

Using HIV&AIDS statistics in pre-service Mathematics Education to integrate HIV&AIDS education

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Abstract

In South Africa, the HIV&AIDS education policy documents indicate opportunities for integration across disciplines/subjects. There are different interpretations of integration/inclusion and mainstreaming HIV&AIDS education, and numerous levels of integration. Integration ensures that learners experience the disciplines/subjects as being linked and related, and integration is required to support and expand the learners' opportunities to attain skills, acquire knowledge and develop attitudes and values across the curriculum. This study makes use of self-study methodology where I, a teacher educator, aim to improve my practice through including HIV&AIDS statistics in Mathematics Education. This article focuses on how I used HIV&AIDS statistics to facilitate pre-service teacher reflection and introduce them to integration of HIV&AIDS education across the curriculum. After pre-service teachers were provided with HIV statistics, they drew a pie chart which graphically illustrated the situation and reflected on issues relating to HIV&AIDS. Three themes emerged from the analysis of their reflections. The themes relate to the need for further HIV&AIDS education, the changing pastoral role of teachers and the changing context of teaching. This information indicates that the use of statistics is an appropriate means of initiating the integration of HIV&AIDS education into the academic curriculum.

Keywords: *integration, HIV&AIDS education, statistics, pre-service teachers, self-study methodology*

Résumé

En Afrique du Sud, les documents de politique de l'éducation concernant le VIH/SIDA indiquent des possibilités d'intégration à travers les disciplines/matières. Il y a des interprétations différentes de l'intégration/inclusion et de la démarginalisation de l'éducation en matière de VIH/SIDA, ainsi que de nombreux niveaux d'intégration. L'intégration garantit que les apprenants sont confrontés aux disciplines/matières comme étant liées. Elle est également nécessaire pour créer et multiplier les occasions offertes aux apprenants d'atteindre des compétences, d'acquérir des connaissances et de développer attitudes et valeurs à travers le programme scolaire. Cette étude utilise la méthode d'autoréflexion au cours de laquelle un éducateur enseignant vise à améliorer sa pratique en incluant des statistiques du VIH/SIDA dans l'enseignement des mathématiques. Cet article se concentre sur la manière dont elle a utilisé les statistiques du VIH/SIDA afin de faciliter la réflexion d'enseignants en formation et les familiariser à l'intégration de l'éducation en matière de VIH/SIDA dans le programme scolaire. Après avoir fourni les futurs enseignants avec des statistiques concernant le VIH, ils ont créé un graphique circulaire qui illustre la situation et ont réfléchi à des questions relatives au VIH/SIDA. Trois thèmes ont émergé de l'analyse de leurs réflexions. Les thèmes concernent la nécessité de plus d'éducation en matière de VIH/SIDA, l'évolution du rôle de conseiller des enseignants et l'évolution du contexte de l'enseignement. Cette information indique que l'utilisation de statistiques est un moyen approprié pour lancer l'intégration de l'éducation en matière de VIH/SIDA.

Mots clés: *intégration, éducation en matière de VIH/SIDA, statistiques, enseignants en formation, méthode d'autoréflexion*

Introduction

Various South African HIV&AIDS education policy documents (Department of Education 1999, 2001, 2002, 2003) set out what is expected of school teachers and higher education educators in integrating HIV&AIDS education into various disciplines. However, these expectations are not offered in conjunction with strategies or guidelines to implement such integration. The need for educators to explore ways of including HIV&AIDS education in disciplines call for the development of new approaches – and these presuppose a specific mindset.

Before educators are able to consider such a possibility, it is important to begin by exploring issues related to the need to initiate integration of HIV&AIDS education into the academic curriculum. The use of data-handling activities to address the need for initiation of integration of HIV&AIDS in the discipline of mathematics is offered as one of the first steps in answering the question: How can the goal of integration of HIV&AIDS education in a discipline be initiated when working with pre-service teachers who are registered for a compulsory Mathematics Education module?

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South African policy documents state that a variety of models may be used for HIV&AIDS education. The models suggested for including HIV&AIDS education in the school or higher education institution curricula range from an integrated model (HIV&AIDS education across the curriculum) to a one discipline/subject area (usually Life Orientation) model. Primary school teachers may consider that the teaching of HIV&AIDS education is only appropriate while teaching a range of health issues and social, personal and physical development in the Life Orientation Learning Programme. To date Life Orientation is not an examinable subject in schools, and it does not enjoy the elevated status (Kollapen, Chaane, Manthata & Chisholm 2006) of other learning areas such as mathematics. Furthermore, the panel who reviewed the National Curriculum Statement (NCS) implementation (Dada, Dipholo, Hoadley, Khembo, Muller & Volmink 2009) points out that the articulation between the foundation (Grades R–3) and intermediate (Grades 4–6) phases is problematic because of the dramatic increase in the number of learning programmes in the intermediate phase. The panel suggests an increase in the foundation phase learning programmes from three to four and a decrease in the intermediate phase programmes from eight to six together with a decrease in the amount of time allocated to health education in the Life Orientation Learning Programme as ‘personal development and social development areas of Life Orientation are part of the general aims of schools’ (Dada *et al.* 2009:9) and need to be infused in the teaching of all subjects. This means that the panel recommends less time to be allocated for teaching and learning about HIV&AIDS education in the foundation and intermediate Life Orientation Learning Programme and that HIV&AIDS education should be integrated in all learning areas in these two phases.

The recommendations of the panel were taken up in the amended NCS (Department of Education 2012) that is implemented in schools in 2012. The amended NCS (Department of Education 2012) now includes the Curriculum and Assessment Policy Statement (CAPS) that replaces the Subject and Learning Area Statements, Learning Programme Guidelines and Subject Assessment Guidelines for all subjects listed in the NCS. In the CAPS document the Life Orientation Learning Area has been transformed and is now known as the Life Skills subject in the foundation and intermediate phases. In the foundation phase Life Skills includes four topics (beginning knowledge; creative arts; physical education; and personal and social well-being), in the intermediate phase Life Skills includes three topics (creative arts; physical education; and personal and social well-being) and in the senior phase (Grades 7–9) Life Orientation includes five topics (development of the self in society; health, social and environmental responsibility; constitutional rights and responsibilities; world of work and physical education).

It is in the personal and social well-being topic that issues related to HIV&AIDS are included in the CAPS. The implementation of the amended NCS (Department of Education 2012) reduces the time for inclusion of HIV&AIDS education due to the limited amount of time (1 h per week in the foundation phase, 1.5 h per week in the intermediate phase and approximately 8 h per year in the senior phase) allocated to this topic. Furthermore, in the foundation and intermediate phases only mathematics and

language will be examined in standardised national assessments. This means that the status of the Life Skills subject in these two phases may be seen by teachers and learners as lower than mathematics and language and teachers may neglect Life Skills teaching and learning in order to spend more time on the subjects that are assessed. The Annual National Assessments for languages and mathematics are supplied by the National Department of Basic Education. In order to promote inclusion of HIV&AIDS issues in mathematics, which is taught for 7 h per week in the foundation phase, 6 h per week in the intermediate phase and 4.5 h per week in the senior phase, possibilities to integrate HIV&AIDS issues in high-status subjects, such as mathematics, need to be explored.

To extend and benefit HIV&AIDS education, it is necessary to encourage teachers to use other options, such as integration of HIV&AIDS into other subject disciplines. In this study, statistics of new HIV infections in the sub-Saharan African region were used as a stimulus for reflection in order for pre-service teachers to see the importance of integration of HIV&AIDS education into disciplines. Teachers and pre-service teachers in particular need to realise that there will probably be HIV-positive children in their classrooms and also children who come from families where HIV&AIDS form a significant part of their daily lives. Each pre-service teacher therefore needs to take cognisance of the influence of HIV&AIDS on the lives of learners and to realise that an important change is required in the pastoral role of the teacher.

Brock and Salerno (1994) developed a cycle of organisational change that highlights the fact that accepting change is difficult. The individual needs to internalise and take on the challenge of change before any positive action occurs. In this research study, a group of pre-service teachers registered for a compulsory Primary Mathematics Education module at a Faculty of Education were given a data-handling mathematics activity that required reflection on issues related to HIV&AIDS education that would influence teaching and learning in a South African context. The reflections of 53 pre-service teachers were collected for this study. They formed a tutorial group of students who were doing data handling as one of the required study topics. The data-handling activity was used to introduce thematic mathematics activities (Van Laren 2009) that include HIV&AIDS education.

After drawing pie charts to display the HIV statistics that showed changes in the estimated numbers of new HIV infections in the 10 regions of the world, the tutorial group of pre-service teachers were given an opportunity to interpret and reflect on the significance of the information, and each to list three different issues that would have an influence on teaching in the South African classroom. The purpose of the data-handling activity was to highlight the fact that the context of teaching and learning in South Africa has changed due to the AIDS pandemic, and that there is a need to integrate HIV&AIDS education across the curriculum.

Locating the study

This article explores how I, a mathematics teacher educator, used statistics to introduce pre-service teachers in a mathematics module to consider how HIV&AIDS would influence the

context of teaching and learning in a South African mathematics classroom. Work with the tutorial group of third-year pre-service teachers was explored after using a data-handling activity which served as a stimulus for reflection on the reality of teaching and learning in the age of HIV&AIDS. By considering HIV&AIDS education in a Mathematics Education module, pre-service teachers were made aware of issues that relate to HIV&AIDS in the classroom. The activity also served as an example of how statistics may be used as a way of exploring issues related to HIV&AIDS with learners in a mathematics classroom.

At the University of KwaZulu-Natal (UKZN), Primary Mathematics Education is a compulsory requirement for pre-service teachers registered for the foundation, intermediate and senior phase tracks in the Bachelor of Education programme. These pre-service students will become teachers in grades ranging from R to 9 (children aged 5–14 years). Grade R–9 learners spend almost one-quarter of their time at school doing mathematics, so while teaching compulsory mathematics in the school curriculum, teachers are in a favourable position to simultaneously provide the appropriate knowledge, skills, attitudes and values for HIV&AIDS education through integration. Furthermore, the integration of HIV&AIDS education in mathematics elevates the status of HIV&AIDS education, since mathematics is considered to be a high-status subject (De Freitas 2006) in the school curriculum. Using a data-handling activity in a high-status subject to initiate integration is considered to be a deviation from the usual Mathematics Education requirements – but is a subtle way of integrating HIV&AIDS education in a mathematics classroom.

This research in Mathematics Education is informed by two theoretical and conceptual frameworks. The first makes use of a 'starting with ourselves' approach through self-study, and the second relates to the notion that addressing HIV&AIDS should become the responsibility of all teacher educators and school teachers.

Self-study

Self-study involves making use of the emerging body of research in teacher education (LaBoskey 2004; Loughran 2004, 2007; Pithouse, Mitchell & Weber 2009) that emphasises the need for teachers and teacher educators to become self-reflective while taking on the challenges of research related to social action. Through teacher educator-led reflections on an activity, I explored the use of HIV statistics in a participatory approach to address the significance of HIV&AIDS, while teaching and learning mathematics classroom education.

Pithouse *et al.* (2009) describe seven key characteristics of self-study from the literature that point to the usefulness of self-study methodology for research on integration of HIV&AIDS education by a mathematics teacher educator. My self-study (Van Laren 2008) satisfies these seven key characteristics by (1) aiming at understanding, describing and improving the practice of pre-service teachers and teacher educators; (2) making use of a variety of methods (including drawing of graphs) to promote the integration of HIV&AIDS education in Mathematics Education from a social justice perspective; (3) being inquiry-orientated, as my teacher/practitioner research is interwoven with social and/or political issues; (4) including experiences and

notions of the 'self' in relation to pre-service teachers as 'others'; (5) involving risk-taking and gaining critical and reflective suggestions through interactions with pre-service teachers; (6) providing opportunities to review what the pre-service teachers and I observe through reflections and (7) aiming at social action and changes to my practice, positions and viewpoints as a mathematics teacher educator.

Integration of HIV&AIDS education

In addition to the teaching and learning of HIV&AIDS education in disciplines or learning areas where the focus is on health issues and social, personal and physical development, teachers need to develop strategies to integrate HIV&AIDS education in other disciplines or learning areas. In the context of AIDS, teachers need to openly and confidently address issues of discrimination and misconceptions and myths surrounding HIV&AIDS. Some teachers are not comfortable with discussing sex-related HIV&AIDS issues (Baxen & Bredlid 2004), but all teachers should be HIV-aware and HIV-competent in everyday classroom interactions with learners. Issues related to HIV&AIDS are complex and require teachers to display particular attitudes when interacting with learners while teaching a discipline. An interdisciplinary approach that explores HIV&AIDS education has a powerful influence on learners, since it is what teachers know, do, care about and believe that has an important impact on the lives of their learners (Hattie 2003).

In order to integrate HIV&AIDS education in mathematics, pre-service teachers need to be competent in the teaching and learning of HIV&AIDS education as well as mathematics. In the vast body of literature on Mathematics Education, there are particular areas of competence advocated for the pre-service teacher curriculum. The seminal work of, for example, Manouchehri (1997) lists competences required in mathematics as subject content knowledge, pedagogical content knowledge and pedagogical reasoning and beliefs. If teachers are, however, introduced to an unfamiliar innovative concept, such as integrating HIV&AIDS into mathematics, they need to believe that the change suggested is necessary. Fullan (2001) points out that the acceptance of new beliefs is significant in the development of curriculum innovations. Attending to the beliefs that pre-service teachers have about integration in the mathematics discipline is an important aspect to consider when promoting the concept of integration of HIV&AIDS education.

The inclusion or integration of one discipline within another may be interpreted and used in a variety of ways. In this research, the theoretical framework suggested by Mathison and Freeman (1997) is adopted. They describe integration as an approach where crossing of disciplinary knowledge borders occurs to achieve a realistic view of knowledge through the use of thematically based activities. In the data handling activity described in this article, an example of an integrated activity for a mathematics classroom is explored. The focus here is on the use of statistics to facilitate pre-service teacher reflection to introduce the need to integrate HIV&AIDS education into a discipline. This formed part of the action that I considered important in my role as a mathematics teacher educator who considers it necessary for all educators to take action and 'do something' to address social issues related to HIV&AIDS (Van Laren 2011).

Methodology

I chose to situate my research within a 'starting with ourselves' framework by selecting my own higher education teaching institution, where I am a mathematics teacher educator, as the research site. Connelly and Clandinin (1988) describe this form of qualitative study as autobiographical, since I investigated my own practice to understand how HIV&AIDS education may be facilitated in Mathematics Education modules that I lecture at a higher education institution. I researched my practice to inform myself about how I can become informed of the issues and concerns of pre-service teachers who will be teaching learners whose daily lives are influenced by HIV&AIDS.

The 'starting with ourselves' methodology is often challenged on grounds of validity and subjectivity, but because of the interactions with other 'selves' within the lecture room situation, I was able to reflect on how I could study the integration innovation 'from the inside'. Studying one's own practice in order to articulate it coherently is also demanding and difficult. In the self-study detailed, descriptive documentation of the research process is a requirement for studying one's actions that facilitate 'reflexive practice' (Bleakley 1999:315).

The manner in which self-study is conducted is not limited to a prescribed method (Loughran 2004), so exploring the phenomenon (integrating HIV&AIDS statistics in Mathematics Education) was viewed through the reflections provided by the pre-service teachers after doing a tutorial activity that I had devised. In self-study, the requirements of validity and reliability (as in quantitative data) are replaced with trustworthiness of the research because the data generated cannot be considered to be 'neutral' and without bias. Feldman (2003) considers trustworthiness to be achieved in self-study through ensuring that the documentation of the research is clear, with detailed explanations of data generation and what are counted as data so I have provided full descriptions of these aspects.

The reflections of the pre-service teachers were used to explore the potential of integrating HIV&AIDS issues in Mathematics Education through using statistics so that I could reflect on ways of improving my practice. Before embarking on my research, ethical clearance for HIV&AIDS integration was applied for and granted by the UKZN research office (Approval number HSS/05119A) as this was the research site. Using pre-service teachers' reflections after doing a data-handling activity, I explored the concerns and issues that they raised. These pre-service teachers will be faced with teaching and learning in classrooms where some learners bear the brunt of HIV&AIDS. One of the activities I prepared for the pre-service teachers to complete as a lecture room activity was the following:

Draw a pie chart for each year to compare the estimated number of adults and children newly infected with HIV during 2000 and 2003 (Table 1).

On the piece of paper provided, reflect on the relevance of this data. Give three different issues that would have an influence on you as a teacher.

Using the HIV statistics, I guided the pre-service teachers towards understanding each of the steps of a statistical survey. The first step, the formulation of the purpose of the survey, was discussed

Table 1. Estimated number of adults and children newly infected with HIV during 2000 and 2003 for the 10 regions of the world.

	2000	2003
North America	45,000	36,000–54,000
Caribbean	60,000	45,000–80,000
Latin America	150,000	120,000–180,000
Western Europe	30,000	30,000–40,000
North Africa and Middle East	80,000	43,000–67,000
Sub-Saharan Africa	3.8 million	3–3.4 million
Eastern Europe and Central Asia	250,000	180,000–280,000
East Asia and Pacific	130,000	150,000–270,000
South and South-East Asia	780,000	610,000–1.1 million
Australia and New Zealand	500	700–1000

in terms of the assumptions or research questions posed by the statisticians, who were interested in the number of adults and children who were newly infected in particular years. The second step, selection of an appropriate, representative sample, led to exploring how these sets of figures may have been obtained and why particular samples of populations were chosen. The third step, collection of data using blood or saliva for testing, was explained (AVERT 2005). The fourth step, organisation of the data in a suitable format, was linked to the format in which the data were presented. The data were tabulated across regions of the world for two different years. The fifth step led to reflection on choice of the type of graph. The importance of choosing a pie chart instead of, for example, a broken line graph was considered. The final step, the use of graphical representation to facilitate analysis and interpretation of data, allowed the pre-service teachers to see a 'picture' of the data.

In the tutorial situation, the pre-service teachers were then given the opportunity to discuss the mathematical meanings of the different ways of representing the data in the 2 years, and also reasons why the estimated 2003 data are represented in the form of a range. When the pie charts were prepared, the pre-service teachers were assisted in using their calculators to work with the large numbers. The meaning of numbers such as 1.1 million was explained. Only after the graphs were drawn did it become obvious that, for example, the number of newly infected adults and children in sub-Saharan Africa constituted more than the number of new infections in all of the other nine regions of the world combined. Only once the graphs had been drawn did the 'picture' clearly reveal that more than 70% of the newly infected adults and children were from sub-Saharan Africa. The 53 pre-service teachers' reflection responses on the relevance of these data for teachers were collected for transcription and analysis. These responses were used to explore the research question: 'How can I improve my practice through including HIV&AIDS statistics in Mathematics Education?' By analysing the responses to the data-handling activity that I devised, I was able to learn more about ways of using HIV&AIDS statistics in mathematics to initiate HIV&AIDS education integration.

Data selection and analysis

The pre-service teachers' reflections were not 'marked' for module assessment purposes. After the reflections had been captured and coded, themes (with categories) were sought to group the responses. The themes emerged from the data, so an inductive process was used to identify them. The responses obtained may be classified as 'thick' and 'dense' as the information gleaned from the reflections could be accommodated and categorised within the three identified themes, which made it possible to draw a clear picture of inter-relatedness and intra-relatedness among the various issues. When coding the reflections, there came a point where no new categories evolved, since all were comfortably accommodated within existing categories of the three themes. The analysis resulted in an in-depth picture of the network of relationships within and among the various issues (Myburgh & Poggenpoel 1995).

Findings

The three themes that emerged from the reflections of the pre-service teachers centred on issues of 'education and statistics', 'teachers' pastoral role' and 'teachers becoming infected'. The three themes and categories that make up the themes can be seen in Table 2.

Evidence of the three themes will now be provided using selected quotations of pre-service teachers' reflections.

Theme 1: Education and statistics

Most reflections were linked to the need for teachers in sub-Saharan Africa to educate learners about prevention, causes, spread, effects of the disease and awareness of HIV&AIDS – so the pre-service teachers considered their role as an educator as being important and valuable in relating to issues of HIV&AIDS. One pre-service teacher concluded that 'Education plays a major role in trying to prevent this disease from spreading even further'.

The number of newly infected people in sub-Saharan Africa caused obvious concern among the pre-service teachers. As one

of them commented: 'The pie chart showing the estimated number of people (adults and children) infected with HIV in the year 2000 is an eye-opener.'

Another pre-service teacher wrote that 'The data, although not totally accurate, clearly show alarming statistics. Sub-Saharan Africa has an estimated 3,200,000 adults and children newly infected with HIV during 2003; this is more than the other nine regions combined.'

The pre-service teachers realised that South African teachers will be influenced by the AIDS pandemic, and commented on the large number of people shown in the statistics. One highlighted the distressingly high rate of HIV infection by saying: 'Being a part of sub-Saharan Africa, the statistics provided for 2003 have clearly shown an alarming amount of people infected with HIV.' Another pointed out that sex education usually covers how HIV can get contracted, but 'after looking at statistics they will/should be more conscious of HIV'.

The statistical data also made the pre-service teachers realise that the school curriculum will need to be adjusted to take cognisance of the change in learner population. A pre-service teacher summed this up by saying

The relevance of this data is to inform us, as teachers, how many adults and children are infected with AIDS in the last few years. It is important for us to know this kind of information, because it is going to affect the education system and curriculum that is meant to be taught.

Some of the pre-service teachers saw the need to include HIV&AIDS education in the school curriculum and considered making use of statistics as a way of influencing learners. One pre-service teacher suggested that Life Skills should be integrated into a mathematics lesson to stress the fact that HIV eventually kills, and another proposed that 'the data could be used to design and plan lessons that are related to HIV&AIDS education'.

Theme 2: Teachers' pastoral role

Many pre-service teachers commented on the need to develop a supportive environment for the learners and to respond to the educational and other needs of learners (Department of Education 2000). One of the pre-service teachers explained how the statistics made her feel:

Personally I feel that this data will teach me to treat each life as valuable. It will teach me that life could be short for my students and so therefore I should try and help them to live life to the fullest so I should bring joy and sunshine into the lives of my learners. This data also shows me that many of my students will be without parents, grandparents and maybe they are the 'head' of homes. . .

A number of pre-service teachers considered and reflected on social justice issues that are important in the light of these statistics. One commented as follows:

We have to realise that a large percentage of people in our society and classrooms may be infected and therefore we

Table 2. Summary of themes and related categories that emerged from the reflections of the 53 pre-service teachers.

Themes	Associated categories that statistics exposes
1. Education and statistics	Need for more HIV/AIDS education Importance of taking note of the statistics Influence of statistics on education system
2. Teachers' pastoral role	Changes required in teaching vulnerable learners Recognising the added teaching burdens in the HIV/AIDS context
3. Teachers becoming infected	Perceived personal risks of classroom teaching Teacher shortages Emotional overload of teachers

should learn to be tolerant and non-discriminatory towards these people.

The data-handling activity made pre-service teachers aware of the importance of being caring and committed, as well as of the need to consider counselling of learners who have difficult family circumstances. One of the pre-service teachers reflected on the emotional/mental stability of learners, that would require the teacher to be supportive and approachable, and continued to comment on the problem of family support by stating

Some learners have parents that are infected with the virus. This means that they may not be able to look after the child properly, leading to the child having to deal with housework and food responsibilities. This could affect their schoolwork as they may be tired, hungry and behind in their work.

Theme 3: Teachers becoming infected

The number of newly infected adults and children concerned some pre-service teachers, because of the perceived risk of coming in contact with HIV. The following reflections by two different pre-service teachers point to the fear of working with injured learners:

I would need to be very careful when dealing with people who have injuries at school. I would use gloves and make sure I do not have any sores that could come into contact with the child or adult's sore.

It is also important to consider the number of teachers who are infected with the virus. It is possible that, through no fault of their own, teachers may transmit the virus to their pupils, through natural and normal contact (one open cut to another).

A few pre-service teachers reflected on the possible shortage of teachers that would result from the large number of infected people in sub-Saharan Africa, described by one pre-service teacher as follows:

These figures should also be concerning for the Department of Education as they will be short-staffed with the result that classes will get bigger and the quality of education will diminish as it is very hard to cope with extra-large classes.

Two pre-service teachers reflected on the emotional drain that is felt while teaching in the context of HIV&AIDS. The despair of one is captured in her reflection:

There is no use to go on teaching in such an environment whereby I as a teacher and my learners would be dead soon.

Discussion

The HIV statistics provided opportunities to learn about data-handling stages in Mathematics Education, as well as drawing attention to concerns about issues that would need to be

addressed while teaching in a South African classroom. The table of HIV statistics provided a context/theme for the teaching and learning of Mathematics Education as well as HIV&AIDS education. It was possible to discuss the 'steps' required in a statistical survey, as well as allow for reflection on HIV&AIDS in the classroom environment. The integration approach was achieved through crossing of disciplinary knowledge borders to achieve a pragmatic view of knowledge by using a thematically based activity with authentic data.

Through reflection, the pre-service teachers realised that transmission of knowledge about prevention, causes, spread, the sense of crisis about the HIV&AIDS epidemic and effects of the disease are critical issues for teachers in South Africa. The pre-service teachers' reflections focussed more on social issues rather than sexual issues related to HIV&AIDS. No mention was made of possibilities of 'drug' (needle) infection. This is in keeping with the fact that in South Africa, there are other forms of HIV&AIDS transmission that are probably far more prevalent than drug usage transmission. The pre-service teachers did also not reflect on the issues surrounding protection of learners (both boys and girls) from sexual abuse and rape.

Advantages of using statistics

There does not appear to be comparable literature or research where HIV&AIDS statistics was used in Mathematics Education as a means of furthering HIV&AIDS education. This research is therefore important as Life Skills is the usual subject where HIV&AIDS education is provided in primary schools but mathematics is a high-status subject that takes up almost one-quarter of the teaching time in primary schools. It is thus important for mathematics teachers to be aware of the implications of teaching in the context of HIV&AIDS and encourage them to include HIV&AIDS education.

After working with the HIV statistics in the integrated activity, the pre-service teachers were not asked to extend their reflections to actual action in their future teaching, but they were able to (without being told) highlight specific personal concerns for their learners. The pre-service teachers realised that the 'alarming' and 'eye-opening' statistics would influence their pastoral role. Instead of telling the pre-service teachers that they would need to take on additional challenges while counselling and/or tutoring learners who require assistance with social or learning problems, the pre-service teachers were able to reflect on and offer suggestions regarding the changes necessary to competently fulfil their pastoral roles.

By affording each pre-service teacher the opportunity to reflect on the challenges illustrated by the statistics in the integrated activity, their responsibilities as teachers in South Africa became obvious. Using realistic HIV statistics, the pre-service teachers were given the opportunity to see for themselves that many South African learners will not only be faced with 'medical' problems, but will also experience a multitude of social and educational difficulties.

Some teachers find it difficult to speak openly about sex education, but using statistics is a less 'sensitive' and more 'neutral',

subtle way of approaching other issues related to HIV&AIDS. Issues of gender, poverty, stigma, discrimination, misconceptions and myths are some of those that can be explored in any classroom without direct links to sex education. Use of the statistics is an alternative entry point into considering HIV&AIDS issues, and different from what is usually offered, where the focus is on the 'medical' model.

As a mathematics teacher educator, I confidently and competently work within my discipline, so I 'did something' about the HIV&AIDS pandemic in an area where I was comfortable discussing issues not necessarily related to sex education. Some of the pre-service teachers did, however, speak with me 'confidentially' after lecture presentations, about their individual experiences of being sexually abused. These discussions with individuals were not difficult, since mostly these adult learners just wanted to share their distressing personal experiences and did not expect me to provide solutions to their problems.

Conclusion and implications

By using HIV statistics for reflection, each pre-service teacher was given the opportunity to consider what, where and why it is necessary to adapt and change learning programmes to address possible barriers to learning caused by HIV&AIDS. The necessary changes could be developed from the 'inside', through reflection in a Mathematics Education module. The statistics activity served as a relatively small yet important first step towards introducing HIV&AIDS education in a Mathematics Education module, where the focus was not on the 'medical' model. It provided the bottom rung of the ladder in an explicit manner, with a particular outcome to address beliefs about changes required in the school curriculum in the face of the HIV&AIDS pandemic.

Each pre-service teacher was willing and able to engage in the reflection activity. This first step in encouraging pre-service teachers to see the need to integrate HIV&AIDS education in the classroom was not met with any opposition. Often young South Africans openly say they are 'sick of AIDS' (Mitchell & Smith 2003:513), but by using a statistics activity in a Mathematics Education module it was possible to consider an alternative approach to addressing HIV&AIDS education. Using statistics cannot be seen as being more important than other sources of information in HIV&AIDS integration but as an alternative approach, it may be extended to use in a mathematics classroom. The pre-service teachers actively participated in the HIV&AIDS education reflections required without indicating that they were 'sick of AIDS', so it is possible to include aspects relating to HIV&AIDS education in a module where primary school mathematics subject content knowledge and pedagogical content knowledge are usually the focus.

By using a 'starting with ourselves' approach, I was able to initiate integration of HIV&AIDS education in a high-status discipline and simultaneously improve my practice as a mathematics teacher educator. The compulsory Mathematics Education module was used to extend and benefit HIV&AIDS education without focusing on the 'medical' model. Using the HIV&AIDS

statistics, it was possible to attend to the changes required to promote the inclusion of 'social' issues related to HIV&AIDS education, and simultaneously incorporate these with the subject content knowledge and pedagogical content knowledge expected in the teaching and learning of the primary school mathematics data-handling topic.

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