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Original Paper

Perceived Roles of Teachers of Agricultural Science in the Implementation of HIV/AIDS Prevention and Control Measures in Secondary Schools of Botswana

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Abstract

The study is to determine the roles played by teachers of agriculture in senior secondary schools in the fight against the spread of Human Immune Deficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS). This was a descriptive research which used a simple random sampling technique to select 127 out of 191 Agricultural Science teachers in senior secondary schools. A questionnaire was mailed to gather data. A factor analysis was conducted for data reduction and clustering the underlying constructs in the variables that measured the effectiveness of the strategies in schools. The study found that the roles perceived to be highly played by agricultural educators included direct counselling and guiding the children that are going to school (Mean = 2.67; Standard deviation = 0.74) and discussing and teaching (Mean = 2.63; SD = 0.73) HIV/AIDS. There was a positive relationship between the three underlying factors and selected demographic characteristics of respondents, like gender and level of education.

Keywords

Agricultural Science teachers, HIV/AIDS, Teachers of agriculture, teachers' roles

1. Introduction

The purpose of this study is to determine the roles played by agricultural science teachers in senior secondary schools in the fight against the spread of Human Immune Deficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS). Botswana is one of the countries in the Southern African region that was seriously affected by the deadly disease of Human Immunodeficiency Virus/Acquired

Immune Deficiency Syndrome (HIV/AIDS) when the disease started towards the end of the 20th century. Botswana's Ministry of Health (2005) stated that the first case of HIV/AIDS in Botswana was identified in 1985 in Orapa in the central district and since then the disease dispersed to different parts of the country. The disease, according to Court (2006) is an issue that has overwhelming implications. The fight against the disease in Botswana was a process that was categorised into four stages (Ellece, 2016). Ellece stated that the first stage involves blood screening which took place between 1987-1989 in government health clinics and hospitals. This was followed by the second stage which is the introduction of awareness information and educational campaign programs which were introduced from 1990-1997. In the third stage, the government introduced educational programs in schools infusing HIV/AIDS information for awareness, prevention and caretaking programs as well as the provision of antiretroviral treatment from 1998-2003. In the last stage a national multi-sectoral framework was established to guide the response from the society and is coordinated through the National AIDS Co-ordinating Agency (NACA), a department established specifically to deal with the disease.

To date, HIV/AIDS has negatively affected the social welfare of many families and is a worldwide social challenge which took its turn as the most dreadful disease affecting human beings (National AIDS Coordinating Agency (NACA), 2008). According to NACA, the situation in Botswana has experienced some slight decline in the occurrence of the disease in urban areas but remains persistent in rural areas. Andersen et al. (2014) cited UNESCO (2008); UNESCO (2012); UNICEF (2013) having reported that internationally, experts would expect schools to play a key role in securing the inclusion, protection, and well-being of HIV-affected children. Anderson et al further pointed out to the fact that in schools, policies should advocate that teachers go beyond their traditional academic role and assist in mitigating HIV impact on children through pastoral care and support including child protection and social protection roles. This was supported by Moyo (2017) who advocated for HIV/AIDS education into school curriculum.

According to Valli and Buese (2007) in the past four years, the roles teachers' play in schools have shown some changes and role expectations have also increased, intensified, and also expanded to include those that relate to instructional, institutional, collaborative, and learning. Such changes as described by Valli and Buese refered to the scope and nature of what the teachers are doing while intensification relates to employees working more than they have been working before. Intensification in teaching explains the time and effort that teachers put into their teaching. According to Easthope and Easthope (2000) teachers now work longer hours, they also teach many students, large classes and also handle increased professional, pastoral and administrative duties in teaching.

Teaching in the classroom is founded on learning theories. To understand the roles of teachers in the classroom requires the understanding of the social learning theories such as behaviour modelling where people learn new things by observing or watching others, peer coaching which is an interactive process of sharing, supporting and assisting each other and being a role model to others. In this situation,

teachers play several roles in the classroom including the setting of a conducive classroom atmosphere for both affected and those not affected by the disease. The teacher is thus expected to build a warm environment, mentoring, nurturing students and being a role model. The most known role of a teacher in the classroom has always been to impact academic knowledge and skills to children, but this has since changed. Today the roles played/performed by the teacher have increased, this implies that the career of teaching has changed to encompass not only teaching but other functions that go beyond the classroom teaching (Valli & Muese, 2007). For example, the Vocational Agriculture Teachers Association of Texas (2009), have impressed the fact that a teacher in the area of agriculture, food, and natural resources must perform many duties to facilitate the success of the career of teaching. Similarly, it was found in a study conducted by Lockaby and Vaughn (1999) in the US, that the Agricultural science teachers agreed on the identified twenty-one values which were the important characteristics to be taught to the young people studying agriculture in high school, of which responsibility, honesty, courtesy, and respect were perceived as the most important values. The author also pointed to the fact that teachers' influence on the moral development of students is also important as well. Moral development is not associated with prescribed curriculum alone but rather the whole system of education.

Harden and Crosby (2000) found that teaching is a demanding and complex task. In this scenario, the agricultural science teacher teaches the subject matter contents to the students, provides coaching on subject matter that relates to the projects and extra-mural activities (sport) and morally provides counselling and guidance. In medical education as found by Harden and Crosby (2000), twelve roles have been identified and these can be grouped into six areas in the teacher's role model (Figure 1).

The roles and functions of an agricultural science teacher just like that of other educators are complex due to social, health, economic and cultural aspects infused into the profession (Figure 1). Role modelling is an influential tool in any form of teaching to pass on the knowledge, skills and values (Cruess, Cruess, & Steneirt , 2008). A teacher plays multiple roles, that of a facilitator, a role model, an information provider, a resource developer, a planner and also an assesser (Harden & Crosby, 2000). According to Miller (2003), the roles of a teacher have changed because of among other factors technology that is fast moving and also the fact that teachers no longer teach only the prescribed curriculum. They also are involved in other aspects making teaching much broader than before because of students' backgrounds and subjects that did not exist before. According to Miller (2003), there are six roles of an agricultural science teacher which include being an expert, formal authority, socializing agent, facilitator, ego ideal, as well as being a person that performed in different ways. Furthermore, the author stated that as an expert, the role of a teacher is to transmit whatever information, perspectives, and viewpoints deemed important or necessary to learners. Miller further stated that,

"*As a formal authority, the teacher is a part of an institution and serves as an agent of control and evaluation. As a socializing agent, the role of a teacher is to clarify the goals and requirements of a particular field or discipline to students and to prepare students for that career path. As a facilitator,*

the role of the teacher is to promote creativity and growth in students, to help them to develop their problem-solving skills, and to overcome obstacles. As an ego ideal, the role of the teacher is to convey the excitement and value of intellectual inquiry in a discipline or field. And, as a person, the role of the teacher is to lead by example, serve as a role model, to illustrate to students that work adds meaning to their lives and the lives of others".

From the Marlow's theory of education, it is clear that the role and responsibilities of a teacher is to develop, boost, inspire, enhance, and sustain motivation in the student learning environment (Burleson & Thoron, 2007). In this perspective where students are affected by HIV/AIDS, a teacher is an individual in a social organization such as a school who is seen to provide an environment for students' socialization. The roles played by theories of sociology and social psychology are important as they are used to explain activities carried out or conducted by teachers in the classroom. Such teachers act out of socially defined categories to ensure each role is a set of rights, duties, expectations, norms and behaviors that a teacher has to perform and fulfill in the career of teaching.

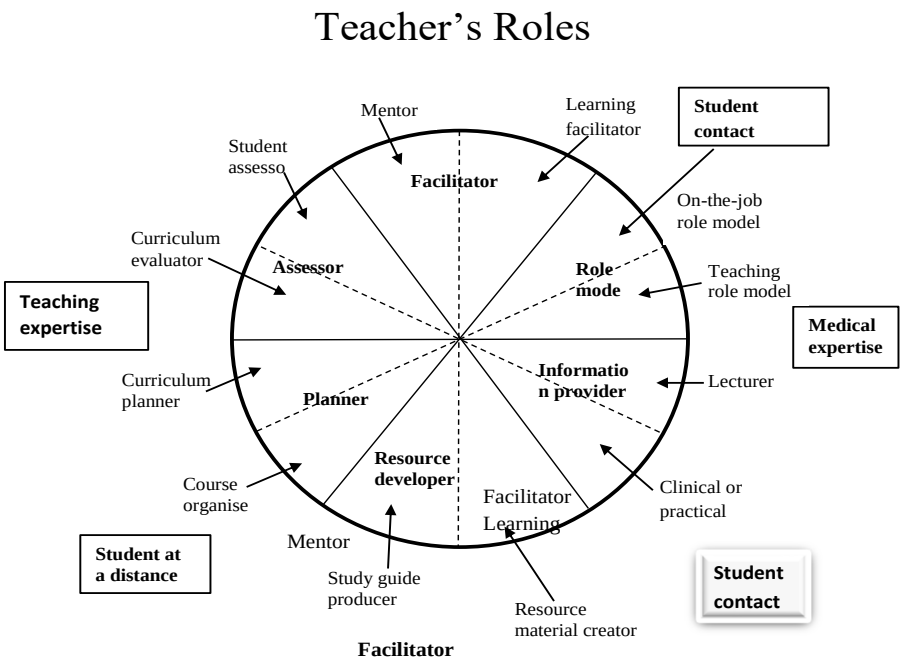

Figure 1. 12 Roles of a Teacher (Harden & Crosby, 2000)

HIV/AIDS is a disease that has affected both men and women, girls and boys, and students in schools (UNICEF/UNAIDS, 2004). Although it seems to be a health issue, it is more of a social and economic matter. A national antenatal survey of pregnant women conducted in the year 2000 found that close to 40 percent of the women were positive and one out of three adults were infected. The report stated that this result has implications for education. Among other implications that the HIV/AIDS has on education is that of creating orphans, and important to note is that children affected by AIDS in their family circles present a huge challenge to classroom teachers. For example, such children frequently

absent themselves from lessons having gone to fetch medication as well as attending counselling classes and may not be motivated to learn (Gertler et al., 2003). Infections amongst children going to school lead to high death rates thus, affecting investments put into the educational system by both the family and the government. The education of children is an investment for a country and therefore children's death become a loss, hence, the need to investigate the disease. The significance of this study is crucial for educators whose roles are likely to be modified hence the need to investigate the roles of teachers of agriculture. HIV/AIDS have impact on many sectors including labour markets which influences childrens' school fees, family conflicts as children are left alone and parental loss as knowledge and skills inherited when children are still young (Slater & Wiggins, 2005).

In a national study conducted by Squire and Gosalamang (2010) the outcomes showed that knowledge of the consequences of having sex without using a condom, having multiple sex partners and lack of self-discipline in having sex are strategies to be mindfulness of during the fight against the spread of HIV/AIDS. The study suggested that the HIV/AIDS information be included in the school curriculum for both primary and tertiary institutions. The authors further noted that knowledge of the HIV/AIDS is very crucial as it will encourage learners to become free to discuss the danger of the disease. Andersen et al. (2014) admitted that infusing policies on HIV/AIDS in school curriculum adds value to the moral development of the learners.

Explaining the situation of the disease in Botswana, the former President of the Republic of Botswana, Mogae indicated that many of Botswana people are aware that the country was sternly affected by the disease. This shows that the country was in an unfortunate situation to have been labelled as one of the highest HIV/AIDS seroprevalence rates in the general population globally. The report stated that "the 2002 sentinel surveillance studies estimated that the country has an HIV seroprevalence rate of 35.4% within the age group of 15-49, with about 258 000 people infected out of a total population of 1.7 million". This marks a decline from 38.5% in the year 2000 and 36.5% in 2001 (President's strategy: Botswana's Strategy in the Fight against HIV/AIDS, 2001).

Several studies have been conducted on HIV/AIDS pointing to issues such as agricultural markets, and households (Parker, Jacobsen, & Komwa, 2009). In education, particularly in schools, studies such as UNICEF (2017), Kuo and Operario (2010) have reported that many children have been left as orphans and some have been exposed to caring for their siblings at a very tender age. Those attending school need role model in order to continue with school. This particular study targeted agricultural science teachers' in-teaching positions because they spend more time with students in schools than most subject teachers teaching in the same schools. Agricultural science teachers teach both theory in the classroom and practical activities of agriculture in which students are involved. In both junior and senior secondary schools agricultural science teachers have been labelled as the most interacting group of educators (although not scientifically published). Majority of teachers of agriculture are involved in guidance and counselling, debating clubs, school-based disciplinary committees, sporting activities, schools' curricula development, assessment committees, young farmers' clubs, Peer Approach

Counselling by Teenagers (PACT), boys scouts and Parent Teachers Association (PTA), Village Development Committees (VDC) and district agricultural fairs. These school based strategies involve mostly teachers of agriculture, thus suggesting that agricultural science teachers in senior secondary schools would be appropriate for this study (MoESD, 2012). The agricultural education plays a major role in preparing farmers of tomorrow, leaders and educators hence the need to study the discipline.

1.1 The Purpose and Objectives of the Study

This study was designed to describe roles played by secondary school Agricultural science teachers in the creation of awareness about HIV/AIDS diseases in schools. The specific objective of the study includes;

a) To describe the demographic characteristics of the agriculture teacher respondents.

b) To describe the perceptions of respondents regarding perceived roles played by agriculture teachers in the fight against HIV/AIDS in secondary schools.

c) To determine if there is a relationship between perceived roles and demographic characteristics of teachers in the fight against HIV/AIDS.

d) To explore patterns of relationships in new dimensions of the constructs (variables) formed from data deduction.

2. Method

2.1 Design of the Study

The study was a descriptive survey (Creswell, 2002; Salkind, 2002) to provide a picture of HIV/AIDS awareness in senior secondary schools in Botswana as perceived by agricultural science teachers. The researchers administered a survey questionnaire to a sample of 127 senior secondary school agricultural science teachers regarding the extent of participation in prevention and control of HIV/AIDS in schools. This descriptive research was found appropriate (Grimes & Schulz, 2002) to provide a baseline on the perceptions of the areas studied.

2.2 Population in the Study

The target population of this study was 191 senior secondary schools agricultural science teachers from which a sample of 127 teachers was obtained. A list of all agricultural science teachers in senior secondary schools was obtained from the secondary department of the Ministry of Education and Skills Development (MoESD), Headquarter in Gaborone. The researchers thoroughly read through the name list to check against schools so as to verify each name listed at the school mentioned. The process helped to control sampling error which could be due to transfer or promotions that can make sampled respondents fail to receive the questionnaire. The list was also thoroughly checked for correctness of names, name repetition, postal addresses of teachers, and teachers on promotion to higher positions, to ensure respondents were all at their respective schools. Agricultural science teachers from senior secondary schools were chosen for this study because they are teaching teenagers who are about to become adults.

The respondents who hold Bachelor of Science degree in Agricultural Education (BSc. Agric. Edu), were involved in Peer Approach Counselling by Teenagers (PACT), boys' scouts and Parent Teachers Association (PTA), Village Development Committees (VDC) and coordinated school's agricultural education fairs and are a member of Botswana Agricultural Teachers Association (BATA). Thus, suggesting that only agricultural science teachers in senior secondary schools who actively interacted with students were appropriate to be surveyed for this study.

2.3 Sampling Procedures

A probability sampling strategy as described by (Salkind, 2002) was adopted, using the simple random sampling technique. Krecje and Morgan (1970) as cited in Salkind (2002) were used to estimate the sample size from 191 target population to a sample size of 127. According to Salkind, each respondent in this study had an "equal and independent chance of being selected to be part of the sample".

2.4 Survey Instrument, Data Collecting Procedures

The survey instrument designed by the researchers was divided into four parts. In part one, teacher respondents were asked to provide their personal characteristics (gender, age, school, location, nationality, highest education attained, teaching position and their experience in teaching agriculture). In part two, the respondents were required to indicate on a 5-point-Likert-type scale, the extent to which the listed roles were frequently performed by teacher respondents in schools as to establish the frequency to which teachers frequently educate students about HIV/AIDS disease. The rating scale was anchored as: 1 = Never used; 2 = Seldomly used; 3 = Used; 4 = frequently used; and, 5 = Very frequently used. In part three of the instruments, the teacher respondents were asked to respond to statements which required teacher to indicate their extent of participation in creating ideas used to educate students about HIV/AIDS disease in schools. The rating scale was anchored on a Likert-type scale as; 1 = Never participated; 2 = Seldomly participated; 3 = Participated; 4 = frequently participated; 5 = Very frequently participated. In part four of the instrument the teacher respondents were asked to respond to statements measuring percieved effectiveness of all strategies adopted to educate, control and prevent HIV/AIDS increase in school children.

To assess the validity of the instrument, educators at Botswana College of Agriculture were used to assess the questionnaire adequacy and clarity of items. The exxperts also assessed the face validity of the questionnaire. The questionnaire was then pilot tested using all teachers teaching agriculture at Kagiso senior secondary school in Ramotswa, purposively selected since the principal researcher was a teacher at the same school. The agricultural science teachers in the pilot study were asked to respond to the instrument and write suggestions to improve the final questionnaire. Data collected for pilot testing was analyzed using version 19 of the Statistical Package for Social Sciences (SPSS) and reliability coefficient values for the three parts of the instrument are 0.82 (frequency of use), 0.89 (the extent of participation) and 0.75 (effectiveness of strategies). The coefficient values were found sufficiently high enough to describe internal consistency in each of the sub parts of the instrument as described by Salkind (2000). Ary et al. (2006) and Salkind (2000) stated that reliability of a measuring instrument is

the degree of consistency with which the instrument tends to measure what it is meant to measure.

Data collection procedures in this study was carried out by using the principles of Total Design Method (TDM) developed by Dillman (1978). The process involved the researcher dropping the fifty questionnaires to ten senior secondary schools located in and around Gaborone by hand and the rest of the questionnaire were mail-posted to senior teachers in schools located outside Gaborone. Permission was granted by the Director of Research, Ministry of Education, Skills Development (MoESD) to conduct the study in senior secondary schools.

The letter requesting respondents to participate in the study was short and clearly addressed to the respondents (Gay & Airasian, 2001). The letter also explained that respondents were not forced to participate in the study; hence they were free not to participate if they decided not to. The survey package sent to teachers contained the questionnaire, cover letter of introduction, self-addressed return envelope and was hand delivered to schools where sampled individuals were teaching. The researchers made "Short Message Service" (SMS) and telephone calls to non-respondents as a reminder (Dilman, 2000; Balabanis, Vincent-Wayne, & Mavrovouniotis, 2007) and made follow-ups by sending another package of the questionnaire, accompanied by a letter and a return envelope sent to non-respondents. The response obtained by the end of the third week was 23 (88.5%) out of 26 who had not responded. This brought the respondents in the study to be 97.6% who participated in the study. The last SMS was made to all respondents to thank them for participating in the study. A total of 124 (97.6%) responses were received prior to the end of three weeks. The descriptive statistics were used to summarize data pertaining to; (i) demographic characteristics of respondents, (ii) frequency of the use of strategies to educate students about HIV/AIDS, (iii) the extent of teachers' participation and roles teachers played, and (iv) perceived effectiveness of strategies.

3. Results

3.1 Demographic Characteristics

Close to forty percent (38.7%) of teachers in the study were married, about fifty-six percent (55.6%) were single and the majority (96%) were Botswana citizens. This means agricultural science in senior secondary schools is taught by Botswana citizens unlike in time past when the majority of the teachers were non-citizens. Slightly above two thirds (34.7%) of the teacher respondents have taught agricultural science for a period of eleven to fifteen years (11 to 15 years) followed by a proportion of thirty percent (30%) of teachers who have taught for a period of sixteen years and above. At least twenty-five (25%) of the respondents have been teaching for a period of six to ten years (6-10 years). This means that majority of the teachers currently teaching in senior secondary schools could have started teaching in the early 1990s after the outbreak of the disease in Botswana in the mid-1980s. Therefore, more than half of these teachers of agricultural science in schools are likely not to have had much experience to handle issues related to awareness, prevention and control of HIV/AIDS. Table 1 also shows that majority of the teachers surveyed are holding the position of senior teacher grade II

(77%) followed by those holding the position of senior teacher grade I (18%); majority hold Bachelor of Science degree in Agricultural Education (96%). Only three percent (3%) holds Master of Science degree in Agricultural Education.

Table 1. Demographic Characteristics of Agriculture Teacher Respondents (n = 124)

Characteristics		Frequency	%
Gender	Male	63	50.8
	Female	61	49.2
Age (in years)	Below 25 years old	0	0
	26-30 years old	7	5.6
	31- 35 years old	26	21.0
	36- 40 years old	52	41.9
	41 and above	39	31.5
Marital status	Single	48	38.7
	Married	69	55.6
	Widowed	4	3.2
	Divorced	3	2.4
Nationality	Botswana citizen	119	95.2
	Non citizen	5	4.0
Teaching experience (in years)	Less than 5	13	10.5
	6 to 10 years	31	25.0
	11 to 15 years	43	34.7
	16 years and above	37	29.8
Position held	Teacher	7	5.6
	Senior teacher II	95	76.6
	Senior teacher I	22	17.7
Professional qualifications	Diploma	0	0
	Bachelors degree	120	96.8
	Masters degree	4	3.2
Pre-service training on HIV/AIDS	Yes	46	37.1
	No	78	62.9
In-service training on HIV/AIDS	Yes	48	38.7
	No	76	61.3

3.2 Roles Played by Teachers of Agriculture

Table 2 show the means and standard deviations for perceived roles performed by teachers of agriculture in teaching and addressing issues of HIV/AIDS in schools. Analysis of data using a 5-point Likert-type scale categorised results into “minimal played roles”; “moderately played roles” and “highly played roles”. The “minimal played roles” were denoted by statistical means less and equal to ≤ 1.14, while statistics means ranging from 1.15 to 2.95 denoted “moderately played roles” and the “highly played roles” were represented by means greater than and equal to ≤ 2.96. The statistical re-coding of data was carried out in order to ease the descriptions of the actual roles teachers perform on daily basis.

The results showed that all 27 roles were categorised under moderately played roles and that the highest mean was obtained from the role of: “*I provide guidance and counselling to my students in my*

school" (Mean = 2.67; Std. Dev. = 0.74). This was followed by three perceived roles which include that the teachers of agricultural science in secondary school are expected to "*teach students to abstain from sex in order not to contact* HIV/AIDS" (Mean = 2.63; Std. Dev. = 0.78), "*discuss with students the danger of teenage pregnancy*" (Mean = 2.63; std. Dev. = 0.78) and "use groups such as PACT to tackle HIV/AIDS issues" (Mean = 2.63; std. Dev. = 1.00).

All the 27 roles played by teachers were denoted as "moderately played roles", signifying that teachers of agricultural science perform a variety of roles in addition to teaching, discussion, guidance, and counselling. The statistical means ranged from a mean = 1.26; std Dev = 0.67 to highest mean = 2.67; Std Dev = 0.74. Generally, the overall mean is low Mean = 2.05; Std Dev = 0.91. Respondent agree that all the roles are important as supported by Harden and Crosby (2000) and Andersen (2014). This is a true reflection of what transpires in teaching because the core role of a teacher is teaching and other sectors would be responsible for support services such as that of counselling. The schools in Botswana have guidance and counselling departments established through the Ministry of Education and Skills and Development to provide both career and social guidance to students. In addition, health workers and social wings are invited to address students on various issues this is a way to provide relevant information to learners. During agricultural education fairs held in schools and Botswana College of Agriculture (BCA) platforms, articles are provided for students at the fair to be taught about welfare and HIV/AIDS.

Table 2. Means and Standard Deviations for Agriculture Teachers Perceived Roles

s/no.	My role as a teacher of agriculture is to	Mean	Std Dev
1	Address students on HIV/AIDS during assembly	2.31	0.96
2	Provide guidance and counselling to my students in my school	2.67	0.74
3	Integrate HIV/AIDS education in lessons	2.60	0.81
4	Allow students to discuss HIV/AIDS issues	2.42	0.91
5	Provide some time to discuss HIV/AIDS issues	2.40	0.92
6	Counsel students on HIV/AIDS	2.50	0.87
7	Teach students about abstaining from sex to avoid HI/AIDS	2.63	0.78
8	Discuss with students the dangers of teenage pregnancy	2.63	0.78
9	Use groups such as PACT to tackle HIV/AIDS issues	2.03	1.00
10	Use existing HIV/AIDS awareness groups to spread the message	1.98	1.00
11	Use published research articles to teach about HIV/AIDS awareness	2.08	1.00
12	Provide time for students to teach others about HIV/AIDS during lessons	1.90	0.99
13	Allow other teachers teach their classes on HIV/AIDS issues	1.90	0.99
14	Place HIV/AIDS information on notice boards	1.94	1.00
15	Promote sporting activities as a means of reducing HIV/AIDS infection	1.77	0.98
16	Use HIV/AIDS school-based day to spread the information	1.80	0.98
17	Use television and video machine to show HIV/AIDS videos and films	1.57	0.90
18	Use videos to show cases of HIV/AIDS as a way to educate students	1.52	0.88
19	Use guidance and counselling committee members to discuss HIV/AIDS and related issues	2.31	0.95
20	Conduct HIV/AIDS school-based workshops for students	1.69	0.95
21	Conduct school-based HIV/AIDS awareness meetings	1.66	0.94
22	Teach students about using of condom	2.04	1.00

23	Teach students to practice faithfulness in their relationships	2.07	1.00
24	Distribute female condoms in places like public bars and toilets	1.26	0.67
25	Collaborate with parents and guardians to talk about HIV/AIDS issues	1.66	0.67
26	Use internet to source HIV/AIDS information	1.86	0.99
27	Use HIV/AIDS month to spread information on HIV/AIDS	2.07	1.00
	Average	2.05	0.91

3.3 Frequency of Use of Strategies by Teachers

To analyze the frequency of use of various strategies employed by teachers, the five-point Likert type scale was converted to a dichotomous scale and re-coded, the percentage of use 1-49% denoted less frequently used and 50- 100% denoted more frequently used strategies in a year. Eighteen of the strategies were found to be frequently used. The highest percentage was on teachers' frequency of *providing guidance and counselling* (81.60%), followed by their frequency of *discussion with students about the danger of the disease* (80.4%). This is in line with the findings of the study by Bakole and Mabekoje (2008), which found that generally, teachers are expected to provide information and awareness education to change the behaviour of students. The study also found that media such as radio, television, newspapers and discussions with friends are the major sources of HIV/AIDS information.

Nine out of eighteen strategies had means ranging from 1.68 to 3.33, implying that the respondents perceived the strategies to be moderately effective. The other nine strategies had means ranging from 3.34 to 5.00, implying that the strategies used were perceived to be highly effective in changing behaviours of students towards HIV/AIDS in schools. Assessing the effectiveness of the interventions or strategies applied in schools to fight against HIV/AIDS was a challenge since new infections were still reported on people and teachers generally lacked basic skills and knowledge about the disease (Bankole & Mabekoje, 2008).

3.4 To Explore Patterns of Relationships in New Dimensions of the Constructs (Variables) Formed from Data Deduction

To address this objective of the study, a factor analysis was conducted to establish if there are any underlying structures existing for the seventeen variables measuring the perceived effectiveness of the strategies used in schools. The variables are: display of information on the school notice boards (*display notice board*), spreading information using drama (*spreading by plays and games*), school trips (*school trips*), students' debates by clubs (*debates by clubs*), school based workshops (*school based workshop*), teachers' and students' discussion (*teacher-students' discuss)*, spreading information through Parents and Teachers Association (PTA assoc.), television programmes such as talkback (*tv. talkback*), student group discussions (*students groups*), the use of magazines and newspapers to educate students (media), class teachers' guidance on HIV/AIDS issues (*class teacher guide)*, radio programmes on HIV/AIDS such as *Makgabaneng* (*radio program*), field trips to voluntary testing and counselling centres, example Tebelelopele Testing Centre (counselling), integrating HIV/AIDS issues during subject lessons (*during subject*), discussing HIV/AIDS issues with students in lessons (*discussion in class*), discussing and promoting abstinence (*discuss abstinence*) and the discussion of

HIV/AIDS issues during assemblies (*discussion in assemblies*). Three criteria were used to establish the appropriate number of components to retain: *eigenvalue*, *variance* and *screen plot*. The principal component analysis was conducted to retain three criteria and *varimax* rotation was applied. After the rotation, the first component accounted for 62.29% of the total variance in the variables studied, while the second component accounted for 6.43% and the third component accounted for 4.46%. Component 1 comprise of six variables that have positive loading, featuring *school related strategies*. The second and third components included variables comprising *mass media and teacher related* strategies, respectively. All the variables in this measurement have positive loadings, which means that they all explain the components in the same manner.

Table 3. Rotated Component Matrix

	Loading
Component 1: School-related strategies	
Displaying of HIV/AIDS information on the school students notice boards (display notice board)	0.779
Spreading information on HIV/AIDS using Drama plays and games (spreadingbyplaysgames)	0.768
School trips to Hospitals and Clinics (school trips)	0.737
Students debate HIV/AIDS by clubs (debates by clubs)	0.728
HIV/AIDS school-based workshops (school-based workshop)	0.689
Teacher and student discussion on HIV/AIDS (teacher students discuss)	0.608
Component 2: Mass media related strategies	
Spreading information through Parents and Teachers Association (PTA)	0.735
Television programmes on HIV/AIDS such as Talkback (Tv talk back)	0.721
Student group discussion on HIV/AIDS issues (student groups)	0.718
The use of articles in magazines and newspapers to educate students (media)	0.718
Class teachers guidance on HIV/AIDS issues (class teacher guide)	0.697
Radio programmes on HIV/AIDS such as Makgabaneng (radioprogram)	0.607
Component 3: Teacher related strategies	
Field trips to voluntary testing and counselling centres example Tebelelopele testing centre (counselling)	0.780
Integrating HIV/AIDS issues during subject lessons (during subject)	0.773
Discussing HIV/AIDS issues with students in lessons (discussion class)	0.768
Discussing and promotion of Abstinence (discuss abstinence)	0.660
Discussion of HIV/AIDS issues during assemblies (discuss assemblies)	0.630

Analysis of the scree plot (Figure 1) showed that the eigen value was leveled after the three components. The magnitude of the graph of each eigen value shows that the knee or bend starts dropping after the 3rd value. This means that there was no variation after the component was rotated providing a visual of the total variance associated with each factor.

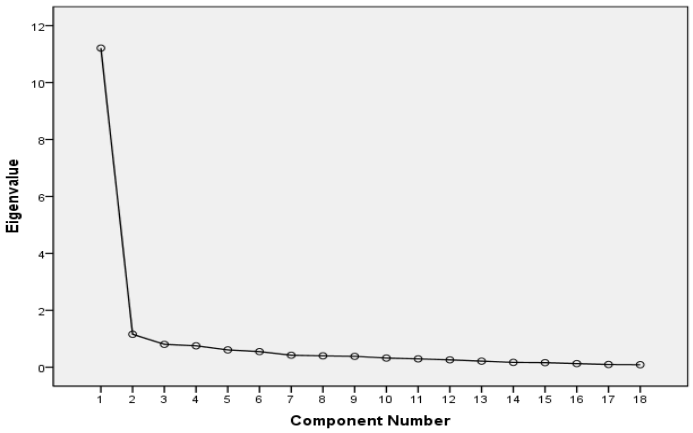

Figure 2. Scree Plot

Source: Field Survey (2012).

To further explain the relationship between the perceived effectiveness of strategies and selected demographic characteristics on the prevention and control of HIV/AIDS, bivariate correlations were conducted. There were inter-relationships between each of the variables that were classified from the factor analysis tool and selected demographic characteristics. According to Davis (1971) as cited in Miller (1994), a Pearson product moment correlation coefficient value of 0.01 to 0.09 represents a negligible relationship; 0.10 to 0.29 represents a low relationship; 0.30 to 0.49 represents a moderate relationship, 0.50 to 0.69 represents substantial relationship and 0.70 to 0.99 represents a very high relationship. Based on David's theory of associations as cited in Miller (1994) the correlations were conducted among selected demographic characteristics and school-related strategies based on factors analysis component matrix, the results showed that 15 inter-relationships were negligible relationships, 9 inter-relationships were in the category of low relationships, 8 relationships showed substantial relationships and only 3 relationships showed very high correlation relationships. The results also showed that most of the inter-relationships among demographic characteristics were negligible while inter-relationships among strategies were found to range from substantial to very high relationships.

The correlations among selected demographic characteristics and mass media-related strategies were based on factors analysis; which showed 13 negligible relationships of the variables, 11 low relationships, 8 substantial relationships, 3 low relationships, 8 substantial relationships and 7 very high relationships. On the correlations among selected demographic characteristics and teacher related strategies was based on factors analysis, the results showed 16 negligible relationships, 1 low relationship, 5 substantial relationships and 2 very high relationships. Based on this study, it can be perceived that a teacher to performs/ plays multiple roles. This calls for thorough training of teachers not only on his/her subject matter contents but also on other roles that the teacher of agricultural science is expected to perform in his or her position as a teacher. Based on this study, Agricultural science educators should be prepared in the area of contemporary emerging issues related to HIV/AIDS and technology advancement.

4. Discussions

The deadly disease of Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS) is one of the diseases that negatively affects children in schools, particularly in Botswana. Due to the wide spread of the disease particularly in developing countries, educators in institutions of learning are formulating strategies for prevention and control of the disease. Teachers' roles in schools were influenced by emerging roles due to the prevalence of the disease in schools.

All the 27 roles presented in this study to be played by teachers were denoted as "moderately played roles", signifying that agricultural science teachers perform variety of roles, in addition to teaching, discussion, guidance and counselling. This is a true reflection of what is taking place in schools because the core role of a teacher is teaching. The results were supported by the findings of a study by Miller (2003). Respondents perceived the strategies for fighting against the HIV/AIDS in schools to be moderately effective in addressing the challenge. The study also concluded that media such as radio, television, newspapers and discussions with friends were the major sources of HIV/AIDS information. Assuming that statistically, the results for this study showed "moderately played roles" and the "highly played roles" and were represented by means equal and greater than ≤ 2.96, then it can be used as a notable conclusion. The main conclusion would be that teachers have several roles to play and policies in schools should take into consideration the important roles played by agricultural science teachers. Agriculture teachers contribute positively to social and economic issues of the countries development. Further studies will be needed to make it more comprehensive based on the comparison with that of other subject teachers in similar schools for the purpose of generalization of roles teachers play.

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