviewed, some agree that talaq right is being abused by some men. They claim that some men invoke triple talaq in order to marry another wife. This is common where a man already has four wives and needs to divorce one in order to enable him to take a new wife. The practice is to get angry over an irrelevant issue and invoke triple talaq. It has been asserted that triple talaq amounts to 40 percent of the talaqs in Nigeria (Salaudeen, pg 85).

A high incidence of conditional talaq was also observed in Nigeria such that the husband exerts his authority by placing a condition on the wife, a breach of which leads to a divorce. An example is for the husband to utter a statement such as "if you step out of this house, consider yourself as divorced." While this form of divorce is in line with Islamic law requirement, call for caution in conditional talaq has been made (Salaudeen, 2015). This study reveals that some Muslims in Nigeria still conform with the Qur'anic formula of talaq. 4 out of 10 women interviewed agree that they were divorced in a state of purity with 1 out of 10 claiming to have observed their waiting period in their matrimonial homes.

It is clear that triple talaq contributes to the high rate of divorce among the Muslims in Nigeria. A great deal of concern has been raised on this practice which puts women in a vulnerable state, especially when the talaq cannot be revoked after the third pronouncement. The women are either left to remarry another man or remain divorced if no other man indicates interest in marrying them. This calls for a critical evaluation of the constitutionality of talaq in Nigeria.

To understand the prevalent formula of talaq and public opinion on the practice in Nigeria, a survey was conducted with 98 respondents across the six geopolitical zones of Nigeria. 38.3 percent of the respondents are from the South West, 30.9 percent from the North East, 22.3 percent are from the Middle Belt region, 6.4 percent responded from the North West and 1.1 percent both from the South East and South South respectively. The ages of the respondents are between 15 and above 40 years.

Table 1: Prevalence of *talaq* in Nigeria

Description	**Percentage**
Divorce by triple talaq	61.7
Divorce by obligatory talaq	13.3
Divorce by permissible talaq	18.0
Divorce by recommended talaq	7.0

Table 1 above reflects the result of the participants on the prevalence of talaq in Nigeria. While majority of the respondents agree that triple *talaq* is widely practiced across the Muslim community of Nigeria, 47.9 percent of the respondents see triple *talaq* and *talaq* generally as a breach of the right to dignity of the Nigerian woman. However, 41.5 percent of the respondents disagree that *talaq* is a breach of fundamental right since women submit themselves to Islamic law and adopt same as their personal law.

Table 2: Constitutionality of *talaq* in Nigeria

Description	**Percentage**
Talaq is constitutional	47.87
Talaq is unconstitutional	41.49
Not sure of the constitutionality of talaq	10.64

On the constitutionality of *talaq*, table 2 above reflects the opinion of the participants. 47.87 of the participants are if the view that *talaq* is constitutional on the strength of the fundamental right of freedom of religion and association as embedded in the constitution. 41.49 participants are of the opinion that *talaq* is unconstitutional while 10.64 percent are not sure of the constitutionality of *talaq*.

34.4 percent of the participants are of the view that there is a need for the government to regulate Islamic law marriage and divorce to create a balance with the laws of the land. 31.3 percent disagree and maintain that the government should not interfere in personal laws while 33.3 percent are of the opinion that parties should be at liberty to determine the extent of government intervention in personal laws. More than half of the participants believe that it will be a breach of the fundamental right to religion for government to seek to regulate how Muslims seek to practice their religion, irrespective of the public perception that women are stripped of their rights. 19.8 percent of the participants want the practice of talaq to be abolished completely while 28.1 percent are strongly of the view that government should put mechanisms in place to ensure that talaq is invoked according to the dictates of the Qur'an to ensure that husbands pronounce the talaq with the opportunity for reconciliation. This they maintain, is the true religion and the permissible talaq.

Additionally, 49 of the 98 participants believe that Islamic leaders across Nigeria should unite to formulate strategies on compliance of talaq and make recommendations to the government on how to regulate the practice of talaq in Nigeria. However, 32 of the respondents disagree on this approach. 66.3 percent of the participants agree that the courts should have the power to review talaq invoked by husbands while 33.7 percent of the respondents maintain noninterference by the courts as this will amount to interference in religion and religious practice.

8. Conclusion and Recommendations

It has been revealed that the legal talaq as provided by the Qur`an stipulates the invocation of talaq with a time frame for revocation in order to give room for reconciliation. However, the practice of triple talaq by invoking talaq thrice at a sitting without the required time frame has been seen by many scholars as illegal but valid with the effect of bringing a marriage to an end. If a man that invokes triple talaq desires to remarry his wife, such a wife must have been

married by a third party who must thereafter divorce her before she can be eligible to remarry the first husband.

With the effectiveness of triple talaq not having any proof in the Qur`an, it will be safe to conclude that many Nigerians who subscribe to the position that triple talaq brings a marriage to an end by interpreting the three pronouncements to be three separate talaqs have wrongly interpreted the intent of Sharia law. This practice of triple talaq exposes women to vulnerabilities and infringes on the rights of women as human beings. Thus, there is a need to intervene on the manner in which the right of talaq is being exercised in Nigeria. In the light of the findings of this study, the following are recommended to ensure best practices in the invocation and applicability of talaq practices in Nigeria:

- Muslims should be taught the correct and regular way of giving talaq in compliance with Qur`anic injunction that requires one revocable talaq followed by the waiting period and the opportunity or remarrying the same spouse one more time, if the talaq is not revoked before the end of the waiting period.
- A position should be taken on the invocation of triple talaq to be interpreted to mean one talaq.
- A law to regulate Islamic divorce in line with Shari`a law should be enacted in Nigeria. The law should be firm on interpreting triple talaq as one talaq and the law should provide for compensation where the wife is treated unjustly. The law should prohibit indirect expression of talaq such as sending a wife back to her parents without clear expression of the husband's intention of divorcing the wife.
- Since an Islamic marriage involves witnesses for it to be valid, talaq should be regulated in Nigeria to include the witnessing of the pronouncement. This will prevent incidences of invoking talaq in anger and jokingly.
- Intending couples should be counselled on their rights in the marriage and in instances of disputes and divorces. Couples should be enlightened on the position of Shari`a law in relation to marriage and divorce.
- All Islamic law marriages and divorces should be registered to enable an accurate data on incidences of divorce and the manner of the divorce.

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