

**The Influence of Pre-conceptual and Perceptual
understandings of HIV/AIDS: A Case study of selected
Ugandan Biology Classrooms**

by

HARRIET MUTONYI

Bsc Educ Islamic University in Uganda, 2000

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Abstract

Curbing the spread of HIV/AIDS in Uganda has largely depended on public and private media messages about the disease. In addition, the introduction of the topic of HIV/AIDS in the Senior Three (Grade 11) biology curriculum has added credence to the campaign. Media campaigns, especially those in local dialects, based on Uganda's cultural norms of communication are metaphorical, analogical and simile-like. To what extent do the students' pre-conceptions of the disease, based on media messages influence their development of conceptual understanding of the disease, its transmission and prevention? Of significant importance is the impact of the students' conceptions developed from the indirect media messages on classroom instructions on HIV/AIDS.

This study describes Ugandan Senior Three students' pre-conceptual knowledge of HIV/AIDS and how these impact classroom instruction on HIV/AIDS. The study was conducted in four different Ugandan high schools: girls' boarding, boys' boarding, mixed boarding and mixed day. Using questionnaires, focus group discussions, recorded biology lessons and informal interviews, students' pre-conceptions of HIV/AIDS and how these impact instructions on HIV/AIDS were explicated.

Interpretive data analysis suggests that students have internalized various messages and developed central beliefs on HIV/AIDS. Students use these central beliefs to understand and interpret HIV/AIDS messages. Some of these central beliefs are inconsistent with scientifically proven information on HIV/AIDS. Some of the beliefs are persistent even after classroom instruction on HIV/AIDS. This has implications on how the teaching of HIV/AIDS is planned and implemented.

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Dedication

This thesis is dedicated to all those interested in AIDS education and to my younger brother, Daniel S. Masinde who recently decided that teaching is fun.

Chapter One

1.0.0 Introduction

In the early 1980s, just as Uganda was emerging from decades of civil war marked by extreme violence and intellectual drought as well as economic destruction, a new disaster struck, one as devastating as the consequences of the civil conflict: Acquired Immune Deficiency Syndrome, AIDS. The government confronted this new scourge head on, and in so doing became the first country in Africa to acknowledge that AIDS was a problem (all Africa, 2000). The Ugandan government's initial response to HIV/AIDS was to run simple media messages that included a clear warning about the dangers of HIV/AIDS (New Vision, 2004a). The campaigns were also taken to schools and sex education introduced in the biology curriculum (see appendix A for message examples).

Educators and psychologists have evidence that students' conceptions of learning have profound influence on the learning process. Given that the Senior Three (Grade 11) students have been exposed to various media messages before classroom instruction, their conceptions determine how they understand classroom knowledge. Furthermore, in many Ugandan cultures, matters pertaining to sexual behaviour are communicated through stories and proverbs which are highly metaphorical and analogical hence indirect. The media had to adopt the cultural methods of communication in order to earn the respect of all communities (USAID, 2002). Often culture has a larger hold on the students and therefore there are tensions in the way the students respond to media messages and classroom instruction on HIV/AIDS.

Given that the private and public messages to which Senior Three students and others are exposed prior to lessons on HIV/AIDS are in metaphorical, analogical, or

simile-like form, different students come to class having constructed their own individual understandings of HIV/AIDS. Since the expressions convey the messages in indirect ways, they are subject to different interpretations depending on individual student's backgrounds (Nashon, 2003). In addition, Pitman (1999) suggests that analogies are a double-edged sword, providing a means of understanding complex phenomena or can lead to misconceptions if not understood. Further still, these prior experiences are the window through which new knowledge will be viewed (Driver, 1983). What this means is that any form of learning is about transforming or reconstructing one's existing frameworks (Hewson, 1982, 1983, 1996; Strike & Posner, 1985, 1992). For this reason, a case study was carried out to investigate Ugandan students' preconceptual and perceptual understandings of HIV/AIDS and how these understandings impact classroom instruction.

1.0.1 Purposes

The purpose of the study was to investigate the nature of Ugandan high school students' pre-conceptual knowledge and perceptions of HIV/AIDS. The study further investigated the nature of metaphorical, analogical and simile-like expressions commonly used by the students and the students' conceptions and perceptions of HIV/AIDS conveyed by the Uganda popular media. In addition, this study investigated the impact of students' pre-conceptual knowledge and perceptions of HIV/AIDS on Ugandan Senior Three biology class instructions about HIV/AIDS.

1.0.2 Problem statement

The apparent success for reducing the spread of HIV/AIDS in Uganda (International Programs Center, US HIV/AIDS Data Base, 2000) has been partly due to the use of various media for communicating messages in forms that include metaphors, analogies, and similes about HIV/AIDS, which convey meaning in the socio-cultural world of Ugandans. Metaphors, analogies, and similes to some extent indicate deeper conceptual understanding (Nashon, 2003; Pittman, 1999). However, they can convey impressions that may lead learners to develop inappropriate scientific understandings (Nashon, 2003). Since knowledge is constructed (Driver, 1983) in the light of prior understandings (Ausubel, 1968; Kelly, 1955), it was important to determine students' pre-conceptions and perceptions of HIV/AIDS and how these impact classroom instruction. Thus, a case study (Merriam, 1998; Stake, 1995, 1998; Yin 2003) involving Ugandan Senior Three biology students, was carried out to investigate:

- a) The nature of Senior Three biology students' perceptions of HIV/AIDS as conveyed by the messages in Ugandan media.
- b) Senior Three biology students' pre-conceptions and perceptions of HIV/AIDS.
- c) How these pre-conceptions and perceptions impact students' understanding of HIV/AIDS before, and during instruction about HIV/AIDS.

1.0.3 The study and its significance

Although it is now recorded that Uganda has been successful in reducing the spread of HIV/AIDS (UNESCO, 1999), it was imperative to establish how the target audience (youth, who make up the school population) understood the messages in terms of the science of the disease. Details of the findings are discussed in Chapter Four.

Despite widespread media campaigns, the students have constructed different understandings based on their individual backgrounds, which in one way or the other impacts biology instructions about HIV/AIDS. Studies by various researchers (Aikenhead, 1999; Ausubel, 1963; Cobern, 1996, Driver, 1983; Hewson & Thorley 1989; Posner, Strike, Hewson & Gertzog, 1982) suggest that students' prior knowledge needs to be probed so that teachers can design effective instructional experiences that can help students develop new understandings and knowledge. HIV/AIDS is a major topic in the Senior Three biology curriculum in Uganda. But students come to Senior Three biology instructions with already formed ideas about the disease. Since no study has been conducted on students' pre-conceptual understanding of HIV/AIDS in Uganda and their impact on teaching and learning of the science of HIV/AIDS, this research is important. HIV/AIDS is a concept that needs full attention given the devastating effect it has had on the Ugandan population especially the youth.

1.1.0 The Ugandan context

The first HIV/AIDS case was detected in Uganda in 1982. Due to the political turmoil, there were no interventions geared towards curbing the disease. By the early 1990's, the disease was having devastating effect on Ugandans (UAC 1992; W.H.O, report 1993). The statistical report released by UNAIDS indicated 1.5 million Ugandans had been affected. At the time, the infection rates in Uganda were the highest in the world and a prompt action was needed. The rate of infection in 1982 was 34% (Center for Disease Control [CDC], 2002).

In 1986 when there was less political turmoil, the Ugandan government responded swiftly by giving out simple messages about abstaining from sex until marriage, staying

faithful to one's spouse, and using condoms. More elaborate messages about risky behaviour and safer sex were not spread until later, when there had already begun to be a decline in HIV figures. Uganda was one of the first countries to recognize and respond to the AIDS epidemic (CDC, 2002). It is also one of the first to show a sustained decline in HIV/AIDS prevalence rates due to a rapid national response (UNICEF, 2002). Currently, 8% of the Ugandan population is HIV-infected, about half the rate in 1992, which was between 16 – 20% (CDC, 2002).

The approach used in Uganda is often referred to as the ABC approach - first, encouraging sexual *Abstinence* until marriage, secondly, advising those who are sexually active to *Be faithful* to a single partner, and, especially if you have more than one sexual partner, always to use a *Condom* (AIDS Information Centre, 2001). Since 1986, when Uganda's Health Minister announced that there was HIV in the country, there has always been political will for openness and honesty about the epidemic, the risks, and how they might best be avoided. Also in 1986, the Ugandan President told the larger populace that it was their patriotic duty to avoid contact with HIV/AIDS (USAID, 2002).

Much of the prevention work that has been done in Uganda has occurred at the grass-roots levels, with a multitude of tiny organizations educating their peers, mainly made up of people who are themselves HIV positive (USAID, 2002). There has been a reduction in some types of risky behaviour, and there is a high level of AIDS-awareness amongst Ugandans. Money is being channeled to Africa through faith-based organizations, especially by the US which has pledged \$15 billion to fight HIV/AIDS in resource-poor countries. Uganda is one of the few countries to benefit from this fund and

many other countries are being urged to follow Uganda's example in fighting HIV/AIDS.
(See extract appendix B)

1.1.1 HIV/AIDS Interventions in schools

In order to reach youth, HIV/AIDS related programs were introduced into school curricula and extra-curricular activities (Mirembe, 2002). The government of Uganda initiated the "sex education policy" in 2002 as a way of protecting school children from HIV/AIDS and early pregnancies (New Vision, Oct 2004). The major objective was to help teachers train school girls to elude sexual advances of lustful men, and provide information on HIV/AIDS plus creating awareness about the dangers of early pregnancies. Private individuals have also joined the struggle to provide a forum for exchange of knowledge. For example the "Straight Talk" Newspaper and radio talk shows funded by UNICEF and USAID provide such forums for students to share their knowledge. Though the programs are aimed at empowering girls, there are other factors that hinder the girls from attaining full benefits of such programs.

Mirembe and Davis (2001) suggest that school peer pressure such as proof of masculinity or gendered stereotypes about women have posed challenges to the success of the health and HIV/AIDS intervention programs. The practice among most Ugandan communities is that society doesn't condemn polygamy, with the girls often being discouraged from resisting sexual harassment or sexual advances from boys. The girls therefore lack support from authorities like teachers, community leaders and parents hence the consequence is to give into sexual desires of boys. The "Monitor" (April 2004) reported that more married women are dying of HIV/AIDS because they feel powerless

in advocating for condom use in addition to the fact that they are always advised to be submissive to their husbands' demands given the patriarchal nature of Ugandan society.

Further, "New Vision" (Oct 2004a) reports that sex education is not sufficient in addressing sexual abuses like rape and defilement, which are fundamental causes of HIV/AIDS infections among youth. The report also suggests that there are some people who argue that sex education at early stages is against cultural values. The report quoted one elder of the community Kyazike, saying "sex and its education is sacred, it should be taught to those preparing for marriage not pupils in primary schools." There is evidence from the data collected that this belief is common, proving that there seems to be conflict in the way some students respond to sex education policies and media messages on HIV/AIDS.

Aikenhead (1996) argues that students often view school culture as different from their social culture, which further influenced the need for the current research to provide insight to the extent to which the intents of the school programs were actually being achieved. Since learning is a social and complex process, it was important to establish how the challenges highlighted above affected individual student's understandings of HIV/AIDS messages from school and media. The researcher got interested in finding out what preconceptual and perceptual understandings of HIV/AIDS Senior Three students had constructed from media messages in relation to their socio-cultural backgrounds. Given that the students are representatives of the cultural backgrounds each comes from, there is a possibility that the cultural, media and school knowledge would lead to some conflict in their minds. This indeed is the case and there are some issues the students have raised about some of the media information. Furthermore, the current research has

established that the cultural hold on the students is strong. This research is important because such revelations can inform curricular planning and implementation of topics on HIV/AIDS, to ensure that canonically viable understanding of HIV/AIDS is developed while respecting the important and meaningful aspects of the socio-cultural fabric in Ugandan communities, of which the students are part of.

1.1.2 Context of the study

The study took place in four Senior Three (grade 11) biology classes from four national schools in the Eastern part of Uganda. At the end of the primary, secondary and advanced education phases, students take national examinations. The Uganda Primary Leaving Certificate (PLC), Uganda Certificate of Education (UCE), and Uganda Advanced Certificate of Education (UACE) are awarded following national examinations taken after seven years of primary, four years of secondary and two years advanced level education respectively. Performance in PLC determines which secondary school one will attend. The public schools base their selection on a grading system and admit students from all over the country, thus giving the schools a national outlook. The grading system is supposed to give the students from different backgrounds equal opportunities for admission in any given school. This gives national schools a relative national outlook in terms of ethnic (tribal) composition. It is important to state that there are also privately owned schools who use different criteria for selection in Uganda. These private schools however, have little diversity as most of them are community-based or religious based. The ethnic distribution of the public schools was an important consideration in the choice of schools that participated in this study.

Uganda also has boarding and day schools which can be single (unisex) or mixed (co-educational). In order to capture the national outlook of the schools, the research was conducted in one boys' only boarding school (BBS), one girls' only boarding school (GBS) and one mixed boarding school (MBS) and one mixed day school (MDS). There were some differences on particular issues although the perceptions of HIV among students in these different school settings were not different. However, the students in the boarding schools tended to rely on teachers and media for information while the students in the day schools had parental input or general community input. This was elucidated by the students in the responses that have been discussed in Chapter Four.

The proceeding chapters of the thesis are as outlined. Chapter Two provides a theoretical framework by discussing in detail previous research findings on knowledge construction. The studies suggest that learning is an individual and group process. The chapter will also discuss how prior knowledge or experiences affect learning. The conceptual change theory will also be discussed. The multifaceted approach to the study of students' perceptions employed in this study, a combination of case study, qualitative methods of data collection are described in Chapter Three. The study site, processes involved in obtaining ethical clearance to conduct the study and matters of privacy have also been presented in Chapter Three. The remainder of the thesis presents the findings of the main research questions that are outlined in Chapter One. Chapter Four is about how the students' conceptions have been constructed. This includes the nature of media messages the students have been exposed to and how the students respond to such messages. These have been drawn from the various data collection techniques. In addition, the nature of analogies, metaphors and similes that the students in the study

used to explain HIV/AIDS are presented. How students' conceptions impact the learning process during classroom discussion on HIV/AIDS is also elucidated.

1.1.3 Researcher Background

The researcher hails from Uganda and therefore has first hand experience with the cultural setting of the country. In addition, the researcher has long experience with HIV/AIDS education in Uganda. First, as a student at the time HIV/AIDS became publicly acknowledged to be a devastating disease prompting extensive public discussion in Uganda, second, as a high school biology teacher and lastly as a community based HIV/AIDS educator. This firsthand experience helped the researcher to insightfully develop the research and at same time interpret data using this lens of experience as well as the knowledge of the Ugandan cultures.

Through these experiences, especially as a teacher and community educator, the researcher realized that people from the different cultures have different understandings of HIV/AIDS. The most memorable experience was during a baseline study on priority diseases in selected communities in Eastern Uganda where the researcher was employed as one of the data collectors. The study was used to design intervention programs for the communities on diseases that the people felt were of immediate threat. One of the participants stood up and said:

We have a problem in our community. We have these young people who are always groping around in the dark without lights. Now some of them have brought problems because during their travels in the dark, they have got this disease. The disease for youth, which is a problem in Uganda today.

It took the researcher time to decipher what this participant was saying and since then, the researcher has developed a deep desire to investigate and understand what interpretations different people have from the indirect communication on sexuality used in Uganda.

In other words, because the indirect messages are given with the assumption that everyday will develop the same understanding, there is always a possibility that some people will develop different understandings that are influenced by their socio-cultural backgrounds. Given that students come from different socio-cultural backgrounds, there is the possibility that they have varied understandings of HIV/AIDS. It was against this background that the researcher developed the desire to conduct this study. In a way, the research provided a means for the researcher to investigate personal understandings about HIV/AIDS and at the same time reflect on the teaching style and practices during classroom instruction on HIV/AIDS.

Chapter Two

2.0.0 Theoretical Framework and Literature Review

This chapter establishes a theoretical background in which the research was framed and data collected, analysed and interpreted. The current study is examining how students in Uganda have constructed knowledge of HIV/AIDS from media messages, and therefore research on constructivism is relevant. In addition, looking at how knowledge is constructed directly leads to how learning environments can be designed to enhance students' knowledge construction. The research study therefore looked at the conceptual change model (CCM) and its implications for classroom learning. These were linked with studies that propose how the model can be made effective in classroom instruction. The research further drew upon studies that have looked at students' perceptions and how these impact learning focusing on those that suggest modifications to the CCM. Furthermore, literature on students' perceptions of HIV/AIDS in other countries was drawn on given that the current study focuses on HIV/AIDS perceptions among Ugandan students. In general, the theoretical framework is highlighting the design of the current study which aims at interpreting students' perceptions of HIV/AIDS and how the students have constructed their understandings. Given that the study aims at establishing how the perceptions impact learning, literature on teaching from a constructivist perspective was drawn on to provide a basis for data interpretation.

Piaget's findings on children's explanations of natural phenomena have perhaps had the greatest impact on the study of the interpretive frameworks students bring to learning situations. The view that students construct their own knowledge (Ausubel, 1968; Driver, 1983, 1989; Erickson, 1983) is now common belief among education

pedagogues. It is against this background that the current study sought to establish how students in Uganda construct knowledge and what interpretive frameworks the students use. This requires an understanding of a theory of learning that explains how people come to know what they know. Therefore, it is imperative that constructivism, which is a theory of learning be discussed.

2.0.1 Constructivism

Constructivist theory describes learning as an active, continuous process in that learners take information from the environment and construct personal interpretation and meaning based on prior knowledge and experience (Driver, 1983). Developments in this constructivist theory of learning have attracted plenty of research on how teachers can help students in the knowledge construction process. Hewson, Beeth and Thorley (1998) argue that there is need to consider learning, not purely as an accumulation of bits of information but as an active, interactive, connective process requiring change of different kinds such as addition, linkage, rearrangement and exchange. Winn (2003) and Colella (2000) have suggested that teachers need to provide students with a learning environment that provides real life experience. An individual's understanding comes from internal effort or integration of newly communicated claims and ideas with his or her own prior beliefs and understandings (Becker, 2000). Hodson and Hodson (1998b) argue for a shift of emphasis from a cognitive approach of science teaching towards a social constructivist view anchored in the Vygotskian notion of education as enculturation.

Bransford, Brophy, and Williams (2000) claim that the implementation of constructivist approaches into the classroom has a great effect in transforming the classroom environment into an environment that strongly encourages the interaction

between teacher-students, student-student, and teachers-teachers. Constructivism is a learning theory based on the idea that each individual learner constructs his or her own knowledge (Hein, 1991) and one of the main principles of this theory is collaborative learning. In this learning theory, Hein claims that learning and development occur when students interact with the environment and people around them. The epistemological implication of this view of knowledge as being constructed is that to know something does not involve the correspondence of conceptual schemes to what they represent “out there”; learners have no direct access to the “real world” (Driver & Leach, 1993). The emphasis in learning is not on the correspondence with an external authority, but the construction by the learners of schemes that are coherent and useful to them. This view of knowledge shifts emphasis from the students’ ‘correct’ replication of what the teacher does to the student’s successful organization of his or her own experiences (Driver & Leach, 1993)

Edelson (2001) provides a summary of the principles that are shared by many contemporary theories of learning, that is, both cognitivist and situated learning perspectives. These principles are:

1. Learning takes place through the construction and modification of knowledge structures.
2. Knowledge construction is a goal-directed process that is guided by a combination of conscious and unconscious understanding goals.
3. The circumstances in which knowledge is constructed and subsequently used determine its accessibility for future use.

4. Knowledge must be constructed in a form that supports use before it can be applied.

Edelson (2001) suggests that knowledge cannot be transmitted directly from one individual to another, with the result that every individual's knowledge structures reflect his or her unique experiences, nor can rich knowledge be constructed instantaneously. Understanding must be developed incrementally through the stepwise elaboration of knowledge structures. However, the actual construction of knowledge structures takes place below the level of awareness and is guided by unconscious processes that attempt to make sense of experience (Anderson, 1983). Based on these principles, research has been focused on how best classroom learning can be structured to facilitate the process of knowledge construction. Knowledge construction in part involves transforming the existing frameworks as eloquently expressed in the conceptual change model of knowledge development.

2.0.2 Conceptual change theory

The conceptual change process has been explained in different ways in the literature. But the explanation by Posner, Strike, Hewson and Gertzog (1982), which is constructivist in nature, provides a model that is important in conceptual change instructions. This model posits that students either assimilate or accommodate new knowledge. Assimilation involves the rearrangement of already existing knowledge and incorporating the new knowledge, while accommodation is when the pre-existing knowledge is transformed in favor of the new knowledge. Posner et al., suggest that accommodation takes place when 1) students are dissatisfied with their pre-existing

knowledge and therefore 2) find the new knowledge more intelligible, plausible and fruitful.

The Conceptual Change Model (CCM) has undergone several revisions (Hewson, 1982, 1983, 1996; Hewson & Hewson, 1984; 1988; 1992; Strike & Posner, 1985, 1992). For instance, (Duit & Treagust, 1998, 2003) see the impression that dissatisfaction with a prior conception will automatically initiate a dramatic or revolutionary conceptual change as problematic, because the model concentrates only on the cognitive aspect of learning. Thus, Duit and Treagust propose the inclusion of affective factors consistent with social constructivist ideals. They suggest that motivational factors such as students' interest in science and how these factors impact learning should be taken into account. In addition, consideration of the social factors that expand the complexity of the learning process is necessary. Therefore, a multi-perspective view of science learning and instruction is more appropriate in analyzing and interpreting students' knowledge construction process.

Modification of the learning environment has a direct impact on how curriculum should be designed. What are the implications for curriculum and instruction in light of the complexity of the learning process? Some researchers have attempted to provide some suggestions on how curriculum should be planned and implemented to accommodate the multi-perspective view of science teaching as discussed below.

2.0.3 Implications for Curriculum and instruction

According to Driver and Leach (1993), the aim of curriculum development is then to create a classroom environment that provides the social setting for mutual support of knowledge construction. Such an environment encompasses not only the learning tasks as set, but the learning tasks as interpreted by the students. Driver and Leach suggest the

following features to characterize the teaching and learning from constructivist perspectives:

- Learners are not viewed as passive but are seen as purposive and ultimately responsible for their own learning. They bring prior conceptions to the learning situation.
- Learning is considered to involve an active process on the part of the learner. It involves the construction of meaning and often takes place through interpersonal negotiation.
- Knowledge is not “out there” but is personally and socially constructed; its status is problematic. It may be evaluated by the individual in terms of the extent to which it “fits” with his or her experience, is coherent with other aspects of the individual’s knowledge and is consistent with the knowledge schemes within particular social groups.
- Teachers also bring their prior conceptions to learning situations, not only in terms of their subject knowledge but also in their views of teaching and learning. These can influence teachers’ ways of interacting with students in classrooms.
- Teaching is not the transmission of knowledge but involves the organization of situations in the classroom and design of tasks in a way that enables students to make sense of the new knowledge.
- The curriculum is not that which is to be learned, but a program of learning tasks, materials, resources, and discourse from which students construct their own knowledge.

The curriculum therefore needs to be designed in such a way that it encompasses the different aspects of learning.

Posner et.al., (1982) claim that students hold onto their conceptions because they find these conceptions intuitively plausible, intelligible, and fruitful. Science teachers therefore need to make scientific concepts intelligible, plausible and fruitful to learners if the learners are to abandon their unscientific conceptions in favour of scientific ones. In other words, science teachers should create situations that provide students with experiences that challenge their previously held ideas. Furthermore, the experiences should help the students see the inadequacy of their pre-conceptions.

In order to achieve conceptual understanding in any given field of knowledge, Wiggins (1989) suggests there should be re-organization of curriculum. He suggests that curriculum must develop in students the habits of mind required for a lifetime of recognizing and exploring one's conceptions. The curriculum should thus: (1) equip students with the ability to further their superficial knowledge through careful questioning, (2) enable them to turn those questions into warranted, systematic knowledge, (3) develop in students high standards of craftsmanship in their work irrespective of how much or how little they know, and (4) engage students so thoroughly in important questions that they learn to take pleasure in seeking important knowledge. All these steps focus on the needs of the students, strengthening the argument that learning is entirely dependent on the students.

Given that this study looks at what perceptions of HIV/AIDS students in Ugandan high schools have, it is of great importance to situate this study in the existing literature on learning. The focus of the study was to establish how students' perceptions impact

classroom instruction about HIV/AIDS. Consequently, looking at the different aspects of constructivism and learning informs how data collected in this study was interpreted and reported. In addition, the literature base helped the researcher think of the implications of such a study on teaching. However, the study had to go beyond searching for implications for teaching to seeking practical solutions on how best learning can be enhanced in a classroom setting. Therefore, literature on how effective the conceptual change model can be in classroom instruction has been drawn on. This provides perspective on what modifications need to be made when using the conceptual change model in classrooms.

2.1.0 Perceptions of HIV/AIDS and learning

Research conducted in different communities affected by HIV/AIDS has shown that perceptions of the disease affect how the communities relate to the disease.

Anugwom (1995) conducted an exploratory research on perceptions of AIDS among University students in Nigeria. The researcher sampled 400 students from different faculties, both male and female, who gave their views of HIV/AIDS on a questionnaire. Anugwom found that 120 of the respondents of both sexes saw AIDS as not really in existence. These students claimed the disease is a problem in white communities and had not seen any patient except on television. Another 280 students saw AIDS as an invention of Western Nations to put Africa in its place. Furthermore, 105 students suggested that if the disease is really a problem, then it is predestined and there is no need to prevent anything. The students who do not believe that the disease exists take no precautionary measures. Anugwom suggests that there should be a realignment of AIDS prevention programs to tackle the problem of wrong or unjustified perceptions.

Cheri, Miller and Burling (1994) conducted a quantitative research of United States college students' attitudes, knowledge and behaviour towards HIV/AIDS. A total of 174 students took part in the study. Cheri et al found that some students were in denial about HIV/AIDS, others suggested punishment was warranted for those infected individuals. A number of students felt embarrassed to discuss issues that relate to HIV/AIDS such as condoms. Other students had concerns regarding HIV/AIDS and infected individuals, believing that the problem is exaggerated. Cheri et al conclude that the way students think about HIV/AIDS may determine whether or not they have a future because these perceptions will be reflected in the choices they make.

The International Development Research Centre (IDRC, 1997) compiled a report on different qualitative and quantitative research on HIV/AIDS. The report aimed at suggesting ways of communicating to adolescents about HIV/AIDS. The adolescents involved in the study were from Zambia, Malawi, Kenya, Uganda, Rwanda and Burundi. The researchers found that the youth explained AIDS using both biomedical and the cultural models of disease explanation. In the biomedical model, the youth know that the disease is viral and has no cure, while the cultural model explains AIDS in the social context of the disease. Further, the research established that the adolescents had misconceptions about HIV/AIDS which included beliefs that the disease could be transmitted by sharing clothes, being bitten by mosquitoes or that abstaining from sex after acquiring HIV will protect them from AIDS. IDRC recommends that communicating AIDS to youth should be stepped up but there is need to take into account what perceptions the youth have about HIV/AIDS.

The studies cited above have a direct bearing on the current study. Anugwom's (1995) study suggests that students' responses should be closely examined given that the students have received numerous messages on HIV/AIDS. Do these students believe that the disease is not really a problem in Uganda? Cheri et al's (1994) findings on different perceptions were also important in interpreting the data gathered in this study. The IDRC study has a direct bearing on the current study which is looking at the perceptions students have on HIV/AIDS. It was imperative to establish if the students in Uganda have views that could affect the way they respond to HIV/AIDS messages. In light of the research conducted in Nigeria, wrong perceptions can have grave consequences in the way the students view AIDS intervention programs. The following section provides insight on how prior knowledge can impact learning. Studies on the perceptions students have of HIV/AIDS did not seek to understand how these perceptions impact classroom instruction and therefore the researcher draws on literature on how students' prior knowledge impacts classroom instruction from other studies on various scientific phenomena. These are discussed below.

2.2.0 Prior knowledge and learning of science concepts

Piaget's research has led to the widespread study of students' conceptions (Driver, 1983). A review of various studies on this topic (Cobern, Gibson & Underwood, 1995; Driver, 1983) shows that students often have prior knowledge on the scientific concepts they encounter in classroom instructions. Research spanning almost half a century has continued to show that prior knowledge in part influences the way new information is understood (Ausubel, 1968; Clement, 1998; Cobern, 1996; Cobern, Gibson & Underwood 1995; Driver, & Easley 1978; Driver, & Erickson 1983; Kelly 1955). Since it

is almost an established fact that knowledge is constructed (Ausubel, 1968; Driver, 1983; Johnson & Gott, 1989), it is possible that some of the prior knowledge is not necessarily consistent with a scientific framework. Whether scientific or alternative frameworks (Driver, 1983; Driver & Easley 1978), it is this knowledge that constitutes a learner's prior knowledge or pre-conceptions, which he/she uses to interpret new information. What this means is that any form of learning is either about transforming one's existing frameworks or restructuring one's conceptual ecology (Hewson, 1983), what in contemporary literature is referred to as the conceptual change process (Hewson, 1982, 1983, 1996; Hewson & Hewson, 1984, 1988, 1992; Posner et.al. 1982; Strike & Posner, 1985, 1992).

Cobern (1996) carried out a descriptive case study on 18 ninth graders from a semi-rural high school in the central desert region of Arizona. The aim of the study was to establish students' worldviews on nature and compare them with scientific concepts such as ecology, evolution, and natural selection. The data were gathered via semi-structured interviews that involved elicitation devices designed to encourage students to talk at length about nature. The study revealed that the ninth graders consistently used their prior knowledge when explaining nature. In spite of the fact that these ninth graders had been taught scientific concepts on nature, they did not use any of the science concepts in their responses. However, these students performed well in the exam, which according to Cobern is an anomaly that science teachers should watch out for. Teachers who base their perception of students' scientific literacy on exam results could be misled in believing that such students are potential scientists (see also Hurd, 1993). From this outcome, Cobern concluded that those students simply "wall off" the concepts that do not

fit their intuitions and practice “cognitive apartheid” (see also Claxton, 1993). In other words, these students have separate compartments: one for scientific knowledge from which they can retrieve the knowledge depending on who needs it, and the other compartment for the knowledge that they can use in their socio-cultural settings.

According to Hurd (1993), scientific literacy requires that students be able to use their knowledge independently in the everyday world. Students ought to be taught in such a way that they restructure their knowledge domain into a framework based on critical dimensions that facilitate the daily use of that knowledge. Hurd’s definition for scientific literacy was important for the current study because it enabled the researcher to determine students’ understandings of HIV/AIDS based on how much science they used in their responses.

Aikenhead (1996, 1999) carried out action research on students in grade 10 in a conventional high school to establish how students’ pre-conceptual knowledge could help in changing the teaching of science. The study focused on students’ conceptions of heat and temperature as a way of understanding the explanation of these phenomena. Three students were interviewed before and after the concept of a *Unit of Heat* was taught by the classroom teacher. Aikenhead cites one student who deliberately refused to believe that there can be temperature equilibrium between nails in a pot of boiling water and the water. The student’s reasoning stemmed from the belief that the object further away from the heat is always cooler than one nearer the heat source. Even when a thermometer placed in different places in the water gave the same temperature readings, the student dismissed it arguing that the thermometer was not sensitive enough to detect the temperature differences. Interestingly, this student was among the best science students in

the class and could have been easily regarded as a potential scientist. Aikenhead however, suggested that such a student is just a smart student who could operate in the world of science and yet keep his own framework of understanding science concepts.

In another study similar to Aikenhead's (1996), Aikenhead and Jegede (1999) carried out an empirical cultural anthropology study with multicultural students to establish how students' cultural worldviews affect their acceptance of scientific worldviews. Aikenhead and Jegede determined that students usually hold onto their cultural beliefs and find it difficult to accept the science concepts that conflict with their ideologies. These students perform well in written exams but never use science in explaining happenings in their everyday life. Aikenhead and Jegede point out that these students see school culture as being different from their home culture and therefore do not extend what they learn in science classrooms into daily explanations of phenomena outside school. This separation of school culture from home culture means that students practice collateral learning (Jegede, 1997) similar to Cobern's (1996) observation that students only use science concepts during special occasions such as during examinations.

Cobern's (1996) and Aikenhead's (1996, 1999) findings provided a special lens for the current study given that it was an inquiry into students' constructed meanings and the impacts on the learning of a particular science concept, HIV/AIDS. The conceptual change model suggests that with evidence students could abandon their unscientific conceptions by adopting scientific meanings. But Cobern and Aikenhead clearly demonstrate that this was not always the case.

Thorley and Stofflet (1996) applied the conceptual change model to science classroom instruction to find out which instructional techniques would be effective in

bringing about conceptual change. The action research study was conducted while a lesson on electrical current was being taught to grade 9 students. The various instructional techniques the teacher used were recorded. One of their findings was that using different linguistic expressions caused deeper understanding of scientific concepts. Thorley and Stofflet developed a framework for making science intelligible to the students. The framework included a linguistic expression, criterial attributes, exemplars, images, analogies and metaphors (kinesthetic or tactile), plus specialized modes of representation (auditory and olfactory). Teachers were rarely observed to use analogies, yet according to Thorley and Stofflet, analogies could be effective tools in science instruction because they usually draw from the students' experiences. Thorley and Stofflet's (1996) findings are key. The current study dealt with the use of analogical and metaphorical expressions, and Thorley and Stofflet's inference that these can be effective tools for instruction piqued interest for data collection and discussion.

Different research studies discussed in the following section suggest that analogies and metaphors are not only good teaching devices but also help in eliciting students' prior knowledge. Given that the cultural way of communication used in Uganda to convey HIV/AIDS related messages draws on analogies, there is a high possibility that some students will use these expressions to reveal their understandings. This lends credence to the need to explore existing literature on analogy use as a means for learning as well as for their significance for understanding students' perceptions.

2.3.0 Analogies, metaphors and Similes

The terms analogy, metaphor and simile are close in meaning and are at times used interchangeably. However, Duit (1991) has highlighted the technical differences.

Analogies are relational structures from one domain that normally can be applied to another domain, while metaphors implicitly compare structures that are not related. Similes are close in character with metaphors but the difference lies in how they are compared. While metaphors cannot be compared literally with the target domain (concept), the characteristics of a simile can literally be compared with the target domain (concept). Similes differ from analogies on the basis that similes come from unrelated domains and the relational structures are obscure at the surface until broken down.

In brief, an analogy explicitly compares structures between two similar domains. For example *comparing* the camera to the human eye is an analogy. On the other hand, a metaphor implicitly *replaces* structures in two domains, so an example would be a camera is like an eye. According to Duit, grounds for comparison in a metaphor are hidden, and taking metaphors literally, renders them false. Similes are close in meaning to metaphors but they compare structures that provide evidence of relationship. An example would be a camera is as effective as the human eye. Metaphors include transference of meaning, naming one thing in terms of another and can be distinguished from similes because metaphors do not have the operative word that points out the aspect of comparison. Therefore in this research, any responses that carried the 'as' tag were considered similes while any that had the 'like' tag were considered metaphors.

2.3.1 Categories of analogies

Dagher and Cossman (1992) conducted a study that explored the nature of explanations used by science teachers in junior high school classrooms. Using classroom observation of twenty public school teachers in a total of 40 class periods, Dagher and Cossman generated 10 types of explanations that are conceptually related to one another.

The ten categories or types of explanations that are generated were anthropomorphic, analogical, functional, genetic, mechanical, metaphysical, practical, rational, teleological and tautological. In yet another study, Dagher (1995) identified five general categories of analogies which capture the characteristics of the 10 types earlier generated by Dagher and Cossman. The five categories of analogies are: compound, narrative, procedural, peripheral and simple.

Compound analogies are those involving instances where the teacher uses more than one analogue (source) domain to explain several ideas related to the target (concept). *Narrative analogies* are those in which the teacher uses one source domain to explain several concepts in the target domain; *procedural analogies* are those that pertain to practice, conduct and processes. *Peripheral analogues* are secondary or accidental analogies that depend on a single analogy; *simple analogies* are those that require further development. These differentiations of analogies were important to the current case study especially during the time of data analysis.

2.3.2 Analogies and metaphors as tools for learning

Analogies and metaphors are “teaching devices” that are close in meaning. Both analogies and metaphors express comparisons and highlight similarities. However, the difference is located in the process of comparing (Duit, 1991). An analogy explicitly compares the structure of two domains (analogue and target) by pointing out the identity of parts of the structures, while a metaphor compares without explicitly pointing out the identity.

Gentner (1983) provides a theoretical framework on how analogies and metaphors can be effectively used in teaching difficult scientific concepts. Zeitoun (1984)

distinguishes analogies from metaphors, models and exemplars, and then provides a model on how analogies can be used in classroom instruction. Over the years, there have been modifications of Zeitoun's model of teaching with analogies by Glynn (1991) and Nashon (2003).

Through experience with analogies, learners are expected to *assimilate* or *accommodate* target information: these are Piagetian terms that describe different modes of learning. The process of assimilation takes place when the new concept or information does not conflict with what the learner already knows (Posner, et.al., 1982). However, this does not always take place as already discussed in previous literature.

Duit (1991), citing various researchers on the analogy and metaphor use in classrooms, provided an overview of the merits and demerits of using analogies and metaphors in science instruction. He suggests that analogies and metaphors are "double edged swords" which may totally mislead students. Often times, when analogies are improperly used (Pittman, 1999), they fail to provide the conceptual understanding they are intended to, especially if the students do not understand the analogy properly or students are not able to identify the analogues used (Clement, 1993).

Clement (1993) conducted experimental research on the use of analogies in a classroom physics lesson. The experimental group consisted of 150 high school students and 55 control group students all subjected to a pre-test and post-tests. He discovered that sometimes the analogies teachers used could not be easily understood by the learners and hence were not effective. Clement suggested that analogies should not be the full proof for the concept but should act as bridges or anchors that cause transition from pre-conceptual knowledge to scientific understanding. However, he noted that analogies used

by teachers often failed because they are improperly administered (i.e. not thoroughly explained).

Clement's (1993) findings are important to the current case study. Analogies and metaphors used in the Ugandan popular media on HIV/AIDS are presented by different governmental and Non Governmental Organizations. From Clement's findings, such analogies may not be understood by the learner (target audience) and therefore fail to bring about the desired results (understanding). The case study intended to establish how the analogies used by the media were understood by the Ugandan students in Senior Three (target audience for the message as the age bracket considered most vulnerable to HIV/AIDS infection).

Another cultural anthropology study by Lagoke, Jegede and Oyebanji (1997), focused on grade 11 students in Kaduna, Nigeria. The researchers aimed at establishing whether the use of environmental (culturally-based) analogies could eliminate the gender gap in science concept attainment. Their study was based on the assumption that the use of analogies from the individual students' socio-cultural environment can successfully act as a psychological bridge for the learning of science concepts. The findings of Lagoke et al., indicate that students benefit significantly from teaching with environmental analogies. Environmental analogues, as used in this study, refer to analogical linkages derived from the social-cultural environment of the learner. This study is significant for the current study because it provides a background context similar to the one in which the case study was conducted. It also alerted the researcher to look out for environmental analogies that students have generated to explain HIV/AIDS.

A lot of studies on analogies have tended to examine teacher-generated analogies (Pittman, 1999). Not much attention has been given to student generated analogies. Pittman conducted a qualitative study with 189 students in a junior high school to examine whether student-generated analogies could provide a better picture of student understanding about protein synthesis than traditional paper and pencil tasks such as multiple choice tests. The rationale for the study was that protein synthesis is generally a difficult topic for junior high school students to visualize and it served as an introduction to a unit on genetic engineering in the district curricular scope and sequence.

Students were to develop analogies on what they had learned about protein synthesis. Pittman's (1999) study revealed that the students remembered what was taught when they generated their own analogies. On the whole, Pittman's study showed that student-generated analogies provided a better picture of student understanding about protein synthesis than the traditional paper and pencil tasks, such as multiple choice tests. Pittman's findings highlight the importance of student-generated analogies in establishing students' pre-conceptual knowledge, which was the major aim of the current study. In addition to that, Pittman's findings underscored the need to take into consideration student-generated analogies in assessing students' understanding of difficult science concepts as they indicate the depth of the students' understandings. The current study used a specially designed questionnaire to elucidate students' understanding of HIV/AIDS through the analogies, metaphors and similes they used.

Nashon (2003) did an interpretive case study research to examine analogy usage in physics instruction in three Form Two (Grade 10) Kenyan classrooms and came up with results similar to those of Pittman (1999). The difference, however, existed in the

way the students explained their analogies during the interviews; they tended to humanize the concepts. Nashon also notes that the teachers too used anthropomorphic analogies which he attributed to the cultural practices of Africans, where everything is ascribed life and human attributes (see also Lagoke et al., 1997). Nashon further pointed out that teacher-generated analogies can be a source of misconceptions, especially if the dissimilar attributes of the analogue (familiar concept) and the target (concept under study) are not pointed out to the students. He suggests that there is need to systematically plan analogies to be used because spontaneously-generated analogies tend to concentrate on similar attributes (between the analogue and the topic/target) and not the dissimilar attributes. This, Nashon asserts, could lead to misconceptions.

Nashon's (2003) study was significant to the current case study because it revealed the anthropomorphic element of the African's worldview. Kenya and Uganda are neighbouring countries with common cultures, and share a historical, social and administrative background. Therefore, Nashon's findings could most probably be applicable to the Ugandan situation. In addition, analogies used in the Ugandan popular media on HIV/AIDS are never explained to the target audience and could therefore be a source of misconceptions.

In general, the research drawn on above (Aikenhead 1999; Aikenhead & Jegede 1999; Ausubel, 1968; Clement 1993; Cobern, 1996; Cobern, Gibson, & Underwood, 1995; Driver, 1989; Driver & Easley 1978; Kelly, 1955; Nashon 2003; Pittman, 1999) provides the theoretical framework in which this study was designed. Further, to understand students' perceptions, many of the studies used qualitative methods that could enable the researchers collect rich data. Given that the current study aimed at

understanding students' perceptions of HIV/AIDS, some of the methodologies of data collection highlighted in the different research were used for collecting data.

2.4.0 Problem Statement and its Educational Significance

Although there have been numerous studies on students' pre-conceptions, there are few in the area of teaching and learning on HIV/AIDS, and almost none in the Ugandan high schools. It is this deficiency that prompted the researcher to study the preconceptual and perceptual understandings of HIV/AIDS among Ugandan Senior Three students in biology classrooms. In conducting this research, the focus was on the students' pre-conceptions and perceptions of HIV/AIDS, the nature of media messages regarding HIV/AIDS, the analogies, metaphors and simile-like expressions students use to express their understandings of HIV/AIDS, and how the students' pre-conceptual knowledge impacts their understanding of HIV/AIDS before and during instruction in a biology classroom.

Though there have been numerous research studies on the impact of HIV/AIDS by organizations like UNESCO, USAID and UNAIDS, little research has been directed at what understandings students have developed from the media messages. Any attempt to provide insight in this area is of benefit to teachers, curriculum developers and policy makers, hence the need for a study of this kind: one that particularly looks at students' understanding of the science of the disease. And the fact that Uganda is being fronted as the most successful African country in containing the spread of HIV/AIDS makes it necessary to research whether the behavioural change recorded among youth is based on understanding of the disease, and not on collateral learning as argued by Aikenhead and Jegede (1999).

Another important reason for this kind of study is derived from the fact that little research on engaging students' prior knowledge has been done in Uganda. Therefore the findings of this study could help sensitize teachers on the diverse knowledge about HIV/AIDS that students bring into the biology lessons. Furthermore, the study aims at sensitizing teachers to the need to always provide students with opportunities to make explicit their prior knowledge and monitor how it impacts their understandings of HIV/AIDS. The greater possibility is that the students will discuss more about HIV/AIDS with peers and others, hence in a way playing an educative role in society.

The following chapter discusses the methodology and research design. The methods and techniques used for data collection have been detailed. Also matters regarding the trustworthiness of the research coupled with ethical considerations while conducting the research are discussed in detail.

Chapter Three

3.0.0 Methodology and Research Design

This chapter focuses on the methodology and techniques used in collecting data. The study used an interpretive qualitative case study (Stake, 1968) approach because it aimed at collecting rich descriptive data that would help understanding of the phenomenon under study, that is, Ugandan students' perceptions of HIV/AIDS. Yin (1984, 2003) defines case study research as empirical inquiry that investigates a contemporary phenomenon within its real-life context, when the boundaries between phenomenon and context are not clearly evident, and in which multiple sources of evidence are used. Based on this definition, the study was empirical and holistic since it involved real classroom experiences.

Literature on case study methods (Merriam, 1998; Stake, 1995, 1998, 2003; Yin, 1984, 2003) offers techniques for organizing and conducting successful case study research. The current study drew upon this literature and others in developing guidelines for systematically conducting the case study. The study employed qualitative research methods such as questionnaires, video ethnography and follow-up group discussions in collecting data. These methods of data collection enabled the researcher to collect rich data that would ensure detailed description of students' conceptions of HIV/AIDS. The procedures for data collection in the case study are outlined below.

3.1.0 Choice of location and participants

The target participants were Senior Three Ugandan students in four large Ugandan schools located in Eastern Uganda (see also Chapter One). These schools were

appropriate for the researcher because they represented the dynamic nature of Ugandan schools, and were willing to participate in the research study. Senior three (S.3) classes were selected because HIV/AIDS is part of S.3 curriculum and S.3 students are able to articulate their responses in English, which is the medium of instruction in Uganda and the language used in this research. Besides, on a social level, this group is considered highly at risk of contracting HIV/AIDS and hence the target of the study (AIC statistical data on HIV/AIDS prevalency in Uganda). A total of one hundred and sixty (160) S.3 students participated in this study. The participants were those studying biology at the S.3 level and were willing to take part in the study. Although the researcher had no control over the distribution of the sample size, the 160 students provided an appropriate number for certain kinds of statistical analysis. The distribution of class size hence sample population has been detailed in Chapter Four.

The students were from four different Ugandan schools representative of the kinds of schools in Uganda. All the schools were public schools that attract students from different regions of Uganda. The schools were either boarding (residential) or day (non-residential) and two were single sexed while the others were mixed (co-educational). All of the schools were located in the eastern region of Uganda because the researcher had already established a research relationship with them. Furthermore, the schools were easily accessible. Details in Chapter Four show the demographics of the participants.

3.2.0 Methods of Collecting Data

A specially developed questionnaire (Anderson, 1990) was used to elicit students' pre-conceptual knowledge about HIV/AIDS. Questionnaires were used because they were appropriate for collecting the kind of data the researcher set out to collect, that is,

rich data. The questionnaire was designed in such a way that students were able to give as much information as possible on their perceptions of HIV/AIDS. This was followed by video recording of classroom instructions on HIV/AIDS, which was then followed by in-depth analysis. The recordings of instructions provided a more naturalistic setting (Denzin & Lincoln 2003) since the researcher was not in the class, hence minimizing the intrusion effect (Hawthorn Effect) that could impact the kind of responses the students gave to their teachers. The aim of the recorded class proceedings was to capture in situ students' participation in the lesson on HIV/AIDS focusing on their use of prior knowledge, prompts that trigger their use of prior knowledge about HIV/AIDS, and their reactions and overall understandings of the instructions.

In order to make sure the students' views were the ones represented in this study, focus group discussions (Goldman, 1962) were also conducted. The focus groups aimed at establishing the students' perceptions from certain responses that were common and unique to each participating school. The focus groups provided the researcher with the opportunity to observe the reactions of the group members to the topic under discussion which would not have been easily identified during individual discussions. Goldman (1962) suggests that discussions amongst peers provoke greater spontaneity and candor than can be expected in an individual interview. The group may provide support to its members during the expression of anxiety-provoking or socially unpopular ideas. This suggestion was central to the decision of having focus group discussion in the study, because HIV/AIDS is a socially sensitive topic that would likely have provided some level of discomfort among students had the researcher used interviews to address some of the responses. Secondly, the researcher did not want to give the students the impression

that their responses were being gauged on a right or wrong basis, thereby creating anxiety. However, there were some students who, after the focus group discussions, participated in an informal interview session with the researcher. The students took on issues that provoked them emotionally and engaged the researcher in further discussion. The students were willing to seek clarification and the same time, argue why they have a different take on the topic under discussion. The researcher allowed the students to give their opinions so that the research established the students' understandings and not the researcher's. In a way, these students provided insights on what issues are core in their interpretation and understanding of HIV/AIDS and other health related issues.

3.3.0 Procedures

The study followed a four phase procedure:

Questionnaire Phase

The first phase of the study involved recruitment of participating schools and teachers from whose biology classes students were recruited. A specially developed questionnaire was mailed to the researcher's agent who gave them to teachers who gave them to the class prefect to administer to volunteering students in their classes. After completing the questionnaires, students who consented to participate in follow-up interviews about their questionnaire responses were requested to complete a personal information section attached at the end of the questionnaire. Each student was to seal his/her complete questionnaire (without making any identification marks on the questionnaire or envelope except the voluntary personal information section) in a researcher-supplied envelope and return it to the class prefect who later gave them to the

teacher who in turn sealed all the returns in a large envelope, which was then forwarded to the researcher's agent who had been trained in matters of confidentiality and signed an undertaking to this effect. This was to ensure that the students' privacy and confidentiality was adhered to throughout the process of data collection.

Video recording of instructions on HIV/AIDS

The second phase involved video recording the HIV/AIDS lessons in the four biology classes that participated in the questionnaire phase of the study. This method of data collection used technology that minimized researcher intrusion. The researcher, through the help of a trained research assistant in Uganda, recruited a person from the local settings of the community to record the classroom proceedings. After the recordings were made, the research assistant played the video for the students so that they could confirm that those were the true proceedings of the class and also to give them the opportunity to edit any information they wanted before the edited version was sent to the researcher. These video recordings were analysed by comparing questionnaire findings and looking for any cases of interaction between the students' pre-conceptions and classroom taught science of HIV/AIDS.

The focus was particularly on students' use of prior knowledge, prompts that trigger their use of prior knowledge about HIV/AIDS and their reactions and overall understandings of the instructions. In other words, this phase aimed to establish the relationship between students' learning behavior in biology class and the knowledge they bring to the class on HIV/AIDS. This was achieved because the teachers used items from the questionnaire to design lessons and used selected questions to prompt students into a discussion.

Follow-up group discussions

The third phase involved focus group discussions (Goldman, 1962) with students who participated in the study. The aim was to get clarifications on issues that had been raised in the questionnaire and had not been addressed in the classroom discussions plus those that seemed persistent in both questionnaire and classroom instruction. This helped in triangulating the responses while at the same time helped in deeper analysis of the responses given the new light the students shed on the issues.

The students were given the issues to discuss and in an open forum made comments on the different issues under discussion. The issues were those that were persistent in a given school and so did not require personalized interviews. The proceedings of this discussion were tape recorded with the permission of the students.

Informal interviews

There were some students who came to the researcher after the discussions to have one on one discussion though the proceedings were not tape recorded but written in the researcher's notebook immediately after such informal discussions. The students who came to have a one-on-one discussion with the researcher had issues that they were struggling with and wanted some clarification. This provided insight to the researcher on the issues that need to be addressed in classrooms and at the same time gave insights in the trend of thought these students had. Even after classroom discussions, there were certain beliefs the students were struggling, with showing that conceptual change is not an instant but rather progressive (Ausubel, 1968) restructuring of given concepts.

3.4.0 Data analysis

As indicated in Chapter Two, studies by Ausubel (1968), Cobern, Gibson and Underwood (1995), Clement, (1998), Cobern, (1996), Dagher and Cossman (1995), Driver, & Easley (1978), Driver, & Erickson (1983), Duit (1991), Kelly (1955), Lagoke, Jegede & Oyebanji (1997), Nashon (2003), and Pittman (1999), provided the researcher with the theoretical framework, and methodological and interpretive skills for analyzing the students' pre-conceptual knowledge and nature of the messages used. Triangulation (Mathison, 1988) was achieved through the use of different classes in different schools and different methods of data collection: questionnaires, video analysis and follow-up group and individual discussions. Triangulation among questionnaire responses, video recordings and follow-up group discussion was in the form of looking for the nature of students' pre-conceptual understanding of HIV/AIDS, the meanings derived from the media messages about the disease and the interaction of these meanings with the science of HIV/AIDS during classroom instruction.

As data were collected from participants, emergent themes were developed based on Erickson's (1986) nine point guideline. The questionnaires provided information on students' pre-conceptual understandings and the nature of metaphors, analogies and similes used by the students to explain HIV/AIDS. The questionnaires were identified based on the nature of the school and gender of the participant. Interpretive methodology was used to arrive at the different themes which captured the students' views. Sorting of the responses from the questionnaires served to inform video viewing and subsequent students' interactions.

In watching the classroom instructions, the researcher observed students' participation levels and noted all the responses that showed the interplay between prior knowledge and learning. The analysis from the questionnaires gave insight into the in-depth analysis of the classroom proceedings because the researcher was aware of the prior knowledge the students have. Through all this, the researcher was seeking to identify the nature of the messages and how prior interpretation affects new knowledge construction during and after classroom instructions on HIV/AIDS.

Focus group discussions were used as a means of following the students' understanding after classroom instruction. The audio-recorded data was transcribed and issues that were deemed important to the understanding of particular responses noted. Furthermore, the researcher compared the recorded discussions with the classroom proceedings to elicit knowledge that seemed persistent even after classroom instruction on the disease. In general, the discussion acted as a member check as well as a window into the students' processing of information.

In summary, data analysis proceeded as follows:

- Search for patterns based on participant gender and nature of schools.
- Coding and categorizing the data into undercutting themes.
- Searching for confirming and disconfirming evidence in each theme.

All these were enabled by the use of Atlas.ti software for in-depth analysis of qualitative data. The software enabled quick coding, linking of codes to quotes and relating the different data sources to particular statements. This simplified the triangulation process.

3.5.0 Trustworthiness/ credibility of the data and conclusions

Trustworthiness and credibility are used in naturalistic qualitative studies to describe in quantitative terms what is called validity (Lincoln & Guba 1985). Validity, generally, is conceived as the trustworthiness of a research study and has been defined in terms of the logic and technical adequacy of the process used to conduct a study (Eisenhart & Howe, 1992). Conventional validity (Eisenhart & Borko, 1993) refers specifically to a level of confidence in the accuracy and appropriateness of the methods used in an investigation. Lincoln and Guba (1985) propose four alternative constructs that more accurately reflect the assumptions of the qualitative paradigm. These are credibility, transferability, dependability and confirmability. The paradigms are each addressed here.

Credibility

According to Lincoln and Guba (1985), credibility demonstrates that the inquiry was conducted in such a manner that the subject was identified and studied. The current study has aimed to understand the nature of Ugandan Senior Three students' preconceptual understanding HIV/AIDS and how this affects classroom instruction. This involves understanding their pre-conceptual knowledge about the media messages of HIV/AIDS as discussed in Chapter One. There are complex factors that influence knowledge construction as is detailed in Chapter Four. Credibility is thus judged on how dependable and believable the findings are. Particular effort has been made to ensure that what was discussed and written is as factual as possible. The researcher established credibility through member checks with participating students, peer debriefing and critical friends in attempt to judge, make claims, draw conclusions or interpret the data.

Transferability

Lincoln and Guba (1985) suggest transferability as a second paradigm for establishing validity in qualitative research. Here, the research has to demonstrate that the findings can be replicated in a setting similar to the one designed by the researcher. However, Lather (1994) argues that making such generalization is problematic given the unique nature of each setting. Rather the researchers in other areas with similar settings should look for the issues that resonate (Newman, 1999) with them. The researcher has outlined the theoretical framework in Chapter Two that guided the study in terms of data collection and analysis. The study was designed as a case study to capture and understand the perspectives of the participants. It is therefore improper to transfer the conclusions to another setting as that was not the intent of the study. The researcher however agrees with Newman's (1999) suggestion of resonance so that the readers of the research can decide for themselves if the findings apply elsewhere. However the researcher used multiple sources of data, that is, four different schools and different data sources to ensure corroboration. Triangulation of different data through different methods of data collection and sources was done to reduce researcher bias or limitations of a particular method.

Dependability

Another criterion for addressing quality issues in research is the issue of dependability, in which the researcher attempts to account for changing conditions of the aspect chosen for study and changes in design based on new understanding of the setting. For the current study, a coding of the data was done to deepen layers of analysis culminating in the creation of themes. The most encompassing process of coding was

used to compare data and interpretations as reported in Chapter Four. This ensured dependability of the research as all responses fit into each of the categories developed.

Confirmability

Do the data help confirm the general findings and lead to the implications? This is what the last criterion addresses. Given the same set of data, would the same conclusions be drawn by a different person? In some ways, the data speaks for itself, although in other aspects it is probable that different conclusions could be made. The framework is displayed in the way one reports the findings. The researcher's theoretical framework detailed in Chapter Two acted as the lens for data analysis and reporting, hence the data confirms the general findings, which lead then to the implications.

Ethical Considerations

In the conduct of a study such as this one, particular concerns over personal knowledge of the setting being studied, as well as protection of privacy for participants and confidentiality of responses are the legitimate responsibility of the researcher. Attention to the guidelines of the Behavioural Ethics Review Board, as well as considerate interpersonal relations is vital. The researcher sought ethical clearance to conduct the research and the certificate from the Ethical Review Board of UBC was granted (see appendix Di).

The procedure in Uganda is that the researcher privately identifies the study location then seeks permission from the responsible authorities. The researcher got an approval letter from the Permanent Secretary in charge of Education since the research belongs to the education sector. Following the approval, permission was sought from the District Education officer under whose jurisdiction the schools are located. The approval

was given which now made the research official. Letters were then given to teachers and principals who had earlier verbally consented to allowing the researcher to conduct the study. The students were then notified and their consent/assent sought.

Seeking consent and assent is a mechanism for participants to be informed of the conduct of the study, as well as inform them of their rights as volunteers.

Consent/assent

According to the guidelines of the UBC Behavioural Ethics Review Board, if participants are under the age of 18, a parental consent is required. This was requested through a separate introduction letter and form addressed to the parents. Each potential recruit (student) was asked for assent to participate in the study, and reminded of his/her right to decline to participate even if the parent/guardian consents. Responding to the questionnaire indicated that the participants had consented to participating in the study. The students from the mixed day school (MDS) could get parental consent but those in boarding school could not. This however was resolved because of the mandate given to the Board of Governors (B.O.G) to make decisions on behalf of the parents and students, in all aspects of students permissions, akin to the *in loco parentis* responsibilities common in North American schools. Given that the students come from various parts of the country, it is not feasible to wait for the parents' decision. The Principal, being the secretary to the B.O.G., is vested with the responsibility of making decisions on behalf of the students' parents in conjunction with the Parents Teachers Association (P.T.A).

Protection of privacy/confidentiality/anonymity

Participants were asked to make no identifying marks on the questionnaires. Providing a separate form and a return envelope for would-be interview volunteers

assured anonymity of questionnaire responses. Participation in the study was completely voluntary, and respondents were so advised in the introduction letter.

Every effort was made to protect the identities of study participants. Although the teachers and principals of the participating classrooms and schools respectively were aware of the research, they did not have access to individual students' responses. This was achieved through having the respective class prefects distribute the questionnaires and collect the returns which were sealed and forwarded to the teacher who presented the sealed envelopes to the research agent who was sworn into matters of confidentiality.

The video recordings of the classroom proceedings were done by a hired agent who had no connections to any of the schools, and with the full consent of the students. The only compromise to confidentiality could have been students' revealing their responses by referring to the questionnaire. Reviews of the recorded classroom proceedings by the respective students occurred in the presence of the research agent before they were sent to the researcher. This was to give the students an opportunity to corroborate their responses and at the same time edit their responses. The edited version of the video tape was sent to the researcher. During report writing, pseudonyms are used to protect the privacy of the students.

Data storage

Documents that comprised the data corpus were labeled with a participant code. This was a unique designation, whereby letters identified the school. For example, instead of identifying the school by name, it was identified by its nature i.e. Mixed Boarding School (MBS) or Girls Boarding School (GBS) while the students were identified based on gender, for example, MBM, designating a male from a mixed

boarding school. By coding the documents, participant identities were protected as well as anonymity assured but allowed cross-referencing of comments from participants in the same school.

Questionnaires and video tapes are stored in a locked file box in the office of Dr. Samson Nashon at UBC and will be kept for a period of five years. He and my committee members are the only ones to have access to the raw data. Transcriptions of questionnaires and class discussions have the participant code as the only identifier, which was used during the phases of data analysis and report writing.

Chapter Four

4.0.0 Data and Analysis

This chapter presents the views and voices of participating Senior Three students in four Ugandan high schools on the subject of HIV/AIDS interspersed with analysis of their responses. The questions that guided this study were:

- What is the nature of Senior Three biology students' perceptions of HIV/AIDS as conveyed by the messages in Ugandan media?
- What are Senior Three biology students' pre-conceptions and perceptions of HIV/AIDS?
- How do these perceptions impact students' understanding of HIV/AIDS before and during instruction about HIV/AIDS?

From the data collected and analysed, students' pre-conceptions are highly dependent on their socio-cultural backgrounds. The students' pre-conceptual knowledge as elicited from the questionnaires are extensions of the experiences and beliefs they have been exposed to both at school and home. Examples of the experiences and beliefs are the students' religious backgrounds, their understanding of nature, their understanding of community dynamics and expectations, and their environment. Over time these experiences and beliefs have been woven into students' scientific understanding of HIV/AIDS.

To explain the data, four major themes have been developed under which students' views are given and analysed. The first theme deals with the nature of media messages and how the students perceive the messages on HIV/AIDS as was deduced from the questionnaire and follow-up discussions. The second theme deals with the students'

general conceptual understandings of HIV/AIDS as was elicited from the data collection techniques: questionnaire, video recordings and follow-up focus group discussions. The third theme discusses how the perceptions were elicited from the nature of metaphors, analogies and similes the students' used in explaining HIV/AIDS in the questionnaires. The fourth theme deals with how the students' conceptual understandings impact classroom instruction as was elicited from the video recordings of the classroom discourses from the four participating schools. Pseudonyms and acronyms have been used to maintain confidentiality. The schools will be referred to using their nature, that is, mixed boarding school (MBS), mixed day school (MDS), girls' boarding school (GBS) and boys' boarding school (BBS).

4.0.1 Demographics of the participants

Table 4.1 Nature of school and number of participants

Mixed boarding school	43	26.9%
Mixed day school	37	23.1%
Boys boarding school	40	25.0%
Girls' boarding school	40	25.0%
Total	160	

Table 4.2 Regions participants hailed from

Central	26	16.2%
North	15	09.4%
West	08	05.0%
East	111	69.4%

Table 4.3 Gender distribution

Females	87	54%
Males	73	46%

4.1.0 Nature of HIV/AIDS messages in Media

On the questionnaire (appendix C) a checklist of different types of media was provided and the participating students were asked to indicate the media from which they got information on HIV/AIDS and what kind of message they had heard from each of the identified media. The sources of information that the students identified are both public (TV, Radio, Newspapers e.t.c) and private (parents, peers and books). Table 4.4 below is a frequency distribution table indicating the source and nature of various messages students recalled. The students were free to check more than one media source and so the stated frequency of exposure as cited by the students and the total exceeded 160 students.

Table 4.4 Media students access for HIV/AIDS Information

Media	Times cited	Percentage (%)
Television	99	61.9
Radio	94	58.7
Drama	90	56.2
Newspapers	89	55.6
Local leaders	87	54.4
Health centres	85	53.1
Posters	83	51.9
T-shirts	81	50.6
Church/mosque	81	50.6
School clubs	81	50.6
Billboards	71	44.4
Parents	15	09.4
Books	08	05.0
Peers	08	05.0

Note: relative percentage is more than 100% because of the overlap of citing by same students.

Television: Television had the highest score as summed in table 4.4 above because the students stated that television gives the real picture of the HIV/AIDS patient and so they can be careful if they see those symptoms. One of the students wrote “TVs show drama on HIV like the drama series ‘Suna has it’ and after watching that, you do not want to get HIV.” The visuals include the rashes, the diarrhea and loss of body weight as symptoms of an HIV/AIDS positive person. The 61.9% students expressed a strong reliance on symptoms to identify HIV/AIDS patients. It was in the same vein that 60 (60.6%) of the 61.9% students suggested that people infected with HIV be identified and denied treatment or counseling, since these prolong their life! One male student from the BBS stated “They encourage those with AIDS to visit TASO (The AIDS Support Organization) giving them the opportunity to spread the disease.” A female student from the GBS wrote: “The people in TASO appear healthy so they intentionally spread the disease to others so they should be left to be identified.”

These statements suggest how being aware of the symptoms has brought fear of infection in students. Also, the 61.9% students seem to use symptoms to identify who is infected and yet symptoms can be mistaken for those from many other diseases like kwashiorkor as discussed in section 4.3.0. In addition, during the window period between infection and early symptoms, there are no visible symptoms and so the students may assume the person doesn't have HIV. There is a risk that the students could engage in sexual relations with HIV-positive persons should they rely on the ‘symptomatic mentality.’ Next the students cited radios as another major source of information.

Radio: According to the 58.7% students, radios are cheap and the messages are also in different local languages catering for a wider audience. One student also said,

“There are so many radio stations thus there is wider coverage of HIV/AIDS messages.” However, even with this advantage, the students said phone-in talk shows do not cater for those who cannot afford phones. To this, one student wrote “people in the rural areas always cannot participate in the shows because of no phones or network which puts them at a disadvantage,” while another said “talk shows are for those who speak Luganda and English because those are the major languages used on the Capital Doctor [radio talk show].” Though there was concern on the method of delivery and inequality of participation, one student suggested that, “people may miss the HIV messages because they prefer music played on the numerous private stations.” While another student said “when you hear the HIV/AIDS messages over and over, they become boring so just ignore.” From these responses, it is probable that the students have some knowledge about the HIV/AIDS programs on radio stations yet feel such messages ought to be balanced out so that people in the rural areas can participate. It seems the radio programs are more informative given the lack of visuals and the dialogue the programs encourage. The next medium of information dissemination was local drama.

Drama: Drama was commended by 56.2% students because as one student wrote “drama brings out the reality of HIV/AIDS, how people become orphans.” Another student suggested: “drama is in our own language so we understand what they are talking about.” One student said “after watching drama, you do not want to suffer from HIV/AIDS, it is a bad disease.” The local drama groups used by different bodies like TASO for educating the masses about HIV/AIDS probably have a similar power of appeal as television. The differences in the frequency distribution are probably because the Television drama messages concentrate on methods of transmission and how the

disease destroys the body and while the local drama talks of the economic and social problems associated with HIV/AIDS. As discussed earlier, the students wanted to see the symptoms of patients so that they could 'identify' people with HIV/AIDS. However, one student said drama is not a very effective method because "drama is taken as entertainment and so the message can be ignored."

Newspapers: There were 55.6% students who cited newspapers as their source of information. One student said "Newspapers like *Straight Talk* and *Young Talk* are good because they tell us why we should abstain and avoid HIV/AIDS; they tell us how to stay safe." The papers identified are given freely to schools and so are readily available. Another student however said, "Daily newspapers are expensive and so we cannot afford them." The *Straight Talk* and *Young Talk* are monthly papers. From this comment, it seems that this student feels that daily newspapers have information that he would like to use but feels the papers are not accessible to him.

Local leaders: Local leaders were cited by 54.4% students as one source of information on HIV/AIDS. This is because of the cultural norm of deferring to authority. A student wrote that local leaders interact with very many people within the community and therefore can spread the messages effectively. The nature of their work and position in the community makes the leaders visible. One student however pointed out, "some of them [local leaders] are not educated so are not able to provide sufficient information." The student suggested that "the leaders should work closely with experts so that sufficient information is provided." This can point to the mistrust the students have with some sources of information. However, the student gave good advice given that the local leaders have an influence that complements the work of health officials.

Health centres: Health centres were considered a source of HIV/AIDS messages by 53.13% students because people take such messages seriously. For example, the reasons as to why health centres are ideal sources of information, a student said, “doctors are trained and so what they tell you is the truth.” The students use professional expertise to gauge whose message they will take in. But when it came to teachers, another student said “only if the teacher is a biology teacher” would the information be credible, which gave an impression that students do not trust information from other teachers especially since HIV/AIDS is considered exclusively in the biology curriculum. Interestingly, the government of Uganda is trying to mainstream HIV/AIDS education so that it is not a topic for biology class alone. The GBS students said they would love HIV/AIDS to be taught in biology as one said “that is where we get facts like during the topic of reproduction.” It seems some students closely associate HIV/AIDS to sexual reproduction which is taught in biology. This is probably because HIV/AIDS media messages and the topic of reproduction in biology deal with sexual behaviour.

However, even if the number of students citing health centres as sources of information is high, there are indicators that students use them as emergency sources of information. A student wrote “you go to the health centre when you are sick. The doctors will tell you about the sickness and you listen if you want to get better.” Many of the students said they could not get advice from the doctors if they were not ill. According to the one AIDS Information Centre Manager, people are afraid to be seen going into AIDS-designated health centres (personal communication Oct 2004). One female student’s response could provide insight to the fear. She wrote, “I want the teacher to teach how actually a virus can be transmitted because even the non-infected person finds himself

with the virus.” This is mainly due to the stigma associated with HIV/AIDS transferred to any program dealing with HIV. The student had a fear of being declared HIV-positive even when she felt sure that she has taken precautions to avoid infection. She could be working on the assumption that if she were to be seen going for an HIV test others would assume that she is infected.

There is a general apprehension in the testing process because these students, as some had indicated, may have known someone who had been declared positive at some point and then later found to be negative. This is a rare occurrence but is said to happen especially when there has been a mix-up of results. In a culture where uncertainties are seen as conspiracies, such findings get overblown. When one goes for HIV testing, a number is assigned, which the person uses for collecting the results. The student assumes the health officer may misread the number, thus giving a possibility for a wrongful diagnosis.

In general, health clinics are good places for information dissemination if the centres treat all kinds of diseases. The designated health centres for HIV/AIDS information however are considered for those who are infected with HIV. The dilemma is these designated health centres have the current information of HIV/AIDS that the students ought to access. It is therefore important for the government to recognize this and help deal with the issue of stigmatization. There ought to be a campaign that aims at restoration of faith in the HIV/AIDS health centres or the information be put in all health centres so that people, like the students in this study, do not feel intimidated by the surroundings when accessing information.

Posters: Posters were cited by 51.9% students as a source of information on HIV/AIDS. One student wrote that posters are good sources because they “contain pictures of HIV/AIDS patients and information on how to treat patients.” Another student wrote, “Posters provide little information because they are small.” The same comment was used for billboards, since if one is in a hurry, they will ignore the billboards.

T-shirts were considered by one student as a “moving information provider and so many people can read what is written.” The disadvantage with T-shirts was that they are expensive but not durable and people may not pay attention to what is written thinking it is just another shirt. However, one student said “compared to other fabric, the T-shirts are good and many people can afford them. Students like *Straight Talk* T-shirts.”

School clubs: School clubs were considered by 50.6% students as good sources of information because they are for students and often headed by the teacher. One student wrote, “The music, dance and drama on HIV/AIDS real brings out how the disease is bad.” To this student, school clubs are as appealing as the other drama groups cited above. Club members are exposed to HIV/AIDS messages and are involved in the dissemination of information, so the school clubs are considered a good source of information on HIV/AIDS.

Church/mosque: Churches and mosques were given high scores (50.6%) because many people go to a church or mosque to pray and also to hear what the religious leaders say. However, one student said “churches/mosques shouldn’t be used to talk of HIV/AIDS because people want to listen to the word of God.” Another student said “religious leaders rarely talk about such things [HIV] because they concentrate on the word of God.” This suggests that where one goes to pray determines whether they will

receive messages on HIV/AIDS or not. This may be contrary to the fact that the government is relying on religious leaders to disseminate HIV/AIDS messages especially ones that deal with prevention methods like abstinence and being faithful to one sexual partner. As discussed earlier in the introduction, religious leaders spearhead HIV/AIDS campaigns in Uganda.

Billboards: these were cited by 44.4% students. One of them wrote “billboards are big so you cannot miss the message.” Another wrote “when you are stuck in traffic and look out the window of the vehicle, you see the billboard-‘Protector My Choice.’” The students believe that billboards cannot be missed but also suggested a disadvantage. One of them said “the messages are brief so don’t give enough information.” So the students have at least seen a billboard message.

All the above sources cited by the students are public. The public sources had the greatest citation frequency giving an indication that there are fewer private sources where HIV/AIDS is addressed. Private sources in this study are those that one can access on a need-basis and encourage one-on-one interaction. Below are students’ views on why the private sources are not commonly cited.

Parents: Parents were cited infrequently (9.4%) as sources of information on HIV/AIDS because, according to one student, “they do not want to talk about such things because they are closely related to sex.” This view was echoed by the Ugandan Minister in charge of Primary Education who has been reported by the local press to be calling on parents to talk to their children about sex (New Vision, 2004b). Though parents were cited by only 15 students, many students said they would prefer to talk to their parents on matters of HIV/AIDS because parents know about such things and the students want their

parents to talk to them. This contrasts the view that the parents use HIV/AIDS to make the male students to work hard. Probably the students want to have a deeper discussion with their parents over issues concerning their fears of HIV/AIDS. It is therefore important that parents open up to discussion on HIV/AIDS, and not raise the HIV/AIDS topic just to scare the boys into hard work.

Peers: Peers were considered a bad influence and could not be trusted because they may think you are infected or worried about being infected. The students fear discussing HIV/AIDS with their peers because to them it would act as an indicator of being sexually active. The only peers with whom they can freely discuss such issues are "boyfriends/girlfriends." A student gave this reason: "the person has to trust that you are safe." Such responses give the impression that the students consider HIV/AIDS discussion a taboo subject to be talked about where a sexual relationship exists. The view of this student is parallel to the belief that condoms are only for those who are married. There is a possibility that the students have associated any discussion on HIV/AIDS with a sexual relationship which may inevitably lead to a discussion of condom use. The students, however, suggested that they do feel free to discuss HIV/AIDS in public gatherings such as school clubs and classrooms.

Books: Books were mentioned as sources of information but were cited by only eight students. The students felt that books have detailed information on the science of the disease. One student, however, said "we do not have enough books. More books should be provided." It may not be so much the lack of sufficient numbers of books as the lack of a reading culture because books were not on a checklist on the questionnaire but written by some students. It is difficult to deduce whether the other students made efforts

in getting books on HIV/AIDS given the low score, or just an oversight by the other students as being a possible source of information. Although the need for more books as was suggested by one student may be an authentic plea.

4.1.1 Summary

The students have been exposed to various sources of information on HIV/AIDS. Each medium used conveys a different type of message which is subject to multiple interpretations as the preceding discussion has shown. Those with a visual focus were favored sources. The students have used these various types of messages to construct their individual and group understanding of HIV/AIDS.

The citation scores reflect cultural practices common to African communities (Jegade 1997), where turning to leaders for direction is the norm. For example, the churches/mosques, health centres and local leaders are highly cited as sources of information compared to parents and peers. Also, the different media, such as television, newspapers and drama were highly cited because the students seem to believe they are good sources of information given the perception that the authors are knowledgeable about HIV/AIDS. The contrast arises in the low scores for parents which points to another cultural practice, where matters regarding sexuality and sexual behaviour are considered taboo in most Ugandan cultures, and they are to be given at the appropriate time. The appropriate time is usually when someone is getting married.

Given the high exposure to public messages on HIV/AIDS, it can also be concluded that public media messages in large part contribute to students' pre-conceptions. Any misconceptions that these students have can most probably be a result

of the exposure to the media messages, which constitute in particular their socio-cultural environment and from which subsequent knowledge about HIV/AIDS is derived.

4.1.2 Students' perceptive reactions to media messages on HIV/AIDS

Besides the different views the students have about the nature of HIV/AIDS messages, there are instant reactions to media messages about the disease. The questionnaires asked students to write down their reactions to HIV/AIDS messages. From the responses, there was an indication that most of the messages have a large emotional impact on the students. The students' perceptions of HIV/AIDS messages can be viewed as resulting from the states of fear, helplessness and indifference.

Fear

The students believe the messages are “scary” and many of the responses hinged on fear. The students said, among their many responses, that they want to avoid marriage, stop schooling since there is no hope, feel the disease leads to loneliness since it is a shameful disease, pray they never get it and feel worried or unable to trust anybody. Most of their thoughts expressed a deep fear of infection with some 10 students suggesting that “those who are infected should be put in a separate community,” while others suggested that government should not encourage the infected to get treatment because they will look healthy and infect others. Because of the fear, the students feel that those who are infected will deliberately infect others.

The media messages may have aimed at creating awareness about HIV/AIDS but there is fear instead. These students therefore do not understand the science of HIV/AIDS but are driven by this fear which could account for the change in sexual behaviour among the youth. Carter (2004) suggests that the decline in rate of HIV infection in Uganda is

due to the first hand experience most Ugandans have had with the disease. He argues that most Ugandans have either witnessed a family member die of HIV/AIDS or have seen an infected person and because of this experience, they are afraid of the disease, which in turn has led to change in sexual behaviour. Given that the highest rate of infection is through sex, the students have developed a stigma against those who are infected which is strongly linked to their fear of infection.

Helplessness

This category contains all the responses that have overtones of vulnerability and despondency over the effects of HIV/AIDS. The responses are religious, social-economic and environmental. Some students wished that the disease would just miraculously disappear. One student wrote, "when I hear of HIV/AIDS, I pray that God just reveals the medicine." Other students felt the disease should be able to spare the innocent, which is an anthropomorphic ascription to the disease. One student wrote, "I wish HIV/AIDS could at least spare the young and the innocent." There was no definition of who the young or innocent are but gauging from the responses, the young are babies and students while the innocent include babies and all those who did everything to protect themselves especially through being faithful to their spouses or abstained from sex. Since the use of condoms is closely linked to being promiscuous (Monitor, April 2004), it is very likely that those who use condoms are not considered "innocent."

Another student also said "when I hear of HIV/AIDS, I think of poverty and the many orphans we now have." This response blends with the plea for the disease to spare the innocent. One female student particularly wrote "the messages make one who has lost parents to the disease helpless." Some of the students stated that they would commit

suicide if they were diagnosed with HIV. A female student wrote “when I hear HIV/AIDS, I feel I can commit suicide if am tested and found positive.” The students argue that the fact is you will not get cured so why stay alive? Other students had similar responses but wrote in third person: “those who have the disease can easily commit suicide because there is no hope.” The contemplation to committing suicide could be due to the social stigma attached to HIV/AIDS. Most of the students referred to the appearance of HIV patients and did not want to have the experience. Many of them wrote that AIDS makes someone look old and ugly even if they are young. This, coupled with the social stigma attached to AIDS, leads victims to a state of loneliness, hence the contemplation of a suicide mentality.

Indifference

Some students had responses that were in a way indifferent to the media messages. The responses included statements like, “AIDS came for us people not animals” and “AIDS came to kill people but not stones, AIDS came for people not trees and AIDS has now become like drinking water.” The students implied that such responses seem to stem from the community. One male student captures this as follows: “Some people say that they will be careful until when? The disease came to kill us and not stones.” It can be argued that such responses are the result of the helplessness people feel in light of curbing the disease and therefore are resigned to the idea that they could become infected anyway and die. However, it is important that such statements be taken seriously by all stakeholders in the anti-HIV campaigns because some of the students may take the messages literally and expose themselves to risk of infection. Anugwom (1995) suggests that the students in Nigeria who seemed indifferent were not willing to

use prevention measures while others believe it is predestined death, meaning that those meant to die of AIDS will do so regardless of whether they take precautions or not. It is important to ensure the students in this study do not harbor the notions the Nigerian students had.

4.1.3 Summary

The media messages may have been coined to create greater awareness about HIV/AIDS and AIDS-related issues but there is indication that with the awareness, there is also increased fear. The fear expressed by the students can easily translate into stigmatization of the infected people. There is a tone of hostility in the students' responses where the infected people are accused of deliberately infecting others. There is the possibility that the behavioral change among youth could be a result of fear of infection, which on the one hand is good but on the other dangerous. It can be dangerous because should there be a declaration that the rate of infection is very low, the students may throw caution to the wind and forget to protect themselves from infection, leading to a renewed epidemic.

The use of images of infected persons on television seems to prevent understanding the science of HIV/AIDS as the students translate the messages into fear, indifference and helplessness. Indifference to the messages needs to be investigated further because it is an indicator that there is a portion of the population where the messages are no longer effective. What kind of messages should be used in such cases? Messages that deal with stigmatization of the HIV-positive people or those that address issues the students are confused about could probably be considered.

The understandings the students have constructed from the different media messages was considered their pre-conceptual knowledge in this study. An elaborate understanding of the students' pre-conceptions and perceptions of HIV/AIDS as constructed from different sources of information, both public and private are discussed in subsequent sections below.

4.2.0 Students' conceptual understanding of HIV/AIDS

This theme deals with the general understanding students have regarding HIV/AIDS. The students illustrated their understandings using elaborate explanations and through analogies, metaphors and similes. The section is divided in sub-themes of origin of the disease, methods of transmission and methods of prevention. Below are the details of how the students' suggested they understood HIV/AIDS. Depending on the question, students used various cultural and scientific understandings to explain their perceptions of HIV/AIDS. Some students used religious understandings to make connections to what scientific knowledge exists on HIV/AIDS while others used politics. Some students used socio-economic nature (poverty, infrastructural problems) to interpret HIV/AIDS information while some others suggest the messages are a conspiracy.

4.2.1 Origin of HIV/AIDS

Knowledge of origin via proven means

Most of the students propose the origin of the disease is the monkey. Out of 160, 143 (89.4%) students believe the disease has its origin in a monkey. A student stated "HIV which is Human Immune Virus originated from a monkey." This statement captures the views alluded to by the other students. This understanding is in line with the

scientific findings on the origin of the disease. According to CNN (2004), a group of scientists have traced the origin of the virus that causes AIDS to African monkeys.

Origin linked to political conspiracies

The other 17 (10.6%) out of 160 students in this study believe origin of HIV/AIDS is political. One male student stated that the disease was manufactured in the laboratory and used as a biological weapon. Another student wrote “the virus was developed in a laboratory and sent to Africa and now there is no cure.” Others suggest that it originated in the western world. A student wrote:

In my view, I could start explaining to him (a person who doesn't know about HIV) how the disease came. I hear it came from white people then it spread slowly like moving air and now the world is on fire and even where we are, there is HIV.

This statement insinuates a conspiracy. From these responses, it is probable that these 17 students trace the origin HIV/AIDS to political agitation. Some students suggested that the disease is a product of war.

In general, most of the students may have embraced the scientific explanation of the origin of HIV/AIDS but a small number have drawn on other experiences to come up with an explanation. The different views are very much a part of the students' conceptions of HIV/AIDS because they kept mentioning these during classroom discourse and follow-up discussions. These students however expressed what their community believes is the origin of HIV/AIDS.

4.2.2. Method of transmission

Linking the proven means of HIV transmission to original infection

Although most of the students agree with the scientific explanation of the origin, they have a different understanding about how the disease was initially transmitted from the monkey to humans. The 143 (89.4%) students who believe the disease came from a monkey also suggest that it was sexually transmitted (proven means of HIV transmission in humans). One student's expression seems to capture what the 143 suggested in this statement: "HIV/AIDS is a disease caused by viruses called HIV meaning human immune virus which was obtained when a man had sex with a monkey. It is the most deadly disease in Africa and the world at large." Despite the link between the virus in the monkey and the virus that causes AIDS in humans, science has not yet established how the virus was transmitted from monkey to man.

One student during the follow-up discussion said "HIV/AIDS came from either a Chimp or a Monkey and it was a man who had sex with an infected ape and now we have this epidemic." This provides an example of students mapping two concepts and using the known to develop an understanding of unknown. The concepts are human-human transmission of HIV/AIDS and the concept of monkey being a possible source of HIV. The students suggest the sexual transmission from infected monkey to a man probably because of the constant encounter of messages emphasizing that the disease in Uganda is predominantly spread through sexual relationships (Carter, 2004). These students could be using this method to provide themselves with a link that science has yet to establish. After the students had established this link, their cultural beliefs were used to describe HIV/AIDS.

Religious beliefs: HIV is a curse

With the belief that HIV transmission is sexual and involved a relationship with a monkey, the religious background of some of the students came into play. Out of the 89.4% students who believe the monkey to human origin, 67.1% of them suggested that the disease is a curse from God. One student put it as follows: "Because of man's desire to have sex, he had sex with an animal and as a result, God was not pleased with this action hence AIDS started." Another student wrote "because man had sex with a monkey, God cursed the earth and HIV/AIDS began." Jegede (1997) suggests that the peoples in Africa interpret any catastrophe as caused by a supernatural force. Uganda's population is highly religious (USAID 2002) with 66% holding Christian, 16% Muslim and 18% indigenous beliefs, so the students must have encountered various but predominantly Christian links their religious notions of the bible and HIV/AIDS. One male student called upon Ugandans to:

Repent and return back to God because HIV/AIDS is a sign to show that the end times are near, because the bible tells us during the end of the world, we shall have many sufferings and I think this one of them.

This quote points to a strong Christian background and how it impacts the way the student perceives HIV/AIDS. This particular student seems to use the science of HIV/AIDS to justify his religious interpretation of the epidemic. For example, he uses the incurable nature of HIV/AIDS to justify his view that these are end times. He used a bible quote and stated "the disease has no cure because the bible says the diseases in the end times will not be curable causing a lot of suffering."

In general, with no alternative explanation on how the disease was transmitted from the monkey to the human, the sexual link seems intelligible to the students and therefore changing their belief is made difficult. This is consistent with the conceptual change model which posits that with no scientific evidence for an alternative explanation, students will hold on to their prior knowledge because it is intelligible to them. Further, some students use existing scientific facts to build upon their conceptual understanding of HIV/AIDS. The conceptions can be drawn from their religious experiences or their political affiliations and experiences. There is a possibility that the student with the strong religious notions of HIV/AIDS will practice collateral learning (Jegede 1999), that is, holding the science facts parallel to the religious interpretation with each view being used as the situation merits.

Knowledge of HIV transmission via proven means

The other 47 (32.9%) of the 143 (89.1%) students, while holding the view that the disease had been transmitted from monkey to man, did not explain how this may have happened. These students proffered only the scientific explanations of how the virus is transmitted between human beings. Several different methods of human to human transmission were suggested by the 160 students. Some of the methods of transmission common in these students' responses were:

- Having sex with an infected person. Most of the students (90%) dwelt on this method of transmission and emphasized that young people are the most vulnerable to this method. One boy said "you know when you are a teenager, you have these feelings about girls and you want to explore them." The reason given

by students is the age and the hormonal changes associated with teenagers. The young people begin to think they are mature and are curious about sex.

- Infected mother to child. 57 (35.6%) students out of the 160 suggested that there is mother to child transmission especially during breastfeeding. Some others pointed out transmission during the time of birth or the heightened risk if the infected mother has a sexually transmitted disease like syphilis. However, the students struggled with the view that there is no mother to child blood exchange during the course of pregnancy. This was a concept that the teacher had to spend a lot of time explaining to the students during the classroom discourse.
- Blood transfusion using contaminated blood. This is one of the methods the students suggested. At least 60% of the students suggested this method of transmission. A student wrote “you get HIV if you are given blood contaminated with the virus.” The students also lack confidence in hospitals that administer blood transfusions. One student, during follow-up discussions asked: “Do the hospitals ever test for other diseases like syphilis and typhoid in the blood before the blood transfusion?” This student feels that the hospitals are sloppy and could give a patient contaminated blood infecting them with other diseases notwithstanding HIV/AIDS. This method of transmission accounted for 40% of HIV infections (UNAIDS, 1999) in Uganda when the disease first began.

Perceptions of HIV transmission via unproven means

In addition to the above stated major methods of transmission, some 10 (6.3%) students believe there is a possibility of transmission through mosquito bites. One student wrote “a mosquito may not have sucked enough blood from an infected person and so

bites another person and transmit the virus.” To this student, the scientific findings that suggest a mosquito cannot transmit HIV/AIDS are not entirely plausible or intelligible. Some 5 (3.13%) other students suggested houseflies that have just fed on a sore of an infected person could transmit HIV/AIDS and infect another person. One wrote “one may be having a wound and happens to sit next to an HIV/AIDS patient and a housefly feeds on the sores if the patient and then falls on this person’s passing on the virus.” This explanation is similar to the process of insect pollination in plants although to this student, the parallels may not have been apparent.

The students’ view may be purely coming from the fear of the disease, which includes fear of patients, and trying to make sure there are no unexpected methods of transmission. Given that houseflies are vectors for some diseases, it is possible that the student believes HIV/AIDS is one of the diseases transmitted by houseflies. It would seem that the students are likely to be practicing collateral learning (Jegede, 1997) regarding messages that suggest no insect-to-human transmission of HIV/AIDS. These messages may be compartmentalized in the brain of the student and used based on the circumstances the student is in say during this research, and different understanding used in an examination requiring recall of information.

In general, the students have formed their own theory of how the virus was transmitted from monkeys to humans. In areas where science does not provide an alternative explanation, the students readily draw on socio-cultural or political beliefs to fill in the gap. The students also have internalized messages and formed conceptions of how the virus is transmitted among human beings. Some of their conceptions have canonically correct science but others need to be addressed so that they do not develop

into misconceptions. There are also some issues that the students want addressed, for example, do tears and saliva transmit HIV/AIDS? The students in the MBS raised this issue in the questionnaire and during classroom discourse. The response from the teacher was it is very unlikely for one to get HIV/AIDS through tears and saliva because the virus concentration in these fluids cannot infect someone. The students also wanted to know if sharing utilities like toilet seats [washrooms] with infected persons is safe. Some of them believe that if an infected person bleeds on the toilet seat and another person happens to have a wound sits on the seat, the person can get infected. These are some concepts that are not well established in the students' conceptual ecology (Hewson, 1993) and need to be addressed before the students begin practicing cognitive apartheid (Cobern, 1996).

4.2.3 Methods of prevention

The participants had knowledge of methods of prevention although there were personal preferences on which method is best. For some students, culture and religion should be put into consideration when deciding methods of prevention, while for others socio-economic nature should be considered. Whereas science has approved certain condoms as good for the prevention of HIV/AIDS, students in this study debated how this fits their other knowledge of living.

Scientifically proven knowledge of prevention

Some 96.7% respondents proffered scientifically proven methods of prevention.

Examples of the responses include:

- Avoid an unprotected sexual relationship with an infected person.
- Not sharing sharp and piercing objects like knives, needles and razor blades with infected persons.

- Infected mothers not breastfeeding their babies.
- Not getting contaminated blood during a transfusion.

Suffice it to say that students offered ways in which to avoid the sexual method of transmission. The methods suggested followed the Abstinence, Being faithful to one sexual partner and Condom use (ABC) formula currently used in Uganda. Below are details of what the students in this research study suggested were good preventive measures.

All the students in this study suggested that the best way of preventing HIV/AIDS infection is through abstinence until one is married and being faithful to your partner. The students suggest that youth should abstain from sexual relations until they are mature enough and ready to marry. One student wrote “to avoid infection, we should abstain from sex.” However, though all of them had abstinence and being faithful as the top priorities, they differed in reasons why these are good methods of prevention. Some students advocate abstinence on purely religious grounds while others advocate abstinence because it is politically recommended.

Religious views of best preventive measures

Some 48.1% (77) students argued that abstinence will help reduce the decline in moral standards. These students suggest that morality is vital if the spread of HIV/AIDS is to be minimized. Some of them suggested that there should be no mention of condom use because this encourages immorality. One student succinctly wrote:

I do not like HIV/AIDS messages because they encourage sex before marriage yet they would have first taught against sexual relationships then could move to other

measures but they end up giving young kids condoms which is bad. This encourages immorality.

To students who hold this view, sex out of the marriage context is regarded as evil and so staying pure through abstinence is a better preventive measure. However, there were some female students from the GBS who felt marriage should be avoided altogether and people should become religious. One student wrote “for one to avoid HIV/AIDS, you should stop having sex and if you are girl, hide yourself among nuns or in case of a boy, get on and become a priest.” From this response, it can be inferred that the students are talking of catholic religious leaders who do not marry. The need to avoid marriage altogether to some is a safe haven from getting HIV/AIDS and not because these students are very spiritual. The religious order is probably one way they can justify staying single.

During the follow-up discussions, the students explained why they would like to stay unmarried. The dialogue captured students’ views on relationships and marriage, given their responses that in order to avoid HIV/AIDS they would rather not marry. Among the many reasons, below are examples of what the students had to say to issues of relationships, power and control in relationships and abuse in relationships.

Suzan: the men cannot be trusted, they always have girlfriends and some of them may be infected and the man infects you. So to be safe, just do not get married.

Juliet: the man will not tell you he has cheated on you and now just gives you HIV/AIDS. It is hard to avoid infection if you are married.

Betty: some men sleep with prostitutes who are having the highest probability of being HIV positive given their having several sexual relationships. Now the man

comes home and demands for sex from you, his wife and also infects you. I rather stay single than die of HIV/AIDS.

In all of these responses, it can be deduced that these female students feel that in marriage, there is little empowerment for the woman. However, the female students are aware of the stigma associated with staying single and so becoming a nun is appealing. One of them said “if you stay single in the village, you are in danger of being raped and also you are ridiculed by the men.” There are Newspaper reports (BBC, April 2003; Monitor, April 2004) suggesting women are not empowered to insist on their husbands putting on condoms if they suspect their husbands could be HIV positive. This could be because the married women fear the appearance of accusing their husbands of having extramarital relationships. The fear stems from the beatings that may ensue if one raises the question of promiscuity. Domestic violence has been reported to be increasing in Uganda (Monitor, April 2004). So these female students could be thinking of their future status and find that becoming a nun is a good way out.

Political and cultural perspectives of prevention

The 45.6% (73) students, who advocate for abstinence and being faithful to one sexual partner because it is politically correct, argue along their status of being young and the future of the nation. The students believe that they are not supposed to be having sex while they are at school. One student wrote “for us students, the best way is to abstain from sex because we have our books to read.” This response typifies the views of the others who adhere to the politically-advanced reasons for abstinence. The students who hold this view believe that HIV/AIDS among youth is due to early sexual relationships as

one wrote “HIV/AIDS is got by those who have sex before the correct age” and “correct age” being 18 years as stipulated in the Ugandan constitution.

The campaign to encourage abstinence among young people is to reduce the number of HIV cases in the 15-24 age bracket, who are considered to be the most vulnerable to infection (Carter, 2004). There are media programs like *Straight Talk* and *Young Talk* that address issues of abstinence until one is married. The programs address teenage challenges and how to avoid thinking about sex. The students have been exposed to these media sources and believe in the argument. One student wrote, “HIV/AIDS is simply a disease that catches a person who doesn’t want to listen to advice which is supplied especially on radios, newspapers like Straight Talk and from parents and elders.” These 45.6% of students who follow the politically-advanced argument seem to adhere to authority as can be deduced from the above quote. These students seem to agree with Jegede’s (1997) suggestion that in an African’s worldview, adherence to authority without question among the young who are considered the lowest in the community social structure is common. The students referred to radios and newspapers which are government channels for communication as well as parents and elders. Although the students advocated for abstinence and being faithful, they also suggested that condoms are another method of prevention against HIV/AIDS.

Should condoms be given to students?

Condom use as a means of prevention seemed to raise some controversy. Some students do not like the idea while others wonder if the condoms are safe or not. Some 93.8% (150) students do not like the idea of condom use as a preventive measure. These students did not want condoms for youth/students drawing again from either religious

notions or politics. One female student wrote “for young people, condoms are not good because they encourage them to have sex.” Although a different reason was given by another student from the GBS, she wrote “talking about condoms in school is indicative of having sex, so we do not discuss that.” This view was held by the students of the BBS as well. One of them wrote “why talk about condoms when you are not going to have sex?” It seems to this category of students, condoms are not for youth especially those who are at school. A student wrote “giving young people condoms encourages immorality and that is a sin.” The argument is that once the students are given condoms, the students think they should use them and therefore enter into a sexual relationship. The students believe it is important that the moral stance advocated by most of the religious leaders in Uganda should be promoted. With this kind of argument, some students wonder why the condoms are encouraged at all.

Nevertheless, there are some 6.3% (10) students who did not proffer political or religious arguments and think condoms should be given to young people. During the follow-up discussion students from the MDS had time to debate the issue of condoms for students. This is what ensued:

Musa: What should a student who is sexually active do if you are saying condoms are bad?

Joan: Such a student should learn to refrain from sex until mature.

Musa: It is impossible to do so and since they are sexually active, condoms should be given to students.

Mary: Even those condoms you are asking for are not 100% safe, so you better stop having sex.

Researcher: Do you students believe condoms are only safe when used by married people? [This question gave the students time to reflect on their arguments.]

Carol: It is because the married people know how to use the condom so it is safe.

Patrick: We are confused; they say the fluid meant to lubricate the condom weakens them instead and so the virus can pass through. That is why we think the condoms are not safe.

Researcher: Is government advocating for condom use knowing very well that they are not a good preventive method?

Deidre: Madam [referring to the researcher] what is your view?

Researcher: What do the others think?

Musa: There are certain brands of condoms that have been banned. Those are the cheapest condoms on the market.

Jeje: There are rumours that the fluids in condoms are believed to cause cancer.

From this discourse, it seems that there are groups of people who are trying to sabotage the campaign for condom use. The MDS students are in a dilemma over using condoms with some believing they are not safe at all while others fearing that using condoms can cause cancer. It was also apparent that these MDS students are divided along the lines of what is morally and politically right in order to make their arguments. The girls in particular followed the call for the students to abstain from sex while the boys were curious about condom use. Suffice it to say that Musa's question was not satisfactorily answered given the controversial nature of the topic under discussion. Nevertheless, the researcher asked the students in light of Musa's question and Carol's response if they

thought it necessary to learn how to use condoms. To this the male MDS students chorused yes, although they added that it was to help those who cannot abstain from sex. The male students from the other schools want to learn about how to use a condom properly just to be ready should a situation arise and they need to use or teach someone else how to use condoms.

Condom use in adulthood as prevention measure

Advocating for condom use as a preventive measure in the adult population seems unproblematic for the students. They all agree that it is a good method for preventing sexual transmission of HIV/AIDS. To engage students in a discussion, the researcher asked if a woman should ask her husband to put on a condom if she suspects he has been having an extramarital affair and therefore putting her at risk of being infected.

The female MDS students said that it is quite difficult because the man will deny any accusation and end up beating the woman for even suggesting it. The boys did not comment on this issue. The male BBS students had a very negative attitude arguing that it is the women who are promiscuous not the men. So the researcher asked them if they would agree to use a condom if their girlfriends asked them to wear one for the boys own protection. Gonza said, "huh, I just chuck that girl and get another one." The others laughed and agreed with him. When the question was reversed, Toto said, "she is my wife, if am sick we die together, I paid dowry." Toto's response portrays the understanding these boys have on marriage. This attitude reflects a lack of empowerment among married women and needs to be addressed. There is a high likelihood that these students will end up becoming domineering husbands in the future.

The female GBS students said it is difficult to raise the issue. Grace said, "if the woman says he puts on a condom, the man will ask her if she doesn't trust him and that will bring problems." To these young girls, it is not only in a married setting that they experience this. One of them said, "when you tell your boyfriend to wear a condom, he will say that you do not love him and that you do not trust him." The girls are not ready to end the relationship so they accede to with whatever the boys want. If this trend continues, there will be a problem in the future because these young women will become the un-empowered wife talked about in the Monitor newspaper (April, 2004). This fear of addressing the issue of using condoms in a relationship is closely tied to male dominance, and could probably stem from the stigma associated with condom use. The condoms have been largely relegated to those who are promiscuous and so talking about a condom is equivalent to admitting to an extramarital affair or promiscuous behavior. Perhaps if government had advocated for condom use as a contraceptive measure, there would be less stigmatization.

Socio-economic nature and HIV prevention

Further, there is a controversy between advocating strict moral standards by not promoting condom use and the reasons why this is a flawed argument given real life situations like prostitution. Out of 160 participants in the study, 83 (51.9%) students felt there needs to be a balance struck between dismissing the idea of condom use and the moral stance currently advocated by religious leaders. Although the students condemn prostitution, they somehow expressed views seemingly sympathetic to prostitution. Debates have been held by religious bodies that attack the government for suggesting use of condoms claiming that this condones prostitution. These 51.9% of the students,

however, had this to say as exemplified by one of them, “HIV is a disease that spreads because women do not have money and so they decide to become prostitutes in order to get some money and feed their family.” Economic stress was seen as a way to prostitution and if there are no appropriate interventions, then prostitution will be difficult to eradicate. These 51.9% students are sympathetic to the circumstances that draw one into prostitution and they mentioned unemployment and low education levels among them.

According to the students, unemployed young men and women are vulnerable to prostitution as a way to earn money because they need to make ends meet. The students referred to this liaison as “having an affair with a sugar mommy” where ‘sugar mommy’ means rich older woman. For the girls, it will be a ‘sugar daddy’ or an ‘adulterous rich man’ who promises them a comfortable living and yet “all they are doing is exposing them to possible infection with HIV/AIDS.” The students felt such people who get into prostitution because of economic hardships should not be condemned but rather helped.

Similar to the unemployed, people with low levels of education may be lured into sexual relationships or even marriage because of a promise of “a poverty free life.” The students associate low education levels with poverty because they believe all jobs require credentials and therefore without such credentials, one cannot get a job and hence will live in poverty. The other 77 (48.1%) students hold a moral stance that prostitution should not be the way to earn money. One of them wrote “why should one decide to sell her body yet she could go to the village and dig [farm] and get money?” To these students, there are ways to avoid prostitution, such as farming or working as a casual laborer.

In general, the students know the methods of preventing HIV/AIDS infection although there are some controversial issues like the safety of condoms or the appropriateness of giving them to young people. In addition, there are competing views on whether morality should be promoted and condoms banned or exceptions made for those who are experiencing economic hardships and therefore find themselves in positions that make them vulnerable to prostitution. Furthermore, there is the issue as to whether women can also ask their partners to use condoms as a prevention measure for protecting against infection. The students seem to suggest that it is an impossible situation at present yet at the same time the students do not think the situation will change in the future. If the government is to be effective in preventing sexual transmission of HIV/AIDS, then the issue of a good marriage relationship should also be addressed, for example, having policies against domestic violence. Also, cultural heads needs to be educated on what is considered a healthy relationship in order for students to understand that it is not one where the husband is the ultimate authority and the wife his property. Dowry is not supposed to be a license for men to mistreat women, but if it is believed to be so, then it should be banned.

4.2.4 Summary of section 4.2.0

Students have been exposed to much scientific information on HIV/AIDS. However where science doesn't have a plausible explanation, the students draw on other experiences and notions to explain HIV-related concepts. From the responses, it is also clear that the knowledge the students have on HIV/AIDS is not strictly scientific but embraces social issues as well. Some of the students blend in strong religious notions or political reality. The female students in this study seem to feel comfortable with

discussing preventive measures that advocate for abstinence and being faithful, but they are not so sure if they can talk about condoms. The boys on the other hand discuss all the preventive measures though are not quite confident and comfortable with using condoms. Some of these students believe young people should also feel free to use condoms. The male students would like to know how to use condoms properly and to know if indeed condoms are safe. This kind of information is not easily accessible to them given that the campaigns aim at teaching the students to abstain or refrain from sex. It can however be argued that some male students may not want to use the condoms and therefore decide they are unsafe or represent a group of people who do not agree with condom use either on religious or cultural base.

Also, the students want a clear and well thought out view on whether condoms should be encouraged or not. If the condoms are a point of contention, stakeholders should come up with humane programs to address issues of prostitution. The students have elucidated their understanding of the messages and extended them to their daily experiences through raising concerns and explaining why there is a danger for the continued spread of HIV/AIDS.

There are some concepts that need to be addressed or else they develop into misconceptions (Clement, 1993) or alternative frameworks (Driver, 1984) that easily make students practice cognitive apartheid (Cobern, 1996). Examples include the question of if mosquitoes and houseflies transmit HIV/AIDS and whether tears, sweat and saliva can also transmit HIV/AIDS. Other examples include whether condoms cause cancer and if sharing utilities like washrooms with infected persons puts one in danger of

infection with HIV/AIDS. Apart from the above examples, the students are very much aware of HIV/AIDS and have some basic scientific facts of the disease.

4.3.0 The nature of analogies, metaphors and similes

Some 150 (93.8%) students used analogies, metaphors and similes to express their understandings of HIV/AIDS. The other 10 (6.2%) students in this study did not use such expressions in their responses. As discussed in Chapter Two, student-generated analogies, metaphors and similes portray a deep understanding of a concept and at the same time give insight to students' alternative frameworks (Pittman, 1999). Analogies are relational structures from one domain that normally can be applied to another domain (Gentner, 1983), while metaphors implicitly compare structures that are not related (Duit, 1991; Nashon, 2003). Similes are close in character with metaphors but the difference lies in how they are compared. While metaphors cannot be compared literally with the target domain (concept), the characteristics of a simile can literally be compared with the target domain (concept). Similes also differ from analogies on the basis that similes come from different unrelated domains and the relational structures are obscure at the surface until they are broken down. The researcher used this categorization to group and compare students' responses.

The researcher used categories identified in literature on analogies to group the students' responses. The students' responses fell into three major categories based on the various types identified by Dagher (1995), Lagoke (1997) and Nashon (2004). The students explained HIV/AIDS in anthropomorphic, scientific or environmental terms.

- Anthropomorphic; ascribing human characteristics (Dagher 1995; Lagoke, 1997; Nashon, 2003) to HIV/AIDS.

- Scientific (Nashon, 2004): using expressions with a science domain to explain HIV/AIDS.
- Environmental (Cultural) (Jegade, 1997; Lagoke, 1997): expressions connoting the socio-cultural environment of the learner.

As described in the theoretical framework in Chapter Two, the categories used by the different researchers have been used to categorize students' analogies, metaphors and similes for HIV/AIDS from this study. Table 4.5 below gives a summary of students' understandings of HIV/AIDS expressed in analogical, metaphorical and simile-like terms. The table 4.5 contains the different expressions that had anthropomorphic or scientific or environmental characteristics.

Table 4.5 Examples of students' conceptual knowledge in analogical, metaphorical and simile form

	Analogy	Metaphor	Simile
Anthropomorphic	<ul style="list-style-type: none"> - it is a terrorist - Mother of all diseases - Mother of twins 	<ul style="list-style-type: none"> - it is like your guardian angel - it is a very cunning disease - it is your twin 	<ul style="list-style-type: none"> - it is as deadly and un discriminatory like the rebels fighting in the north - it is as deadly as a Mike Tyson knock out blow.
Scientific	<ul style="list-style-type: none"> - it makes one look like (s)he is suffering from kwashiorkor - it is the cancer of Africa - it is a biological weapon of mass destruction 	<ul style="list-style-type: none"> - it is like tuberculosis, tetanus and polio - It spreads like moving air. 	<ul style="list-style-type: none"> - it has become as dangerous as malaria - the patient becomes as thin as a skeleton - The diarrhea a patient gets flows as fast as a running tap.
Environmental	<ul style="list-style-type: none"> - Silimu (weight loss) - The polythene bag - Passport to death - The disease for the cold 	<ul style="list-style-type: none"> - never eat an unwrapped sweet - remember not to peel the banana - always wear socks when taking a walk - always put on glasses when reading that book 	<ul style="list-style-type: none"> - the rash you get is as a belt you wear - it makes you as tiny as a hockey stick - it spreads as fast as one taking a sip of water when thirsty.

A total of 53 (35.3%) anthropomorphic terms were in the students' responses, 52 (34.7%) scientific and 45 (30%) environmental expressions. The expressions were categorized by the researcher according to the nature of the definitions highlighted above. Some students used all the three types of expressions in their explanations, that is, metaphor, analogy and simile while others had just one of the types of expression. Most of the expressions emerged from the students' cartoon messages (see Questionnaire, Appendix C) as a means of expressing their understandings of HIV/AIDS.

Anthropomorphic expressions

Analogies

As highlighted in Table 4.5 above, students used anthropomorphic analogies to capture their understandings of HIV/AIDS. Out of the 53 students who used anthropomorphic expressions, 17 (32.1%) compared HIV/AIDS to terrorism. Perhaps the analogy was in line with the devastating effect the disease has had on the Ugandan population or an extension of what some students believe is the origin of HIV/AIDS (see Section 4.2.0). Not only has the disease led to the deaths of many people, it has made people live in fear (Avert, 2004). As the United States fights the war on terror, 32.1% Senior Three students in Uganda believe the terrorist is HIV/AIDS. One student wrote "let us fight this terrorist, Mr. AIDS" as a slogan for an HIV/AIDS message, while another called upon all concerned to "kick out Mr. AIDS from Uganda." These students have mapped messages that call upon destruction of all terrorists and used the messages to address 'their' terrorist.

While some students addressed the terrorist as Mr. AIDS, some five (9.4%) female students said that HIV/AIDS is the mother of all diseases. This analogy addresses

the compound effect of the disease, that is, HIV/AIDS weakens the white blood cells destroying the immune system making the patient susceptible to further opportunistic infections. To these students, HIV/AIDS gives birth to all the other diseases that a patient acquires by ensuring there is no immunity. This makes HIV/AIDS a “mother of all diseases.” This analogy blends into the reference of HIV/AIDS as “mother of twins (Nalongo).” The expression means that the disease comes in pairs and not alone. Referring HIV/AIDS as “your twin” depicts the relationship between the disease and the infected person. Once infected, you become identified by the disease making it your twin. Twins are always believed to be a part of one another and therefore HIV/AIDS is analogous to this belief.

Metaphors

There are 10 (18.9%) students who likened HIV/AIDS to a “guardian angel” given the role of angels to humans. This was elaborated by one student who wrote “it is your angel because if you are going to mess, HIV/AIDS is watching you.” Uganda has a high percentage of Christians, and so it is probable that these students have been exposed to aspects of the Christian faith. The students could have heard that guardian angels keep a record of all one does and are therefore watching. This has been captured by one student who wrote “remember as you decide to ‘enjoy life’ HIV/AIDS is watching you.” Guardian angels may have been used by religious leaders to make people conscious of sin but the students liken their role to HIV/AIDS because “it makes you think twice about what you are doing,” as explained by one student. HIV/AIDS, like a guardian angel, acts as one’s voice of caution when treading a dangerous path. The expression being metaphorical in nature, the comparisons cannot be literal. However, the students’ use of

this metaphor is puzzling due to the contrary nature of its application. Guardian angels are protective while HIV/AIDS is harmful.

There were 7 (13.2%) students who used the expression “HIV/AIDS is very cunning” to depict failure for finding a cure. One student’s explanation elucidates this: “HIV/AIDS is very cunning because no one knows the cure.” Some students called it cunning because “no one really knows its origin and yet it is killing many people.” The disease in this case has beaten man’s wisdom and hence it is very cunning. The use of anthropomorphic characters gives HIV/AIDS abilities of thoughts and discernment which in reality is incomprehensible. On the other hand, this could be another means of expressing their religious belief that the disease is a curse from God and a sign of the end times as earlier discussed.

Similes

HIV/AIDS was defined by 20 (37.7%) students to be “as deadly as war and an indiscriminating as the rebels fighting in the north.” For seventeen years, there has been a civil war in the northern region of Uganda and many atrocities have been committed. One student wrote “HIV/AIDS doesn’t discriminate; it catches the rich and poor; the young and the old, the male and the females.” Another student wrote “HIV/AIDS cannot tell if you are innocent or not, it just kills all,” a character associated with the rebels who are abducting children and civilians and killing them. Like HIV/AIDS, the war has claimed many lives and left many orphans. In addition, there has been indiscriminate killing, a characteristic given to HIV/AIDS. Whereas the rebels are situated in the northern region, the students have extended the experiences to the effect of HIV/AIDS on

the wider population of Uganda. In spite of their associating the disease to the spread of war, the students know that the effects are not exclusive to the war torn regions.

There were 5 (9.4%) male students expressed HIV/AIDS to be “as deadly as a Mike Tyson knock out blow.” One student underscored this response by stating “once you are infected by the disease, it is the knock out blow you cannot recover from”. For those who watch boxing, knock-out blows determine the winner and so in this case, HIV/AIDS wins the match. Mike Tyson being a legend in boxing, it is probable that these students liken the strength of HIV/AIDS to him. However in boxing, one can recover from the blow, which is not the case with HIV/AIDS.

Scientific expressions:

Analogies

As pointed out in the Table 4.5 above, students (34.7%) used various science domains to explain HIV/AIDS. One student clearly stated HIV/AIDS “makes one look like she or he is suffering from kwashiorkor.” Another student wrote “if one is infected, he/she appears older even if they are still young.” Because malnourished children have skins that look like those of people who are much older, these students perhaps extended this characteristic appearance to describe an HIV positive person. Like kwashiorkor, those infected with HIV suffer from weight and hair loss, hence the analogy. Furthermore, with kwashiorkor children have a poor appetite which makes the symptoms comparable to an HIV patient in the later stages of infection.

There were 10 (19.2%) male students who called HIV/AIDS the “cancer of Africa.” The students compare cancer to HIV/AIDS because these two diseases are major health problems. However, cancer is considered “a disease for the West” just as

HIV/AIDS is considered “an African disease.” This may be due to the fact that cancer is a major concern in the West while HIV/AIDS is a major concern in Africa. The analogy, however, does not compare the statistics of rate of death due to HIV/AIDS and those for cancer. Further, unlike HIV/AIDS, many cancers can be treated through chemotherapy or removal of the cancerous cells. It is therefore important that the students learn to unpack the analogue, as suggested by Nashon (2003), or the dissimilar attributes could become misconceptions.

HIV/AIDS was also referred to as a biological weapon of mass destruction by 20 (38.5%) students. One of them wrote “HIV/AIDS is a biological weapon of mass destruction like the anthrax scare in the U.S.” There are multiple relations between HIV/AIDS and this analogy raised by these students. Some of the students elaborated on their choice of analogy. Some believe HIV/AIDS was manufactured in a laboratory making HIV/AIDS a deliberate act this “attribute” is mapped to weapons of mass destruction. Other students considered HIV/AIDS a weapon of mass destruction because of the number of people dying due to HIV/AIDS. One student wrote “there are so many people dying of HIV/AIDS” similar to what weapons of mass destruction can do. Another student however believes HIV/AIDS should be considered a biological weapon of mass destruction because “it is a very dangerous disease and some infected people can inject you with it.” The students therefore use the same analogy to explain different understandings of HIV/AIDS, that is, causation, spread and effect of the disease. But it is also important that the dissimilar attributes be made explicit to the students.

Metaphors

Some students likened HIV/AIDS to diseases like polio, tuberculosis and tetanus. There were 17 (32.7%) students who offered such metaphors. One of them wrote “HIV/AIDS is like polio that makes one become thin” and another wrote “HIV/AIDS is like tetanus.” These are viral diseases which is the only relationship they have with HIV/AIDS. Another student likened HIV/AIDS to tuberculosis. She wrote “HIV/AIDS affects people in the same way as tuberculosis, so it is like T.B.” Tuberculosis is a bacterial disease and airborne unlike HIV/AIDS which is viral and not airborne. However the relational structures lie on how the two diseases affect the human body. Tuberculosis patients lose body weight which is also characteristic of HIV/AIDS. Further, there has been a finding in Uganda that people with HIV often get tuberculosis (personal communication Manager AIC, Mbale, 2004). These students may draw on this information and conclude that all tuberculosis patients are HIV positive which is certainly not the case. There is need for students to understand that tuberculosis is an opportunistic disease in HIV/AIDS patients but that does not imply that all T.B. patients have HIV/AIDS.

There was one male student who wrote “people blame those who are infected yet they do not know that AIDS spreads like moving air.” It was not clear in what sense this expression was used but it is possible that it was used to express the fact that anyone can get infected with HIV/AIDS regardless of their status in society. Further, the expression of HIV/AIDS spreading like “moving air” is probably meant to capture the rate at which the disease spread in Uganda. The disease was first identified in one region of the country and within a short span of time had spread to all parts of the country.

Similes

Students further expressed their understanding of HIV/AIDS through the use of similes as shown in Table 4.5. There are 30 (57.7%) students who compared HIV/AIDS to malaria. One of them succinctly wrote, "HIV/AIDS has become as dangerous as malaria." For a long time, malaria has been the top priority and killer disease in Uganda but with the devastating effect of HIV/AIDS, the emphasis in terms of resources has shifted and malaria is no longer considered an immediate threat. Given the wide coverage in the media concerning HIV/AIDS, the students know the devastating effect it has had on the population. The effect could be relative to malaria, which has been endemic in Uganda and was considered a number one killer disease in Uganda. However, there are some students who wrote "I [would] rather suffer from malaria and not HIV/AIDS." This statement could be related to the fact that malaria is not having the publicity that HIV/AIDS is having in the Ugandan media. It could also point to the stigma associated with HIV/AIDS. However it is important to add that malaria is treatable unlike HIV.

The other similes related to the symptoms of HIV/AIDS were typified by the following statement from one of the participating students: "the patient becomes as thin as a skeleton." Another wrote "the diarrhea a patient gets flows as fast as a running tap." There were 15 students who used symptoms of HIV/AIDS as similes. These students seem to have insider knowledge of how the patients suffer. However, as discussed in section 4.1.0, television drama is a source on HIV/AIDS symptoms for some students. It is such knowledge that makes students fear to know their HIV status and this fear has resulted in behavioural change among the youth and may be responsible for decreasing infection rates (Carter 2004).

Environmental expressions

Analogies

Analogical expressions are predominantly related to prevention and effects of HIV/AIDS. As highlighted in Table 4.5 above, students refer to HIV/AIDS as “silimu [slim].” There were 40 (88.9) of the 45 students who used environmental expressions who used the phrase, “silimu” for HIV/AIDS. This is because when the disease was first diagnosed, there was reference to loss of body weight which made people slim or emaciated. The word has now been adopted into the local dialects and patients are said to be suffering from “silimu.” The dependence on symptoms to describe or identify patients is evident in this expression.

There were 25 (55.6%) students who compared HIV/AIDS to a “polythene bag [kavera].” This is because with the spread of HIV/AIDS, there was a wide campaign for condom use. The students said, as elaborated by one of them, that when they hear about HIV/AIDS, “they think of always having a condom” indicating the association the students have made between the condom and HIV/AIDS. In order to maintain the cultural communication style, the condoms are called “Kavera” which means polythene bag. Despite the counsel to always have a condom, some male students expressed lack of knowledge on how to use a condom. In addition, there are many mixed messages as to whether condoms are an effective means of preventing HIV/AIDS as was highlighted in Section 4.2.0.

HIV/AIDS was called a “passport to death” by five (11.1%) students. One student underscored this by stating “once you are infected, you know that death is waiting for you.” This expression conveys the fact that the disease has no cure. Many students in

their questionnaire responses alluded to HIV/AIDS as a constant reminder of inevitable death. Passports allow passage from one place to another and therefore since the infected person leaves the world of the living to that of the dead, one student stated, "HIV/AIDS makes it clear that you are actually going to have that transition," hence the analogy.

Furthermore, 12 (26.7%) students said HIV/AIDS is the disease for the cold season. One student stated "the cold weather is breeding ground for HIV because of the need to keep warm." During the cold weather it is believed in many Ugandan communities that people couple to keep warm. The assumption is that all unmarried people will couple and end up engaging in sexual activity. To these students, it could be an easy way of stating that the peak HIV/AIDS infection is during the cold season. However as suggested by Glynn (1992), Nashon (2003) and Zeitoun (1984), it is important that such analogies be explained and dissimilar attributes pointed out. This is important because some students may think that during the hot season, there is less chance for infection.

Metaphors

The metaphors students used as shown in Table 4.5 mainly convey messages reminding people to use condoms. The metaphors like "never eat an unwrapped sweet" and "remember not to peel the banana" have similar meanings in the socio-cultural world of these students in particular and Uganda as a whole. The message is that sex can be a pleasurable experience but in the presence of HIV/AIDS, always wear a condom. The other metaphors "always wear socks when taking a walk" and "always put on glasses when reading that book" are also close in meaning. Although they call on people to use condoms, these metaphors are meant to portray the message that HIV/AIDS is

preventable if you use a condom. The caution is when you decide to have sex, remember to have a condom. Despite the students' use of metaphors for condom use, there is now controversy over whether condoms are appropriate for students or if they should be promoted at all. This underscores the need to ensure that students' conceptual understandings be addressed by all concerned parties like teachers and government.

Similes

There were 30 students who used symptomatic similes. Similes like “the rash you get around the waist is as a belt you wear” and “HIV/AIDS makes you as thin as a hockey stick” convey symptoms of the disease. One way of referring to an infected person in the local dialects is “kisipi [belt]”. This is used interchangeably with silimu, because rashes around the waist and neck are common symptoms among HIV/AIDS patients. It is therefore probable that the students have extended the symptoms and developed a simile. Since the rash is seen around the waist, the students decided to call the rash a belt. Again this points to the students having insider knowledge given that the rash is not conspicuous. The hockey stick simile used by 3 male students replaces the word “silimu” which talks of weight loss.

The simile “HIV/AIDS spreads as fast as one taking a sip of water when thirsty” depicts the ease with which one gets infected. One student wrote “just one wrong affair and boom you are infected,” while another wrote, “people are no longer afraid because the disease has become like drinking water.” These are contrasting explanations conveying different messages. The former is giving advice through stating that it takes only one sexual affair with an infected person to acquire HIV/AIDS, while the latter reveals an indifferent attitude that some people may have in order to deal with the reality

of HIV in Uganda. The indifference attitude could be similar to what Anugwom (1995) called believing in predestination and living resigned to the fact that you may die of AIDS and not need to take any prevention measures.

4.3.1 Summary of section

In general, students used various analogical, metaphorical and simile-like expressions to portray their understandings of HIV/AIDS. Suffice it say that the expressions were mainly simplistic (Dagher, 1995) but effectively portrayed the students' understandings of HIV/AIDS. These expressions were extensions of what the students had detailed in Section 4.2.0 above, especially those that discussed the students' views on methods of prevention. Although the students may not be sure about condom use as a good preventive measure, they used expressions that suggest that they are willing to use the condoms.

Some students showed an adept knowledge of the symptoms of HIV/AIDS given the choice of metaphors. The students dwelt on the symptoms of the patients because many of them use the symptoms to identify patients. According to Carter (2004), many Ugandans have at least seen an AIDS patient or have lost a loved one to AIDS. However, the students suggested that the knowledge about symptoms is obtained from television plays about HIV/AIDS and from various charts in health centres showing the symptoms of HIV/AIDS infection. Apparently these students pay close attention to these messages.

4.4.0 Engaging conceptions during classroom discourse

The recorded classroom sessions in each school were analysed in a bid to elucidate the influence that prior conceptions have had on learning about HIV/AIDS in

the classroom. The analysis also aimed at establishing what prompts the use of prior knowledge during classroom instruction. All of the teachers began the sessions with stating the topic of the day and then teaching the science of HIV/AIDS and other health-related issues like sexually transmitted diseases. After 30 minutes of the 45 minutes allotted for the lesson, discussions ensued and that is where the interplay of prior knowledge of HIV/AIDS and learning became evident. The teachers used questions from blank copies of the study questionnaire (see Appendix C) to encourage discussion.

There were cases where students indicated the robust nature of their experiences and beliefs as conveyed in their explanations of the concept of HIV/AIDS. The beliefs emerged at different points of the discussion. It was also clear that issues raised in the questionnaire generated a lot of discussion. The issues were at times raised by the teachers or by students seeking clarification on their responses especially when they felt the teacher had not touched the issue. The students were using this classroom discourse to establish veracity of their beliefs.

Origin and cause of HIV/AIDS

The classroom discourse in the MBS will be used to capture a typical classroom discussion on the origin and cause of HIV/AIDS. The teacher explained the science of HIV/AIDS by differentiating HIV from AIDS, how the disease affects the body and why youth are encouraged to abstain from sex until they are married. After the lesson, the teacher invites questions from the students. This is what ensued:

Stewart: But in your own view what is the cause of HIV/AIDS?

Teacher: A virus. What do you think the cause is?

Class: Monkey.

Teacher: A monkey did not cause HIV though there is a virus similar to HIV in monkeys.

Stella: A man had sex with a monkey.

Teacher: That is an incorrect theory because no one knows how the disease started in humans.

Class: “aaaaaaaaaahhh” and [laughter]

From this dialogue, there is a high possibility that the students are maintaining their beliefs of the origin of the disease in human beings. Also, the teacher did not correct the students when they were confusing the concept of origin with that of cause. Also, Stewert who used the phrase *in your own view* hints on the way he views classroom knowledge. To this student, school knowledge and one’s own view could be separate. There is potential for this student to practice collateral learning.

The students in the GBS on the other hand easily exchanged one belief for another in relation to the cause of HIV/AIDS. When the teacher explained that HIV/AIDS was not caused by a man sleeping with a monkey, they suggested it came from the West. It is from this school that one student suggested “HIV/AIDS is an American idea for discouraging sex.” To this, the teacher responded by telling the students they were mistaken. The teacher then asked why they thought it was the Americans and one student said “that was where the disease was first diagnosed.” It became apparent to the teacher that the students had associated first diagnosis to origin. The teacher decided to give the history of the disease and said, “It is probable that the disease existed but was not detected, and so it was not right to associate the origin to a particular group of people.” The students smiled but were not satisfied because one said, “But where did the first

person get the disease from?" and no response given. The students therefore are intrigued by how human beings acquired the disease and since science has not yet established this, the students are likely to hold onto their beliefs.

How HIV/AIDS is transmitted

Students used scientific knowledge in their seeking clarification from the teachers. The students wanted clarification on how long the HIV virus lives outside a living cell. The discussion in the MDS biology class provides an understanding of how the discourse proceeded:

Stacy: Teacher is it true that a virus dies after five minutes when exposed to air?

Others: yeah...

John: Viruses die after five minutes if they are outside a living cell.

Teacher: That principle is not applicable to the HIV/AIDS virus. Even after 5 minutes, you could get infected by a dirty needle.

The students in the MBS raised the same issue but wanted assurance on whether sharp objects when exposed to air can still have the virus after the stated five minutes. To this, the respective teacher said HIV/AIDS survives in fluids longer than five minutes and this makes it a special virus. The teachers then cautioned the students and asked them not to share sharp objects. There is a possibility that this response reinforced the students' fear of infection given the suspicion that an infected person may intentionally contaminate a needle thereby transmit HIV.

The students then wanted to know if kissing spreads HIV/AIDS. The teacher in the GBS decided to let the students to discuss the issue:

Kelly: I do not think the virus passes through saliva.

Julie: Suppose you have sores in the mouth, can't you get the disease?

Tessa: I read somewhere that the virus in the saliva cannot infect someone.

Rest of the students: You just never know it could be your bad luck.

Kelly: Teacher what do you think?

Teacher: Tessa is right; the amount of HIV in saliva cannot cause infection. This is because the viral counts in saliva cannot transmit the virus.

Such discussions engaged students' prior knowledge although the discussion indirectly touched on all the issues raised in the questionnaire responses given by the students. This can be made clearer by reviewing the students' responses on how the disease spreads. The students stated that HIV/AIDS can be acquired from sharing utilities like plates and facilities like washrooms.

Sharing a bed with infected persons was also believed by some students to spread HIV/AIDS. The reason given by one of the students was "the person may wake up in the night and bite you or even prick you with a needle." This reason suggests the paranoia the students have developed about the disease. It could be seen as a good reason not to share beds, but the labeling of the infected persons as deliberately out to infect others is problematic and needs to be addressed. This is one way HIV positive people are stigmatized.

Who cannot get HIV/AIDS?

The students wanted to know if it is true that there are some people who cannot get HIV/AIDS. A student from the MDS raised a question that captures the view of many students in the study:

Ishmael: Which people are resistant to HIV/AIDS?

Teacher: There are differences in the time of full blown HIV/AIDS symptoms among infected persons, but that doesn't mean there are any people who are safe from infection. However, there is research being conducted to establish the difference in the rate of infection among the patients.

Ali: Which blood type is being researched on?

Teacher: I am not going to suggest any because it is still in research process.

The students seemed to want to trick the teacher into divulging the blood type considered resistant but the teacher declined. The teacher just cautioned the students against believing that there are those who cannot get infected because this is misleading. This question was raised by students from the other schools (BBS, GBS, & BBS) in the questionnaire as one of the things they wanted to learn about in a biology lesson. According to *The Guardian* newspaper (May, 2005), a group of scientists have discovered that there is a group of people in Uganda who are resistant to HIV/AIDS. But the report does not specify which blood type although the report says that the people are being researched on by the Uganda Virus Research Institute (UVRI). It is therefore probable that these students have heard of this research from other media. The teacher's tact is commendable given that the students seem to be looking for some kind of assurance.

Misconceptions on HIV prevention

Among the questionnaire responses, students suggested that "AIDS cannot be got through having sex when menstruating, playing sex with an old man and playing sex while standing, young boys and girls cannot get AIDS". These ideas were not raised

during classroom discourse but the researcher decided to pursue the views during the follow-up visits to the schools. During a follow-up group discussion, the students from the MDS clarified their responses on why they thought one cannot get AIDS if they engage in sex during menstruation:

Jane: The menstrual blood will remove the virus hence preventing infection.

Susan: I believe the person cannot get HIV because the tubes in the penis responsible for seminal fluid will be blocked and so there will be no exchange of fluids with the infected person.

James: The woman can get the disease but it is safer for the man because the woman will not have orgasm and so the man will not have an exchange of fluids with the woman.

It is clear that the students have different understandings regarding HIV/AIDS and sexual functioning of humans. These ideas are contrary to what they have learned about HIV/AIDS. The students held onto their conceptions probably because they were not addressed by the teachers during the classroom discourses. The students then discussed why they believe one cannot get HIV when they have sex with an old man. Their responses were as follows:

Susan: Old men do not produce the seminal fluid through which the virus is transmitted so they cannot infect anyone even if they have the disease.

Judi: The old people are generally HIV-free because the disease came when they are already old and not at risk of infection.

Kaka: Some people think AIDS is meant for youth not the old people.

The students defined old people as those who are 45+ however, some of them clarified that there are some 'old' men especially those in the mid forties who are still sexually active and potential carriers of HIV. Susan said that the old men are the ones engaged in trans-generational sexual relationships and therefore are able to get infected. It is interesting to see Susan having these two ideas side-by-side, apparently an example of collateral learning (Jegade 1997).

The students suggested the following to explain why one cannot get HIV if they have sex while standing:

Goretti: The sperm flow will be interrupted since the couple will be standing.

Junior: The man's tubes will be pressed so there is no possibility of seminal fluid thus limiting the chances of infection.

Juma: It will be easier for the man to withdraw before orgasm so there will be no exchange of fluids.

Jane: I think when someone is standing; the condom is firmer thus preventing infection with HIV/AIDS.

The students drew upon their understanding of gravity to explain the above view. They thought the sexual position mattered in determining the direction of fluid flow and the firmness of the condom. In general, the students have alternative frameworks on how one cannot get HIV, and yet their explanations are not consistent with the science of HIV/AIDS or the science of the male reproductive system and cycle. Such students could be putting themselves at risk of infection if they believe that they cannot get HIV/AIDS when they have sex while menstruating, or with an old man or while standing. This

underscores the need for teachers to elucidate students' prior knowledge as suggested by the conceptual change model CCM.

Effect of HIV/AIDS

The social effects of the disease were discussed in the classroom and the students at first hesitated to respond until further explanation was given by the teachers. Since all Ugandan teachers use the same curriculum, the following example from the BBS illustrates the nature of the discussion that characterized the dialogue of all the participating classes:

Teacher: How many of you have been affected by HIV/AIDS?

Students: [silence]

Teacher: Are you sure you have not been affected by HIV/AIDS?

Students: No.

Teacher: I know the problem; there is a difference between affected and infected. Affected refers to knowing how the disease is devastating many homes and the population and in one way or another, we are all affected. Infected means you have the virus and are living HIV positive. So now, before we discuss any further, how many of you are affected by the disease?

Students: [all lift up their hands]

Teacher: Since we have come to common ground, let us discuss how the disease affects us.

The teacher spent time differentiating the terms affected and infected. Then the class discussed the effects of HIV/AIDS on the society. The effects range from socio-economic, political, to socio-cultural. The economic effects included poverty, loss of

human manpower, hence lower productivity, which affects the general economic growth of the country. Political effects included increased resource allocation to health issues at the expense of other important sectors like education. The socio-cultural effects revolved around increased number of orphans and general population decline. Based on such effects, the teachers cautioned the students to ensure they do not contract the disease.

How HIV/AIDS is prevented

The students echoed the ABC formula used in Uganda on how the disease is prevented. That is, abstaining from sex until you are married, being faithful to one sexual partner when married and, condom use. This formula is meant to instill moral fiber in order to prevent heterosexual transmission. The other means of prevention discussed included not sharing sharp objects especially with infected persons, and infected mothers not breastfeeding their babies. However, in the MBS, one student raised the issue of circumcision as one way of preventing infection. This generated the following discussion:

Solomon: Circumcision is one way of preventing infection

Teacher: That is not correct; both non-circumcised and circumcised men get infected.

Solomon: But I heard on Capital Doctor that circumcised men are less likely to get infected.

Teacher: What the doctor was referring to was not HIV/AIDS but other STDS like gonorrhoea and syphilis which infect men under the foreskin. Because the foreskin is removed during circumcision, circumcised men are less likely to be infected with gonorrhoea and syphilis.

The student had confused the two concepts and the teacher clarified. In the questionnaire responses some 25 male students suggested that circumcision is one way of preventing infection although some 40 students felt it is a major means of HIV transmission.

The 25 male students may be satisfied with the response of the teacher but the 40 students may not have benefited because they were referring to the process of circumcision not the after effects thereof. However, it was good that circumcision was raised during the discussion because some cultures in Eastern Uganda practice circumcision and it could be a common belief among such communities that they are less likely to get infected. It is therefore important that when programs like Capital Doctor are addressing Sexually Transmitted Infections (STIs) and circumcision, these programs should also explain why HIV is unique. To the students, HIV is also considered a STI and therefore generalizing statements makes them develop a wrong conception.

To complete the discussions in class, the teachers encouraged students to go for an HIV test. The teachers suggested that in order not to live in fear, it is advisable they get the tests and know their HIV-status. The students in the BBS would not buy the idea: they laughed and shook their heads. During the follow-up discussion, the boys said that they would only take the test if it is mandatory and not if it is voluntary. To the students, going for an HIV/AIDS test could be equivalent to admitting that they may have reasons to doubt their HIV-status. This again points to the view that there is stigmatization associated with HIV and people prefer ignoring messages that encourage blood tests just to know one's status.

4.4.1. Summary

Students used the classroom discourse to investigate some of their beliefs on HIV/AIDS. In some incidences, it seemed students were seeking justification of their beliefs from the teachers especially in regard to origin of the disease. Also, in light of classroom discourse, it is not always that the students abandon their prior understandings of the disease. Instead, the students blend scientific knowledge with their beliefs and come up with a concept.

From the classroom discourse, it became apparent that the teachers' choice of language impacts the learning process. This was seen in the discourse preceding the discussion on the effect of the disease. The students at first did not understand the difference between affected and infected, yet the teacher had made this assumption. This underscores the need to make explicit any new terms that may confuse the students. The students' reluctance to respond to the question when they had misinterpreted it shows that declaring HIV/AIDS status cannot be done openly. This is due to the stigma associated with admitting one's HIV status.

4.5.0 Issues some students find confusing about HIV/AIDS messages

Apart from the conceptions the students have discussed in section 4.2.0 and 4.4.0 above, there are some other issues that were not so clear to the students. Most of them had questions relating to the effect the disease is currently having in Uganda and the new scientific findings related to HIV/AIDS. The issues were raised in the questionnaire have been categorized into two major questions as detailed below.

Is HIV/AIDS a problem?

A student wondered “if there are so many people dying of HIV/AIDS, why are there campaigns advocating for family planning?” which was a question alluded to by other students. These students believe the government is not being honest about the effects of the disease. To some of the students, these two messages are contradictory and require clarification. One female student stated that in light of these campaigns for family planning, HIV/AIDS is just an “American idea for discouraging sex” given that the campaigns are spearheaded by NGOs like UNESCO and USAID. The female students particularly raised questions about the campaigns to family plan yet many people are dying of HIV/AIDS. The family planning campaigns have not been well received by religious leaders and given the high percentages of religious communities in Uganda, the students may be expressing views of a given religious community.

Furthermore, some of the family planning messages may cause confusion as the female students may feel responsible for the maintenance of the clan in terms of producing many children since this is a cultural expectation. These female students may in future produce many children to maintain allegiance to their clans and not take heed to the family planning messages. Claxton (1993) calls these *social stances* that cannot be easily changed because they seem to carry more weight. *The conflicting messages, one stating that the majority of the population is dying of HIV/AIDS and the other stating that Uganda is overpopulated and therefore family planning should be practiced, may give students reason to be suspicious.* The messages have been promoted side-by-side. However the ‘contradictory’ messages were not the only concern of these students.

Is HIV/AIDS a conspiracy?

Some students on the other hand were concerned that their parents constantly referred to HIV/AIDS when encouraging them to study hard. One boy wrote:

Parents use HIV/AIDS to scare us to read hard and discourage us from having sex at an early age. They tell us to read very hard and get on with education and avoid 'staring at skirts' because you can get HIV/AIDS.

To this student, HIV/AIDS messages are not portraying the truth and parents are exploiting this to make them work hard. The students are already scared as has been detailed above and constant reference to the disease hand-in hand with education may be legitimate cause for suspicion. Further, some male students think that government and religious leaders (advocating for abstinence) are conniving by not out-rightly stating that the disease is no longer a threat and parents are taking advantage of it in order to have them read and work hard in school.

Much as the parents may achieve the goal of scaring the boys from having an early sexual relationship, it seems to present another stereotypical gender problem in portraying females as carriers of HIV/AIDS. The labeling of females as a threat to the educational success of the males, as well as being potential infectors or carriers, places blame for the spread of HIV/AIDS on females. Uganda being predominantly male-oriented, such statements cement the fate of females as the ones to blame. The students from the BBS during the follow-up discussions stated their beliefs that girls are to blame for the spread of HIV. These boys argue that the girls are the ones that have sexual relationships with older married men and have a high potential of being infected. The boys believe that young girls are a risk to them. Such an attitude in the era of gender

equity needs to be addressed because as pointed out by Mirembe and Davis (2002), the female students will not have the support they very much need to overcome being discriminated against. Teachers then, are in a position to provide a forum to discuss national issues, like gender, in schools.

In general, the students showed that there are certain conflicting ideas that readily need to be addressed, for example, the advocacy for family planning and the announcements that many people are dying of HIV/AIDS. As discussed earlier, such issues if not well explained can easily be exploited by opportunists like those who want to cling to cultural ideologies, for example the man quoted on the New Vision (Oct 2004) saying sex education goes against culture. Also, given that the students most likely listen to the cultural leaders, there is a possibility that the cultural argument of having many children as a measure of safety and ensuring continuation of the clan will be accepted over the advocacy for family planning. The HIV/AIDS campaigns will then be ignored and cultural norms upheld.

4.6.0 Summary of Chapter Four

Chapter Four has dealt with the findings of the research collected through questionnaires, video recordings of the participating classes and follow-up focus group discussions. The students' conceptual understandings were deduced from comments on specific questionnaires and the choice of metaphors, analogies and similes they used. The issues that needed further clarification were addressed in the focus group discussions. The information on the video recordings aimed at addressing question two of this research looking at the impact of pre-conceptions on instruction about HIV/AIDS.

The conceptions that comprise the students' prior experiences from media messages, cultural teachings and insider knowledge of HIV/AIDS patients, have translated themselves as beliefs and are used by the students as the starting point in understanding HIV in classroom settings. The students in this study have been exposed to various messages on HIV/AIDS but issues that seem to give them some cognitive dissonance are *origin of the disease* and *condom use*. Probably this is directly related to their cultural background and therefore piques a lot of interest among the students. It is also evident that the conceptions some students have on methods of HIV transmission are not in line with canonically correct science and therefore potential areas for risky behaviour and exposure to infection. For example, the idea that the old men or menstruating girls cannot transmit or acquire HIV is risky given that these students in this study are at the age where they are curious about sex.

The students in this study showed a cultural way of communicating matters relating to HIV/AIDS. The expressions used for condom use were typical of a cultural way of communication. This is because condoms and sex are related and therefore cannot be openly addressed. The stigma developed from the media campaigns and the cultural taboo of not talking about sex results to disadvantage advocacy of condom. The students did not use only cognitive abilities to discuss HIV/AIDS but some responses were emotional. Therefore, both cognitive and affective factors were used in the process of knowledge construction on HIV/AIDS.

Chapter Five

5.0.0 Discussion, conclusions and implications for teaching

This chapter ties together the findings of the research and blends the data into the theoretical framework of the study. The students who participated in this study appear to have grasped the gravity of HIV/AIDS in Uganda. This was evidenced in their attempts to explain the disease. Most of them are aware of the economic and social effects of the disease. To some students, the awareness of how devastating the disease is on a patient and the nation as a whole has developed in them a deep fear of contracting HIV/AIDS, the consequence of which seems to be a reduced rate of infection among youth. Because of this, Uganda has been commended worldwide for the success of their campaigns to promote abstinence until married and being faithful to one sexual partner (USAID 2002). Other African countries have been urged to model themselves after Uganda's strategy of curbing the spread of HIV/AIDS. Carter (2004) argues that the decline in the rate of infection is highly attributed to the change in sexual behaviour among the youth and married couples, and not through increased condom use as some people believe. He defends his point by referring to the declining infection rates among Ugandans before the government promoted condom use.

Although Carter (2004) argues that the reduction in rates of infection among youth is largely due to change in sexual behaviour, this alone cannot fully account for the reduced rates of infection. Given that it is culturally difficult to get any information pertaining sexual behaviour, it is difficult to establish the fact that there are some people using condoms. The CDC (2002) and USAID (2002) claim that more condoms are used in Uganda than before, which gives the impression that they too have played a role in the

preventing sexual transmission of HIV/AIDS. Most of the students reported beliefs in abstinence and being faithful to one sexual partner as the best way to prevent HIV/AIDS among youth. The students based their views on either religious or political authority. This shows that the students have a high regard for a particular authority.

Even though the students have an adept understanding of how devastating HIV/AIDS is, they still have a lot to learn about the nature of the disease. Nature in this study refers to the structure, origin, cause, transmission, prevention of HIV/AIDS, and the general science of reproduction, sexuality and sexual behaviour. The students in this study are apparently aware of the current scientific findings of the possible origins of HIV/AIDS and used the known to explain the unknown. It is true that scientists have traced the origin of HIV to a similar simian virus, although the scientists state that the simian virus does not affect monkeys the way HIV affects humans. The students on the other hand have used these findings to establish a link to HIV/AIDS in humans. Further, the scientists are still trying to establish if the virus strain in monkeys could have been transmitted to humans but some students have already formed a belief and explain HIV acquisition as if it were an established fact. Some of the students attribute the origin to a man having a sexual relationship with an infected monkey. With such a notion in mind, the students then used their religious notions and called the disease a curse. It was not easy for the students to abandon their belief after classroom instruction on the science of HIV/AIDS as is postulated in the Conceptual Change Model.

However, despite these allegiances, there are some issues that the students find problematic that cause them to distrust authority. The issues include family planning advocacy, a growing population despite the ravages HIV/AIDS and parents perhaps

twisting the HIV/AIDS propaganda for the purpose of enforcing their son's study habits. This 'contradictory information' caused some of the students to become suspicious and thus sensed a conspiracy on the part of parents and society.

The students may not be able to interpret population projections and therefore take the projections as established facts. The students may be using their prior knowledge on HIV/AIDS to interpret any other public health information and national campaigns too. There have been many media programs addressing HIV/AIDS as evidenced by the students' citations of different media. It seems probable that the students are following closely any developments on HIV/AIDS. Any contrary view raises questions in their minds hence dissatisfaction with their understanding. In addition, the students believe HIV/AIDS is a nightmare and therefore may be looking for any kind of assurance that HIV is no longer a threat so that they can loosen the fear under which they currently live. However, the students are not ready to take on the authorities but are willing to seek clarification on some of the issues from their biology teachers. This dissatisfaction with certain messages provide a good basis for the Conceptual Change Model (CCM) and a constructivist philosophy of learning that teachers can use to bring about meaningful learning.

The Conceptual Change Model (Posner et al., 1982) posits that in light of new evidence, students readily abandon their alternative frameworks (Cobern, 1996) or naïve conceptions (Driver, 1983) and accept scientific ones. Posner et al. argue that students adhere to their naïve conceptions because they find them intelligible (it makes sense), plausible (can address the current situation) and fruitful (brings results). In the case of some students in this study, science has some loopholes and therefore the students used

prior experiences to come up with a concept on the origin of HIV which is intelligible plausible, and fruitful. For better understanding, the three steps of the CCM will be used to elaborate how the students' have held to their prior conceptions on the initial origin of HIV/AIDS.

a) Intelligibility: The students believe the most likely explanation for the initial origin of HIV/AIDS is a sexual relationship with a monkey or if not, then the virus was deliberately manufactured. Science traces the origin to monkeys but do not explain how the virus was acquired by humans. Since the students have understood how HIV/AIDS is transmitted between humans, they have extended these understandings to explain how the virus was initially acquired by human beings. The following statements seemed intelligible to the students:

- since the disease is sexually transmitted, it must be through a sexual relationship with a monkey or
- Africans were deliberately infected by sharp objects or blood transfusion by a terrorist who wanted to use the virus as a biological weapon of mass destruction.

These are all naive explanations in light of present scientific understandings that have not established the monkey-human linkage. Until science solves the mystery about how the virus could jump the species barrier between monkeys and humans, the students fill in their own beliefs that make sense to them.

b) Plausibility: The students find that their understandings of the initial origin of HIV/AIDS can address the current situation. Given that science has

established the methods of HIV/AIDS transmission, the students seem to believe that these methods also apply to the initial transmission from monkey to human. Current research has not established the possible method of transmission across the species barrier but since students need closure, they have extended what have been proven as methods of transmission to address this knowledge gap. In the absence of an alternative scientific explanation, the students find their beliefs satisfactory to them in understanding how the initial transmission may have occurred. The students proffered sexual transmission or through a contaminated sharp instrument as plausible explanations which seem logical to them.

- c) Fruitfulness: Fruitfulness is defined as being in a position to use the same explanation when faced with a similar situation (Posner et al., 1982). The students believe that the initial transmission must have taken a pattern similar to the present human-to-human transmission, therefore the students are more likely to use this view over again. The students use scientific facts of the possible methods of transmission to make this argument. For example, since the virus is transmitted through a sexual relationship with an infected person, and the virus is traced to monkeys, the students conclude that sex must be the method of transmission from monkey to man. Science has not investigated any possibilities of such a transmission but to the students, this seems a potential area for investigation. This understanding seems outrageous and so cannot be considered as a real possibility yet the students find the view very plausible and hence fruitful given that science is

still trying to establish a link between the Simian Immune Virus (SIV) and HIV. Scientists are still puzzled about the SIV in monkeys because the virus is transmitted to other apes through eating the flesh of an infected monkey. Maybe the next step for scientists to establish an initial method of transmission is to investigate the possibility of humans having eaten the flesh of an infected monkey. But until such a claim is verified, the students will hold on to the belief in a sexual transmission given that this is an established method of HIV/AIDS transmission.

Suffice it to say that the conceptual change model, if used in the classroom, will not be sufficient in changing the students' pre-conceptual understandings about the origin of HIV/AIDS in humans. This is because there are no alternative explanations that science can proffer to help the students construct a more scientific understanding of the initial origin of HIV/AIDS in humans. The model posits that teachers should provide alternative explanations that can cause the students to be dissatisfied with their present understandings but that is not possible with the present linkage gap. Therefore, the pre-conceptual understandings of the students will persist until such a time when there is a plausible alternative explanation.

Although the Conceptual Change Model will get stuck because the teachers will have no alternative explanation to offer about the origin of HIV/AIDS, it is important to deal with students' beliefs on how transmission of the disease can be prevented. Some students believe that HIV can be prevented through having sex while standing or by having sex during menstruation. Based on today's proven methods of HIV/AIDS transmission, these are misconceptions that need to be addressed. Students who hold such

conceptions are at a risk of engaging in sexual relationships that may lead to HIV infection. The CCM suggests that teachers should elicit students' prior knowledge in order to prepare lessons that engage this prior knowledge and help the students construct new knowledge. This was not the case in the recorded biology lessons because the teachers first taught what was in the curriculum before the students were given time to ask questions. The instructional method was teacher centered where the students were silent until the teachers opened the lessons to discussion. The teachers therefore did not explore the students' prior understandings and so the lessons were not designed to engage students' prior knowledge, as suggested in the CCM.

However, in this study, the researcher sought the students' prior knowledge through the specially-designed questionnaire. Because of this, the researcher was aware of what constituted students' prior knowledge. The recorded biology lessons were used by the researcher to analyse the interplay between students' prior knowledge and classroom knowledge. This was possible because the researcher had already elicited the students' prior knowledge and so could know what misconceptions needed to be addressed by the teachers. Some of the misconceptions were not addressed in the biology lessons and therefore the researcher decided to engage these understandings in the follow-up focus group discussions. Therefore this underscores the importance of eliciting students' prior understandings (Aikenhead, 1996; Clement, 1993; Cobern, 1996; Driver, 1983; Kelly, 1955; Nashon, 2003; Pittman, 1999).

5.1.0 Conclusions

This qualitative case study discovered among other things that the AIDS perceptions of Ugandan Senior Three biology students are highly varied. Some students

see HIV/AIDS as a curse, others a political problem, while for others it may be a conspiracy. Some of these findings are as insightful as they are disturbing. They seem to call for better HIV/AIDS intervention programs and better teaching strategies for AIDS education in schools.

Psychologists and constructivist arguments that students possess prior knowledge stand true for the students in this study. The students may have heard the same messages on HIV/AIDS from the public media and received similar information from their respective teachers but yet constructed different individual understandings. This seems to confirm the view that learning is indeed a cognitive process and individual (Posner et al., 1982): the same information is understood differently by the students. Also, Driver's (1983) suggestion that prior knowledge is the window through which new knowledge is accepted stands true for these Ugandan students.

Learning is indeed a social process involving cognitive and affective factors (Duit & Treagust, 1998). The students in this study have prior experiences with HIV/AIDS and because of these experiences have developed and constructed understandings about the disease. Some of the experiences are first-hand and may be considered insider knowledge while others are through public and private media. These experiences are instrumental for the way students understand and respond to HIV/AIDS information. Some students respond on an emotional level while others believe that they need to be more religious. Furthermore, some of the responses were held by several students making it probable that the views are socially constructed.

Students' prior knowledge is sometimes contrary to canonically correct science knowledge and therefore can be seen as misconceptions. This underscores the need to

make explicit students' prior understandings before classroom instruction. The students in this study had outright misconceptions that the respective classroom teachers had no knowledge about, yet these became evident to the researcher through the collection of prior understandings on the questionnaire. Because the teachers did not elicit the students' prior knowledge, the students in this study may believe that their understandings are correct. For example those who believe HIV cannot be acquired through having sex during menstruation or insects like mosquitoes and houseflies transmit HIV/AIDS could still hold these beliefs because the teachers never addressed them in class and so were not challenged.

The design of a lesson is important. During the classroom discourse, there was evidence that the students were willing to change the way the lesson was conducted, that is a transmissive model of teaching. The students did not just listen and take in what the teachers said but engaged the teachers in discussions and showed a genuine interest in the learning. This research provided them with a voice given the constant reference to their participation in their research and recall of the questionnaire questions and the responses given. The classroom dynamics were thus changed and during the follow-up focus group discussions, one teacher commented on how interested the students were in learning and expressed amazement at how willing they were to participate in the study. Generally, the research generated a lot interest because the students were given the opportunity to express themselves.

5.2.0 Implications, Recommendations, and Further Research

The implications of this study are far-reaching. From the students responses there are implications for science teaching, curriculum, political leaders and different

stakeholders in the HIV/AIDS campaigns. HIV/AIDS is not a concept to be relegated to one aspect of learning given that it cuts across societal concerns. The implications and recommendations are discussed under each sub heading below:

5.2.1 Implications for Science teaching

Teaching the science of HIV/AIDS as stipulated in the curriculum and using health officials to conduct lessons is good but the problem is assuming the students will just accept the information. As discussed above, the students have pre-constructed understandings which are deeply embedded. The teachers repeat media messages to the students but take no time to elicit meanings that the students have constructed over the years of listening to the messages, especially the indirect ones. Some of the messages are simple and can be immediately understood but others need to be explained further to avoid concept confusion and (mis)understanding. The following are implications for teaching:

The classroom should be a place where students can test out their hypotheses and develop a systematic way of constructing knowledge. It is important that teachers organize the classroom as a place where students ask questions and seek knowledge. Wiggins (1989) suggests that students should learn to further their superficial knowledge through careful questioning. In science education, different researchers (e.g. Matthews, 1998) are advocate that scientific inquiry be taught to students, and different technology-based models are being designed to explore such ideas. In the case of HIV/AIDS education, methods for scientific inquiry need to be taught if the conceptual change model is to be effective in building on students' prior understandings.

Teaching that is not sensitive to the students' socio-cultural backgrounds is insufficient to develop a scientific understanding of HIV/AIDS. Media messages and biology lessons focus on the scientific facts of HIV/AIDS as well as the economic impact of the disease, but do not take into account the differing cultural values of the students. Therefore, a teacher's job is made more complicated. What the students consider important, in their personal worldviews, need to be addressed in the stipulated curriculum. In this study, many students openly expressed their views on the questionnaire and during interviews but exercised restraint in the classroom until discussion was opened up by the respective teachers. The students obviously sought discussion about HIV/AIDS. This curiosity and eagerness in expressing their views represents an untapped direction for curriculum change.

The qualitative nature of this research gave students an opportunity to elucidate their prior understandings of HIV/AIDS. Had this research been exam-oriented, for example, a multiple choice test or required for marks, the students' responses may have been more constrained to 'academic knowledge' of HIV/AIDS and therefore their prior conceptions would not be expressed. The fact that responses were not being gauged for right or wrong in this study allowed students to consider much more widely what their beliefs and values are. The students felt that their views were taken into consideration and important just because the responses were not being gauged on the basis of being right or wrong. During the follow-up discussions, the students were proud of their responses and some of them were willing to engage the issues in a debate while others used the discussion as a forum to seek clarification on, or even convince the researcher of, their beliefs.

Ugandan teachers should provide students with opportunities to share their pre-conceptual knowledge. This is important because learning will be more meaningful to the students if they participate in the process of learning. The constructivist approach to learning should be used especially when dealing with issues as far reaching as HIV/AIDS. Students can in turn learn to engage their pre-conceptual knowledge when such opportunities are provided.

5.2.2 Implications for science curriculum design

The science curriculum should be designed in such a way that students are able to learn science inquiry skills. According to the CCM, when students develop science inquiry skills, the students can engage their understandings and establish flaws in the argument they may be having. Once the students become dissatisfied with a current understanding, the teacher will be in position to guide the students into constructing new knowledge that is more scientifically correct. The curriculum therefore should emphasise inquiry skills through providing teachers with guidelines on how to teach HIV/AIDS. The present curriculum seems to state what to teach about HIV in a biology lesson, and the teachers just aim at covering what is stipulated, and do not taking into account students' prior understandings.

The HIV curriculum should be designed in such a way that cultural, religious and socioeconomic aspects are addressed in the classroom too. This is because these aspects are affecting the students' understandings of the science of HIV. Presently, the messages seem to be conflicting and because of this, some students believe there is a conspiracy going on while others are confused. The government is planning to mainstream HIV education in the secondary school curriculum, but it is important to ensure that whatever

is taught is complementary and not contradictory, so that students can construct a wholesome understanding of HIV.

Incorporating interdisciplinary aspects of HIV/AIDS education will require teachers to gain new teaching skills. It is important that professional development be provided so that teachers can get acquainted with these new science teaching methods. The constructivist approach would be one way of getting teachers to think about involving learners in their own learning experiences, but it is imperative that professional development be part of change if a new AIDS curriculum is to be implemented successfully.

5.2.3 Implications for policy

The students in this study raised some issues that could be used to influence policy in Uganda. HIV/AIDS is not only a scientific phenomenon, but cuts across many aspects of life. Students raised a cultural aspect that affects female students, that of being subordinate to males in the community. Female students felt that subordination is disadvantageous to them and so believe that the only way to avoid contracting HIV is through remaining celibate. During the discussion on condom use in heterosexual relationships, female students pointed out that it is impossible in this cultural setting, where the women are supposed to be submissive to the men to ask the men to use condoms. This calls for a policy to be enacted that addresses the rights of women in the context of a male dominant culture.

The messages on HIV/AIDS aired on the Ugandan popular media need to be monitored so that contradictory information is removed. There is evidence that some people are sabotaging government programs aimed at minimizing the spread of HIV in

Uganda. Some of the students wrote that there are those who are campaigning against condom use by suggesting that condoms are not a good preventive method while others are claiming condom use leads to cancer or impotence. Policy makers ought to set policies on what public messages are appropriate or consistent with the campaign against the spread of HIV/AIDS.

Government should develop programs that address HIV without being contradictory. The students did not understand the relationship between population statistics, family planning and the devastating figures of HIV's effects on Uganda. The programs developed should therefore thoroughly explain these various aspects of the economy so that the students understand the messages and not put themselves at risk by assuming HIV is no longer a problem. Some of the students suggested that the disease is no longer a problem given the campaigns to family plan, which is not exactly the intended message behind these programs.

5.3.0 Recommendations and suggestions for further research

It would be inappropriate to conclude this thesis without making reference to the question "What next?" What follows is a list of key recommendations that have emerged from the findings. The researcher hopes that these can be taken forward by key organizations and institutions in order that Uganda can improve its proud record of AIDS education and continue to reduce the infection rate among the youth.

- Efforts to improve AIDS education in schools have been assisted by governmental guidelines issued as part of the National AIDS Policy. There is need to enact sectoral legislation that covers the full range of gender equity and rights issues identified in this thesis.

- Existing laws and new legislation must address issues of a socio-economic nature so that students who are in economic hardship do not end up in prostitution or compromising situations that put them at risk of infection.
- Although education and information campaigns have been mounted with some success by government and NGOs, it is vital that specific attitudinal work be undertaken to challenge particular stereotypes and myths about HIV. In particular, the ideas that only youth, promiscuous men and women can get AIDS but not old men and women must, be challenged by individuals and institutions throughout the country.
- AIDS education strategies in schools should be geared towards addressing sexuality and reproductive health given that students have many misconceptions regarding body development. The cultural way of communication, especially the analogies in the local dialects need to be decoded by teachers in schools so that better understanding of sexuality can be realized by the students.
- Greater attention needs to be paid to the gendered nature of HIV stereotypes in Uganda. Women's rights of life and social security need to be protected. Women's specific health needs should also be addressed. Laws against domestic violence should be enacted if heterosexual transmission of HIV/AIDS is to be reduced.

5.3.1 Suggestions for further research

This report has highlighted a number of areas in which more research would be beneficial. Further research on the existing perceptions of HIV/AIDS among different

communities in Uganda and various cultural factors that may impede progress towards a society that is fully educated about AIDS would be beneficial.

Also follow-up research with the students who took part in this study to investigate whether the follow-up discussions and taking part in this research had any impact on their knowledge of HIV/AIDS would be useful. The students showed great interest in the study and a follow-up that engaged their pre-conceptions in a more structured manner could provide a useful examination of the efficacy of the CCM for developing more scientific understandings.

Investigation into how AIDS education programs entrench gender discrepancies is another area of great interest. The issue of gender inequity and cultural stereotypes has only been touched on in this study.

Large scale studies are needed to look at the social as well as the economic impact of stigmatization on the families of the infected and affected. Stigmatization was only implied by students but more information would help in designing better AIDS education programs.

More research is needed to investigate the AIDS education programs within schools and their efficacy in teaching about HIV/AIDS. There is need for research that helps blend media and curriculum for AIDS education in schools. Students seemed to experience uncertainty as to whether some sources of information can be trusted.

Above all, it must be recognized that there can be no effective AIDS campaign unless there is a multi-sectoral approach to the issues raised by the students in this study. Research needs to be done in the sectors of health care, employment and legal frameworks so that wider knowledge on HIV/AIDS challenges can be created.

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APPENDICIES

Appendix A: *Examples of messages students' are exposed to*

Figure 1 students' newspaper



Figure 1 Messages in schools on HIV/AIDS



Figure 3 Billboard message

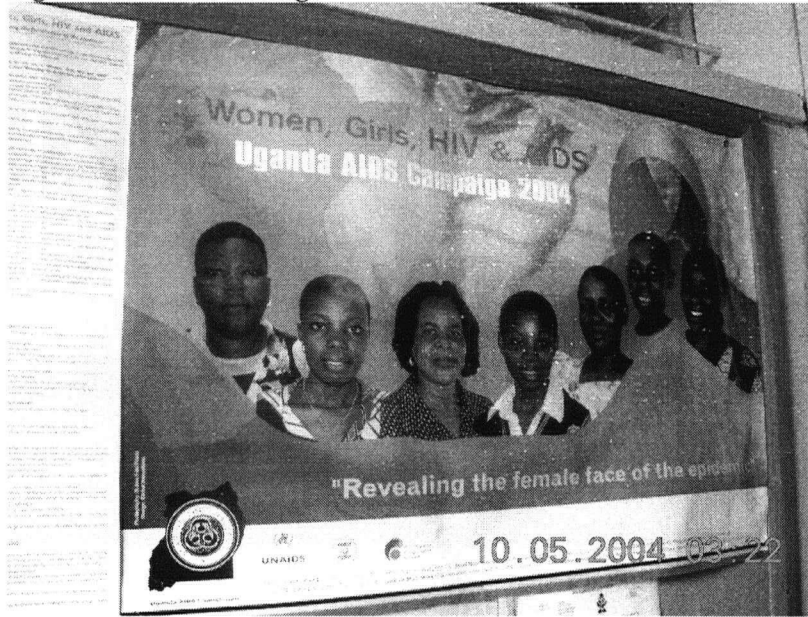


Figure 4 Teen Newspaper



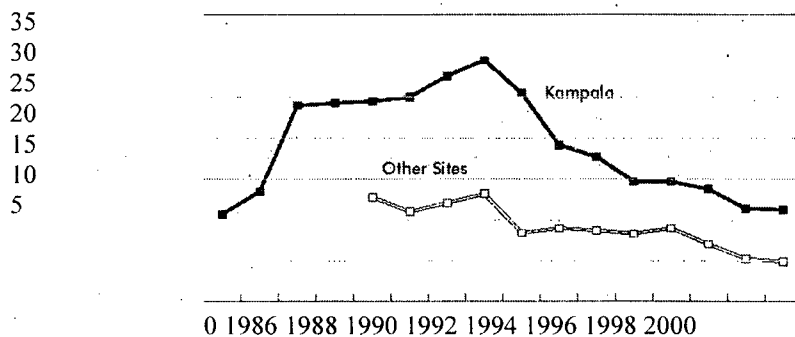
Appendix B: Excerpt of reports on HIV/AIDS

Appendix B (i). WHAT HAPPENED IN UGANDA?

Declining HIV Prevalence, Behavior Change, and the National Response

This document is not intended to provide a definitive explanation for Uganda's AIDS prevention successes during the 1980s and 1990s. Rather, it is a synthesis of presentations made in February 2002 at the U.S. Agency for International Development (USAID) by four individuals with long-term experience in HIV prevention in Africa. USAID's Office of HIV/AIDS decided to commission a summary document synthesizing the ideas presented by these researchers. The following pages do not include all the various statistical and other details that were presented; however, it is hoped that the main points described here provide some insight into how Uganda has managed to control its HIV epidemic during the past 15 years.

MEDIAN HIV PREVALENCE AMONG PREGNANT WOMEN IN UGANDA
(Interpolated for one-year gaps in site data)



Source: HIV/AIDS Surveillance

Report, STD/AIDS Control Programme, Ministry of Health, Uganda, June 2001.

HIV prevalence has declined significantly in Uganda: Now considered to be one of the world's earliest and best success stories in overcoming HIV, Uganda has experienced substantial declines in prevalence, and evidently incidence, during at least the past decade, especially among younger age cohorts. According to Ministry of Health (MOH) data, prevalence among pregnant women has declined consistently since the early 1990s at all of the country's sentinel sites (except Tororo, near the Kenyan border, where prevalence increased a little during the mid-to-late 1990s, but declined significantly again by 2000). While it is more difficult to find reliable data on trends in incidence (or the rate of new infections), seroincidence also appears to have fallen significantly. In one site, Masaka, incidence fell from 7.6 per thousand per year in 1990 to 3.2 per thousand per year by 1998. As with prevalence, the decline was more pronounced among younger women.

Seroprevalence among 15-19-year-old pregnant women, which is believed to be reflective of HIV incidence, fell sharply from the early 1990s, when this data was first collected, until 1995 or 1996, and since then has remained low. Based on this trend, as well as the fact that national seroprevalence peaked in 1991 and from some other

indications (e.g., syphilis rates in Rakai plummeted in 1988), it is probable that incidence in Uganda would have peaked sometime in the late 1980s. Regarding prevalence, estimates by the U.S. Census Bureau/Joint United Nations Programme on HIV/AIDS (UNAIDS) are that national HIV prevalence peaked at around 15 percent in 1991, and had fallen to 5 percent as of 2001. This dramatic decline in prevalence is unique worldwide, and has been the subject of curiosity since the mid-1990s, and recently of even more intense scientific scrutiny.

Observed consistently over time and across many different geographic and demographic populations, Uganda's falling HIV prevalence is likely not due merely to measurement bias or a "natural die-off syndrome," but rather mainly to a number of behavioral changes that have been identified in several surveys and qualitative studies. Some have postulated that the decline in seroprevalence was primarily a result of so many people succumbing to the disease that the rate of new infections was simply outweighed by the numbers of AIDS deaths. However, a number of other African regions (e.g., Zambia, Zimbabwe, western Kenya) have experienced nearly as old—and at least as severe—epidemics as Uganda's, yet prevalence has yet to decline at the population level. Furthermore, the large decline in prevalence among younger age cohorts in Uganda argues against this as a primary explanation.

Details of this report can be got from SynergyInfo@tvassociates.com or www.usaid.gov/our-work/globalhealth/aids/countries/uganda.pdf

Appendix B(ii). REPORT ON PROVEN METHODS OF TRANSMISSION

HIV Prevention report retrieved from DHAP: <http://www.cdc.gov/hiv>

HIV Prevention HIV and Its Transmission

Research has revealed a great deal of valuable medical, scientific and public health information about Human Immunodeficiency Virus (HIV) and acquired immune deficiency syndrome (AIDS). The ways in which HIV can be transmitted have been clearly identified. Unfortunately, false information or statements that are not supported by scientific findings continue to be shared widely through the internet or popular press. Therefore the centers of disease control (CDC) have prepared this fact sheet to correct a few misperceptions.

How HIV is transmitted

HIV is spread by sexual contact with an infected person, by sharing needles and/ or syringes (primarily for drug injection with someone who is infected) or less commonly (and now very rarely in countries where blood is screened for antibodies), through transfusions of infected blood or blood clotting factors. Babies born to HIV-infected women may become infected before or during birth or through breast feeding after birth.

In the health care setting, workers have been infected with HIV after being stuck with needles containing HIV-infected blood or less frequently after infected blood gets into a worker's open cut or a mucous membrane (for example, the eyes or inside of the nose). There has been only one instance of patients being infected by health care worker in the U.S; this involved HIV transmission from one infected dentist to six patients.

Some people fear that HIV might be transmitted in other ways; however no scientific evidence to support any of these fears has been found. If HIV were being transmitted through other routes (such as through air, water, or insects) the pattern of reported AIDS cases would be much different from what has been observed. For example, if mosquitoes could transmit HIV infection, many more young children and preadolescents would have been diagnosed with AIDS.

All reported cases suggesting new potentially unknown routes of transmission are thoroughly investigated by state and local health departments with the assistance, guidance and laboratory support from CDC. *No additional routes of transmission have been recorded* despite a national sentinel system designed to detect such an occurrence.

HIV in the Environment

Scientists and medical authorities agree that HIV does not survive well in the environment, making the possibility of environmental transmission remote. HIV is found in varying concentrations or amounts in blood, semen, vaginal fluid, breast milk, saliva, and tears. (See page 3, Saliva, Tears, and Sweat.) To obtain data on the survival of HIV, laboratory studies have required the use of artificially high concentrations of laboratory-grown virus. Although these unnatural concentrations of HIV can be kept alive for days or even weeks under precisely controlled and limited laboratory conditions, CDC studies have shown that drying of even these high concentrations of HIV reduces the amount of infectious virus by 90 to 99 percent within several hours. Since the HIV concentrations used in laboratory studies are much higher than those actually found in blood or other specimens, drying of HIV-infected human blood or other body fluids reduces the

theoretical risk of environmental transmission. to that which has been observed—essentially zero. Incorrect interpretations of conclusions drawn from laboratory studies have unnecessarily alarmed some people.

Results from laboratory studies should not be used to assess specific personal risk of infection because (1) the amount of virus studied is not found in human specimens or elsewhere in nature, and (2) no one has been identified as infected with HIV due to contact with an environmental surface. Additionally, HIV is unable to reproduce outside its living host (unlike many bacteria or fungi, which may do so under suitable conditions), except under laboratory conditions, therefore, it does not spread or maintain infectiousness outside its host.

Households

Although HIV has been transmitted between family members in a household setting, this type of transmission is very rare. These transmissions are believed to have resulted from contact between skin or mucous membranes and infected blood. To prevent even such rare occurrences, precautions, as described in previously published guidelines, should be taken in all settings—including the home—to prevent exposures to the blood of persons who are HIV infected, at risk for HIV infection, or whose infection and risk status are unknown. For example, Gloves should be worn during contact with blood or other body fluids that could possibly contain visible blood, such as urine, feces, or vomit. ❖ Cuts, sores, or breaks on both the care giver's and patient's exposed skin should be covered with bandages. ❖ Hands and other parts of the body should be washed immediately after contact with blood or other body fluids, and surfaces soiled with blood should be disinfected appropriately. ❖ Practices that increase the likelihood of blood contact, such as sharing of razors and toothbrushes, should be avoided. ❖ Needles and other sharp instruments should be used only when medically necessary and handled according to recommendations for health-care settings. (Do not put caps back on needles by hand or remove needles from syringes. Dispose of needles in puncture-proof containers out of the reach of children and visitors.)

Businesses and Other Settings

There is no known risk of HIV transmission to co-workers, clients, or consumers from contact in industries such as food-service establishments (see information on survival of HIV in the environment). Food-service workers known to be infected with HIV need not be restricted from work unless they have other infections or illnesses (such as diarrhea or hepatitis A) for which any food-service worker, regardless of HIV infection status, should be restricted. CDC recommends that all food-service workers follow recommended standards and practices of good personal hygiene and food sanitation.

In 1985, CDC issued routine precautions that all personal-service workers (such as hairdressers, barbers, cosmetologists, and massage therapists) should follow, even though there is no evidence of transmission from a personal-service worker to a client or vice versa. Instruments that are intended to penetrate the skin (such as tattooing and acupuncture needles, ear piercing devices) should be used once and disposed of or thoroughly cleaned and sterilized. Instruments not intended to penetrate the skin but which may become contaminated with blood (for example, razors) should be used for only one client and disposed of or thoroughly cleaned and disinfected after each use.

Personal-service workers can use the same cleaning procedures that are recommended for health care institutions.

CDC knows of no instances of HIV transmission through tattooing or body piercing, although hepatitis B virus has been transmitted during some of these practices. One case of HIV transmission from acupuncture has been documented. Body piercing (other than ear piercing) is relatively new in the United States, and the medical complications for body piercing appear to be greater than for tattoos. Healing of piercings, generally will take weeks, and sometimes even months, and the pierced tissue could conceivably be abraded (torn or cut) or inflamed even after healing. Therefore, a theoretical HIV transmission risk does exist if the unhealed or abraded tissues come into contact with an infected person's blood or other infectious body fluid. Additionally, HIV could be transmitted if instruments contaminated with blood are not sterilized or disinfected between clients.

Kissing

Casual contact through closed-mouth or "social" kissing is not a risk for transmission of HIV. Because of the potential for contact with blood during "French" or open-mouth kissing, CDC recommends against engaging in this activity with a person known to be infected. However, the risk of acquiring HIV during open-mouth kissing is believed to be very low. CDC has investigated only one case of HIV infection that may be attributed to contact with blood during open-mouth kissing.

Biting

In 1997, CDC published findings from a state health department investigation of an incident that suggested blood-to-blood transmission of HIV by a human bite. There have been other reports in the medical literature in which HIV appeared to have been transmitted by a bite. Severe trauma with extensive tissue tearing and damage and presence of blood were reported in each of these instances. Biting is not a common way of transmitting HIV. In fact, there are numerous reports of bites that did not result in HIV infection.

Saliva, Tears, and Sweat

HIV has been found in saliva and tears in very low quantities from some AIDS patients. It is important to understand that finding a small amount of HIV in a body fluid does not necessarily mean that HIV can be transmitted by that body fluid. HIV has not been recovered from the sweat of HIV-infected persons. Contact with saliva, tears, or sweat has never been shown to result in transmission of HIV.

Insects

From the onset of the HIV epidemic, there has been concern about transmission of the virus by biting and bloodsucking insects. However, studies conducted by researchers at CDC and elsewhere have shown no evidence of HIV transmission through insects—even in areas where there are many cases of AIDS and large populations of insects such as mosquitoes. Lack of such outbreaks, despite intense efforts to detect them, supports the conclusion that HIV is not transmitted by insects.

The results of experiments and observations of insect biting behavior indicate that when an insect bites a person, it does not inject its own or a previously bitten person's or animal's blood into the next person bitten. Rather, it injects saliva, which acts as a lubricant or anticoagulant so the insect can feed efficiently. Such diseases as yellow fever and malaria are transmitted through the saliva of specific species of mosquitoes. However, HIV lives for only a short time inside an insect and, unlike organisms that are transmitted via insect bites, HIV does not reproduce (and does not survive) in insects. Thus, even if the virus enters a mosquito or another sucking or biting insect, the insect does not become infected and cannot transmit HIV to the next human it feeds on or bites.

HIV is not found in insect feces.

There is also no reason to fear that a biting or bloodsucking insect, such as a mosquito, could transmit HIV from one person to another through HIV-infected blood left on its mouth parts. Two factors serve to explain why this is so—first, infected people do not have constant, high levels of HIV in their bloodstreams and, second, insect mouth parts do not retain large amounts of blood on their surfaces. Further, scientists who study insects have determined that biting insects normally do not travel from one person to the next immediately after ingesting blood. Rather, they fly to a resting place to digest this blood meal.

Effectiveness of Condoms

Condoms are classified as medical devices and are regulated by the Food and Drug Administration (FDA). Condom manufacturers in the United States test each latex condom for defects, including holes, before it is packaged. The proper and consistent use of latex or polyurethane (a type of plastic) condoms when engaging in sexual intercourse—vaginal, anal, or oral—can greatly reduce a person's risk of acquiring or transmitting sexually transmitted diseases, including HIV infection.

There are many different types and brands of condoms available—however, only latex or polyurethane condoms provide a highly effective mechanical barrier to HIV. In laboratories, viruses occasionally have been shown to pass through natural membrane (“skin” or lambskin) condoms, which may contain natural pores and are therefore not recommended for disease prevention (they are documented to be effective for contraception). Women may wish to consider using the female condom when a male condom cannot be used.

For condoms to provide maximum protection, they must be used consistently (every time) and correctly. Several studies of correct and consistent condom use clearly show that latex condom breakage rates in this country are less than 2 percent. Even when condoms do break, one study showed that more than half of such breaks occurred prior to ejaculation.

When condoms are used reliably, they have been shown to prevent pregnancy up to 98 percent of the time among couples using them as their only method of contraception. Similarly, numerous studies among sexually active people have demonstrated that a properly used latex condom provides a high degree of protection against a variety of sexually transmitted diseases, including HIV infection.

For more detailed information about condoms, see the CDC publication "Male Latex Condoms and Sexually Transmitted Diseases."

CDC's Response

CDC is committed to providing the scientific community and the public with accurate and objective information about HIV infection and AIDS. It is vital that clear information on HIV infection and AIDS be readily available to help prevent further transmission of the virus and to allay fears and prejudices caused by misinformation. For a complete description of CDC's HIV/AIDS prevention programs, see "Facts about CDC's Role in HIV and AIDS Prevention."

Appendix C: Questionnaire

QUESTIONNAIRE

Topic: The Influence of Pre-conceptual and Perceptual understandings of HIV/AIDS: A Case study of Ugandan Biology Classrooms.

**By Dr. Samson M. Nashon, Assistant Professor and
Harriet Mutonyi, Research Assistant**

Note

This questionnaire is part of a study that aims to elicit Ugandan form three biology students' pre-conceptions and perceptions of HIV/AIDS prior to instruction about HIV/AIDS. Your views about HIV/AIDS are important to the effective planning and implementation of instructions about HIV/AIDS.

Answer all questions by writing your responses in the spaces provided. There is no wrong or right answer.

You may complete the questionnaire at home or in the dormitory and return it sealed in the attached envelope to your biology teacher during the next class. It should take not more than one hour to complete. Make no identification marks on the either the questionnaire or the envelope.

Participation in this part of the study is voluntary. You may withdraw from participation at any time without giving reason and with no consequence.

Your participation in this study is completely voluntary. You are free to withdraw from this part of the study at any time.

Complete the attached personal information section attached if you wish to participate in clarification seeking follow-up interview about your questionnaire responses.

Completing this questionnaire will be considered consent to participate in this part of the study.

Personal Data (Tick the box that apply)

Your school: Boarding Day Public Private

Your gender: Female Male

Your Province of birth in Uganda: East West North
South Central Other

Your type of school: Boys Girls Mixed

Questions

- 1 (A) Below are some of the media through which the public is educated about HIV/AIDS. How would you rate each medium's effectiveness in disseminating information about HIV/AIDS? Tick your rating next to the medium Please indicate the language commonly used in each media.

Medium		Language used in conveying message
Radio		
Drama		
Television		
Local leaders		
Newspaper		
Posters		
T-shirts		
Television		
Billboards		
Church/Mosque		
Health centre		
School clubs		
Parents		
Other (specify) _____		
Other (specify) _____		

(B) Considering all the media in (A) above, which one would you consider to have had:

(a) The most effect on the way you perceive HIV/AIDS? Why?

(b) The least effect on the way you perceive HIV/AIDS? Why?

2. For each medium in the table below, write the slogans or expression about HIV/AIDS that you have yourself heard.

Medium	Slogan/Expression about HIV/AIDS
Radio	
Drama (Funniest)	
Television	
Newspaper (One you have frequently read)	
Posters (Most encountered)	
T-shirts (Most available)	
Television	
Billboards (Most encountered)	
Health centre (Nearest and outstanding)	
Other (specify)	

3. When you hear about HIV/AIDS, what terms/words/phrases come to your mind to express your thoughts or feelings about the disease? Write the terms in the ovals below.

4. In your daily interaction with your peers, friends, relatives, elders in your community and others you might probably have heard or shared a story about HIV/AIDS. Write down at least three phrases or slogans that you would consider being effective in expressing the seriousness of HIV/AIDS

(a) _____

(b) _____

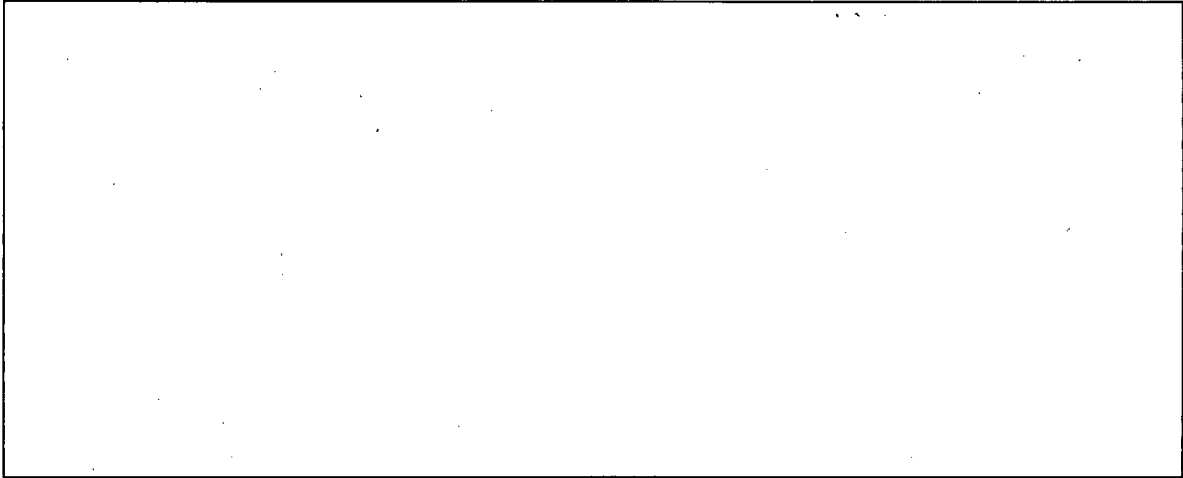
(c) _____

5. Given an opportunity, how would you explain HIV/AIDS to someone who has never heard about the disease?

6. What would be your own slogan for HIV/AIDS? Illustrate in a cartoon form the message your slogan would convey about HIV/AIDS. Explain the message your cartoon is conveying.

Your slogan _____

Draw cartoon in the box below



7. What do /don't you like about the way messages regarding HIV/AIDS are conveyed in Uganda? Why

Like

Don't like

8. Based on your own experiences and those you have seen in your community, what would you consider to be the common methods of transmission of HIV/AIDS? Tick Yes for all those that apply or No for all those that don't apply and give your own reason

Method of transmission	Yes	No	Not sure	Reason
Mosquito bites				
Housefly bites/eating contaminated foods				
Blood tests				
Sharing utilities like toilet/bathroom/plates with infected persons				
Sharing bathing sponge/towel with infected persons				
Talking to infected people				
Shaking hands with infected people				
Sharing beddings with infected persons				
When near a coughing HIV/AIDS patient				
Infected mother to child				
Prostitution				

Unprotected sex with infected persons				
Sharing sharp objects				
Smoking				
Kissing				

9. What would you expect to learn in a biology lesson on HIV/AIDS?

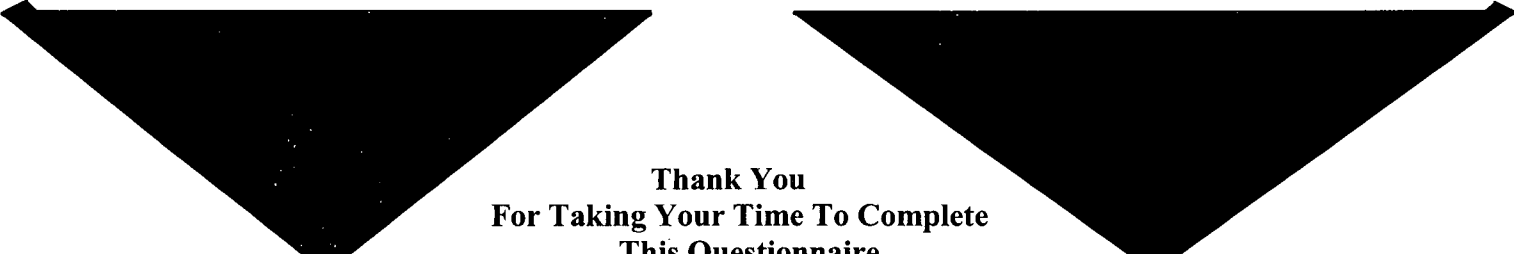
10. With whom would you feel free to discuss the subject of HIV/AIDS and sex? Why? Tick all that apply. Give a reason.

Person	√	Reason
Mother		
Father		
Auntie		
Uncle		
Brother		
Sister		
Doctor		
Teacher		
Male friend		
Female friend		
Grandmother		
Grandfather		
Other (specify)		

11. In your view, what is the cause of HIV/AIDS?

12. What preventive methods have you heard being advocated for preventing the spread of HIV/AIDS? Tick all that apply.

Method	√
Abstinence	
Being faithful to one sexual partner	
Condom use	
Circumcision	
Family planning	
Blood tests	
Bathing after sexual love affair	
Having sexual love affair with a virgin	
Having love affair during menstrual periods	
Other (specify)	



**Thank You
For Taking Your Time To Complete
This Questionnaire**

Appendix E: Consent/assent letters

Consent to take part in an interview as part of a study conducted

by Dr. Samson Nashon

Title: The influence of pre-conceptual and perceptual understandings of HIV/AIDS: A case study of Ugandan Biology Classrooms.

The purpose of the study is to investigate the nature of Ugandan high school students' pre-conceptual knowledge and perceptions of HIV/AIDS. The study further aims to investigate the nature of metaphorical, analogical and simile-like expressions commonly used in the Uganda popular media and the students' conceptions and perceptions of HIV/AIDS. In addition, this study aims to investigate the impact of students' pre-conceptual knowledge and perceptions of HIV/AIDS on Ugandan form three biology classroom instruction on HIV/AIDS.

Revelations from this study will be invaluable consideration when revising biology classroom instruction on HIV/AIDS. Your responses will sensitize teachers to the wealth of knowledge students in form 3 in Uganda have on HIV/AIDS, creating the need for the teachers to always provide the students with an opportunity to express this knowledge.

You are being asked to take part in this follow-up interview based on your questionnaire responses as part of the study. The interview is meant to provide opportunity for you and the investigator to discuss and clarify some of the information you provided on the questionnaire.

Your identity will be concealed by use of a pseudonym.

Participation in this interview is voluntary.

You are also free to withdraw from this interview at any time without giving reasons and without any consequences.

Audio records will be kept in a locker that only the investigator (Dr. Nashon) and his research assistant will have access. Any information that will be used in any publications, seminars, and other forms of public presentations will conceal your identity by use of a pseudonym.

Records kept on computer will only be accessed using a special code known to Dr. Nashon and his research assistant who will make an undertaking to maintain the confidentiality of the material he/she may access as part of his/her duties of a research assistant.

Participant:

If I have any questions or desire for further information regarding this study, I may contact Dr. Samson Nashon

If I have any concerns about my treatment or rights as a research participant I may contact the Director of Research Services at the University of British Columbia, Dr. Richard Sprattley at (604) 822 – 8598.

Consent:

I understand that my participation in this study is entirely voluntary and that I may decline to participate or withdraw from the study at any time without jeopardy to my status.

I have received a copy of this form for my own records.

I **agree/ do not agree** (cross one) to have the interview session audio-recorded.

I consent to participate in this follow-up interview, which is based on my responses to the questionnaire items that I earlier completed.

Sign _____ Date _____

Full Name _____