

# Preparing Science Teachers to Address Contentious and Sensitive Science Topics

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## ABSTRACT

**Purpose:** Despite high HIV prevalence rates in Ivory Coast, the formal K-12 curriculum was not developed to address HIV/AIDS information completely for many African students. The purpose of this study was to identify factors that influenced Ivorian teachers' teaching of the HIV/AIDS curriculum in middle school science curricula in nine middle schools in Abidjan, Ivory Coast. **Methods:** Data collection in this mixed-methods study included a survey and individual interviews with teachers. 140 teachers were surveyed and 39 teachers were interviewed. **Results:** The results indicate that the formal curriculum, teachers' personal beliefs, and lack of teacher preparation in addressing controversial science topics limited the effectiveness of HIV/AIDS education in schools. **Conclusions:** Overall, findings suggest that science teacher education must play a more immediate, fundamental and emancipatory role in shifting science teacher preparation practices to directly address how to teach controversial science topics in ways that are culturally relevant to students. In sum the challenge for pre-service science Ivorian teachers is to receive a decent training that would allow them to handle the responsibilities brought by HIV/AIDS. **Recommendations:** A number of initiatives to consider were presented for in-service teachers and pre-service teachers, including professional development about how to use HIV/AIDS language in a classroom and formal preparation on topics like how to teach in culturally relevant ways about safer sex practices, condom use, and HIV/AIDS in an African classroom context.

**Keywords:** Ivorian Teachers, HIV/AIDS education, Ivory Coast, Gerontocratic cultural beliefs, HIV prevention

## INTRODUCTION

Researchers have shown that teachers' learning at both the pre-service and in-service levels can increase their understanding of their subject matter (Carter & Gonzalez, 1993; Pinnegar, 1988) and increase the effectiveness of certain professional teaching practices (Billings & Halstead, 2013; Lumpe, Czerniak, Haney, & Beltyukova, 2012; Mc Kee, & Eraut, 2012). Students may benefit from teachers addressing contentious topics that can

contribute to healthier lifestyles and informed decision-making. Even though not all teachers feel comfortable teaching contentious topics like HIV/AIDS and sexual behaviors (Page, Ebersohn, & Rogan, 2006), teachers may become better able to do so as a result of experiences in their teacher preparation programs and in-service professional development. In Ivorian school settings there is no health education available to students. Gaining knowledge and background in how to address contentious and uncomfortable science topics

such as HIV/AIDS before encountering these types of situations will allow educators to more effectively provide support to their students who might also be in need of enhancing their health and well-being (Sen, 1999). This means students in turn may be able to apply relevant skills and knowledge received from their teachers, and demonstrate healthy attitudes, take action to protect themselves, and finally be able to promote their own and other's health (Bonell, 2005). Since "excellent teachers transform their own content knowledge into pedagogical representations that connect with the prior knowledge and dispositions of the learner" (Shulman & Quinlan, 1996, p. 409), teaching science teachers how to address a range of topics within the science fields, including HIV/AIDS topics should be one goal of science teacher preparation. Given the reality that "the role of teachers is to help their students make sense of the world" (Silin, 1995, p.225), the inclusion of how to address contentious science topics, including HIV/AIDS prevention messages, within teacher preparation programs could help teachers teach their students to be more sexually responsible and accountable (O'Leary, Goodhart, Jemmott, & Boccher-Lattimore, 1992).

It is clear that teacher knowledge and skill impacts their students' learning (NCTAF 1996; 2013). Teachers' preparation experiences influence their knowledge and skills, and more specifically influence how comfortable and willing they are in addressing sensitive and contentious science topics such as HIV/AIDS information (Klein, et al., 2010). Researchers also have found that "on items on which students did not exhibit misconceptions, teacher subject matter knowledge alone accounted for higher student gains" (Sadler, Sonnert, Coyle, Cook-Smith, & Miller, 2013, p.1020). Hence, teachers' knowledge of their subject matter is very important because it influences their students' learning.

In this study HIV/AIDS and human sexual behaviors are referred to as contentious science topics because in the Ivorian society HIV/AIDS and human sexual behaviors are viewed as cultural taboo topics. It is an Ivorian cultural belief that personal conversation about sex and HIV/AIDS between parents and their children is inappropriate. Because the Ivorian population in general, and by extension, Ivorian curriculum makers view sex and HIV/AIDS information as

taboo subjects, the Ivorian Ministry of Education has not developed curriculum to address HIV/AIDS information completely in the school program. Hence, schoolchildren in Ivory Coast do not receive comprehensive HIV/AIDS and sexual education. If Ivorian teachers were prepared with greater knowledge of content (e.g. HIV/AIDS information) and had a range of skills on how to interact with students around contentious topics, they might be more likely to do so. An important component of effectively teaching about contentious topics in any subject area is providing educators and teachers the opportunity to examine their own beliefs or biases about the topic before they have to teach anyone else about the topic. Using teacher preparation programs as one place to help educators and teachers realize or address bias they may have toward these topics might also increase their effectiveness in working with students about the topics. Such experiences will support both in-service and pre-service teachers in learning to use their teaching practice as a site for inquiry (Ball & Cohen, 1999), a practice that will be useful in developing their practice in general and in improving their handling of controversial science topics specifically.

#### **Ivorian Context**

Sub-Saharan Africa alone accounted for estimated 69% of all people living with HIV (UNAIDS, 2012) and 70% of all AIDS deaths in 2011 (UNAIDS, 2013). In response, despite the fact that a number of initiatives have been launched in various West African countries to educate local populations about HIV/AIDS, the topics are not always addressed as part of the formal K-12 science education African students experience. In the Ivory Coast, there are no health classes available to students, nor are there qualified health education specialists in the school system to teach HIV/AIDS content to schoolchildren. Students have to rely solely on their schoolteachers including both science and civics teachers to learn about HIV/AIDS topics. Part of this might be attributed to the lack of preparation science and civics teachers experience in how to address contentious science topics, both here in the United States and in Sub-Saharan African nations. In the Ivory Coast, the site of this research study, despite the fact that HIV/AIDS became the leading cause of death among adult males and the second leading cause of death among women (UNFPA, 2009) the Ivorian Ministry of Education has not mandated that a comprehensive

HIV/AIDS curriculum be taught in their public schools or their science teacher preparation programs.

The secondary education system in the Ivory Coast lasts seven years overall. Secondary education runs from grade sixth to grade nine and then from grade ten to grade twelve. The first cycle or middle school (grade six to grade 9) has four years of secondary school; students take exams and are awarded the certificate of the lower cycle of secondary study (brevet d'étude du premier cycle - BEPC). After the second cycle of three years of study (which runs from grade 10 to grade 12), graduates earn the baccalaureate, which indicates a level of learning roughly equivalent to one or two years of university study in the United States. After completing the baccalaureate students can attend secondary-level teacher training or be admitted to a normal school (école normale) to become a secondary-level schoolteacher.

Secondary school education is a logical place to reach young students (Page, Ebersohn, & Rogan, 2006), including Ivorian students, about issues related to HIV/AIDS. Few secondary school teachers have accurate information or know how to teach certain issues related to HIV. Understanding the importance of science teachers' HIV/AIDS training is particularly urgent in mitigating Ivorian students' vulnerability to HIV/AIDS.

## PURPOSE

My belief in the need for this study was driven by the idea that science teacher education programs often overlook the importance of preparing K-12 teachers to address controversial science topics such as HIV/AIDS (Brotman, 2009; Silin, 2009). Because contentious science topics like HIV/AIDS fall outside the comfort zone of many science teachers (Baxen & Reidlid, 2004) and are often not addressed through teachers' pre-service education programs, teachers often have an inadequate understanding of content related topics such as HIV/AIDS topics. Unfortunately, teachers' reluctance to discuss contentious issues, like sexual issues (Gallant & Maticka-Tyndale, 2004) has made HIV/AIDS education an uncomfortable one (Quackenbush & Villarreal, 1988).

Pre-service preparation, building on

controversial science topics, could help teachers grasp and teach contentious science topics content from a pedagogical perspective (Wilson, Shulman, & Richert, 1987). As teachers learn to talk about and deal with controversial science topics during their preparation programs, they ask hard questions about themselves and their biases, they create new understandings, and participate in the improvement of teaching and learning (Ball & Cohen, 1999) for all their students. Regardless of initial preparation, "teachers are never fully prepared for classroom realities" (Bartell, 1995, p.28-29). Thus it is essential that pre-service preparation programs find a way to help pre-service teachers connect the content learned in these programs training to the "contexts" of current science classrooms (Dalton & Moir, 1996) where they will conduct their future work.

In order for science teacher preparation programs to effectively prepare teachers about contentious topics, including HIV/AIDS discourse, there should be time to "include theory, demonstration, practice, feedback, and classroom application" (Joyce & Showers, 1980, p. 379) within the curricula used to prepare teachers to teach about the topics. "Teacher education programs could and should perhaps help teachers develop the self-confidence and skills" (Lagemann, 1994, p. 4) needed not only to address issues related to teaching in general, but also to address contentious topics. Given the challenges teachers often face in addressing contentious topics, they may try to avoid discussing them. However, the topics, including HIV/AIDS-related topics, manage to enter their classes, "through the voices of their students" (Silin, 2009, p. 247), whether they have been prepared for it or not. Science education programs should include how to effectively teach about contentious science topics in their curricula to support pre-service teachers learning needs (Barber & Mourshed, 2007). To effectively help students learn about contentious science topics, future teachers have to have extended opportunities and participate in professional study through longer episodes of pre-service education in a clinical setting in order to gain practical experiences in the classroom. In these sorts of settings, "pre-service candidates do experience the real world of teaching with students and classroom issues present. They learn to work with colleagues and to use academic language on the job" (Bowman & Herrelko, 2014, p.63). Additionally, with in-

service teachers, a recurring cycle of study and practice throughout their careers in the form of extended periods of in-service education would prepare them to tackle students' questions about contentious science topics. Researchers have reported that teachers embraced new curriculum materials when they were supported by training and adopted the practices taught in their professional development and in their workshops (Cohen & Hill, 2001). Therefore, the purpose of this study was to investigate factors that influenced Ivorian teachers' teaching of the HIV/AIDS curriculum and the integration of HIV/AIDS topics into the science curriculum. In this study, this research question is explored: What are Ivorian teachers' views on factors that influence the integration and implementation of HIV/AIDS curriculum into the science curriculum?

## METHODS

Here I report the process of designing, conducting, and analyzing data from Ivorian secondary school teachers. The rules of consent, voluntary participation, confidentiality, and anonymity were observed during and after the data collection process. In this study a mixed methods approach was used: both qualitative and quantitative. Using both quantitative and qualitative inquiries here helped me focus not only on each of the study participant's lived experiences about HIV/AIDS, but also in examining Ivorian teachers' teaching performance (Proctor & Capaldi, 2006) of HIV/AIDS and explaining their behavior through the discourse of HIV/AIDS topics within the Ivorian science classroom. Therefore using a mixed methods approach strengthened the reliability of the study because multiple perspectives and multiple data collection points allowed me to verify that the outcomes I found with the study participants were consistent across sources.

### Research Design

This mixed methods paper was written to describe and analyze Ivorian teachers' school accounts of the implementation of HIV/AIDS education within Ivorian schools. All data collection, i.e., document analysis, individual interviews, and surveys, were collected in French, the dominant local language in the study community and translated to English for publication. Since French was the Ivory Coast's official language, most of the participants in this

study expressed themselves in this language. Through my interactions with these participants I was able to identify the teachers' views of their world. Data for this study were gathered through document analysis of sixth grade civics and science curriculum materials, individual interviews, and field notes.

Nine middle schools in two schools districts in Abidjan, Ivory Coast participated in this study. The data included in this study came from 140 teacher survey responses and 39 individual interviews with teachers (13 Science teachers and 26 Civics teachers). In terms of teacher participants, civics teachers are teachers who lacked a degree in biology and never majored in science. They are initially recruited by the Ministry of Education to teach subjects such as French, English, History, Spanish, and Philosophy across the middle and high schools and often teach the HIV/AIDS curriculum by default. Next, an overview of the teacher demographic information is presented. Table 1 presents the distribution of teachers' gender, religion, and years of experiences teaching in the Ivorian school system. In addition, I used purposive or purposeful sampling for science teachers to focus on particular characteristics of their teaching and tried to collect data on their stance on culturally relevant HIV/AIDS curricula.

In short, teachers answered questions about "what is happening?" and "why or how it is happening" (Shavelson & Towne, 2002, p. 99) in these schools. The teacher survey contained 38 questions items that asked for their outlooks on how to best teach topics of HIV/AIDS in their science and civics classrooms. All these survey questions were adapted from the 1989 World Health Organization's practice survey instrument for teachers (Brotman, 2009; Klepp, Ndeki, Leshabari, Hannan, & Lyimo, 1997). Teachers who participated in the teacher survey also took part in the individual semi-structured interviews sessions that lasted approximately one hour. Individual interviews and teacher survey responses were used along with document analysis because I wanted to capture participants' external perspectives through objectivity (Kerlinger, 1986) in order to promote confidence in the outcomes of the study. Individual interviews were conducted with teachers to stimulate discussion about their perceptions of HIV/AIDS education in an effort to seek deep understanding about Ivorian experiences. Furthermore, the discussions

during these interviews focused on knowledge of HIV/AIDS, effective ways to teach HIV/AIDS topics, HIV/AIDS curriculum design, and delivery of HIV/AIDS information in Ivorian school programs. Document analysis was the final data collection method I utilized to gain a fuller picture of the status of HIV/AIDS education within the science curriculum at the nine Ivorian middle schools where I conducted the study. I examined a large volume of documentary evidence, such as the Ivorian previous science and civics curriculum materials and science test materials from different years that were made available to me by the Ministry of Education. These data on the current status of HIV/AIDS education within the Ivorian science curriculum provided valuable insights to the Ministry of Education decisions around HIV/AIDS curricula.

Throughout the data collection process, I used field notes to keep track of more informal interactions with participants as well as to document any observations that might add depth to the interviews. These field notes provided key information about issues or challenges, as well as successes that might arise unexpectedly (Harper, 2000; Merriam, 2009). Using a mixed methods approach allowed me to see if HIV/AIDS education content was addressed in the Ivorian science teacher preparation program.

In this paper I will focus on the results relevant to factors that influence teaching of HIV/AIDS-related content. The teacher survey contained items that addressed factors that influence the extent to which HIV/AIDS content was incorporated into the Ivorian science curriculum. Interval data such as items measured on a Likert scale ran from 1 = strongly disagree to 5 = strongly agree. These Likert scale items enabled participants to indicate their responses on a scale of 1-5. A few items used other scales, where 1= almost never to 5 = almost always or 1 = total lack of confidence to 5 = lot of confidence. Since interval data are data that were continuous and had a logical order, data produced by my participants were sufficiently varied among study participants to make useful quantitative comparisons.

#### **Human Subjects Approval Statement: IRB and Informed Consent**

The Teachers College, Columbia University IRB Office provided human subject approval for this study and the IRB office also reviewed my

informed consent as well, effective March 18, 2014. The IRB number assigned to my protocol was 13-194.

## **RESULTS**

The findings from the study prioritize science education that includes HIV/AIDS science education for all, with emphasis on HIV/AIDS prevention in Ivory Coast. Factors such as having an imposed formal curriculum, traditional African beliefs, cultural beliefs as a result of colonization, the belief of different generations (e.g., elders, adults, youth), influence of religious beliefs, and the influence of personal beliefs have swayed effective development and implementation of HIV/AIDS education in Ivorian school programs. The understanding of these factors mentioned above by pre-service and in-service teachers would ultimately teach them how to implement future HIV/AIDS curricula that build from and include young Ivorian HIV knowledge. Thus, it would indirectly help teachers to grasp how their students' HIV funds of knowledge are formed and shaped. The observational findings are addressed and presented below.

### **Imposed Formal Curriculum**

In the Ivorian sixth grade curriculum documents and interviews with science and civics teachers revealed that Ivorian schools were only minimally involved in HIV/AIDS education. HIV/AIDS has not been integrated into the sixth grade science curriculum, but it has been included in the civics curriculum. HIV/AIDS is seen as a social issue, not as a science issue. Hence, civics teachers teach HIV/AIDS though they have no expertise in HIV/AIDS prevention education. Additionally, many Ivorians believe that it is not the role of the education sector to address the sexual life of young people or the role of schools in contributing to Ivorian students' behavior change, but rather that it is the responsibility of parents. A science teacher added, "HIV/AIDS education at the sixth grade level is not taught by science teachers but by civics teachers who do not have a degree in biology". However, HIV/AIDS was partially covered in the civics classroom and a 50-year civics teacher said, "The number of hours addressing HIV/AIDS was only two hours during the academic school year". Survey responses and document analysis supported this statement. Specifically, teacher survey responses to the questions "How many

times in a week do you teach HIV/AIDS lessons in your class?" ( $M = 1.53$ ,  $SD = 0.64$ ) and "We cover two HIV/AIDS lessons in two hours of class during the school year" ( $M = 4.98$ ,  $SD = 0.25$ ) indicated that HIV/AIDS lessons were taught infrequently. The content of the two lessons focused mainly on sexual abstinence and the preservation of health. A teacher noted that, "the two mandated HIV/AIDS lessons during the school year do not help our students understand HIV/AIDS".

Document analysis of the sixth grade curriculum confirmed that civics teachers (teachers who lacked a degree in biology and never majored in biological sciences) were the primary instructors of the two HIV/AIDS lessons on sexual abstinence until marriage. Furthermore several science teachers were frustrated and disappointed that Ivorian schools did not have expert health educators to effectively teach HIV/AIDS content in the Ivorian school system. Many science teachers called for change and responsible health education within the Ivorian educational program.

Moving HIV/AIDS instruction into the science curriculum would ensure that someone with a background in biology or with content-area expertise would be teaching the lessons. Many science teachers recommended that HIV/AIDS should be integrated and taught in science classes, instead of being placed in the civics education curriculum. For example, one teacher proposed, "HIV/AIDS education has to be programmed as a stand-alone academic school subject and taught from sixth to twelfth grade." Another science teacher argued that only science teachers should teach HIV/AIDS topics and that the Ministry of Education should support the creation of a HIV/AIDS course for Ivorian schoolchildren that will run in secondary school from grade six to grade twelve:

"I know that the civics teachers only talk about abstinence because it is easy to teach, but this information on abstinence can't change student sexual behavior. Honestly the Ministry of Education needs to create a new school subject called HIV/AIDS Education or to just include HIV/AIDS education into the science curriculum and let us [the science teachers] teach it because we understand HIV/AIDS topics better than the civics teachers."

The results of this mixed method study revealed that several factors, both outside and

inside the school contributed to the way HIV/AIDS content was or was not taught within either the science or the civics curriculum. The teacher survey had four items that addressed factors that influence the extent to which HIV/AIDS content was incorporated into the Ivorian science curriculum (Table 2).

The results from the first three items, "My school is doing everything possible to provide me with educational materials about HIV/AIDS" ( $M = 1.14$ ,  $SD = 0.42$ ); "The current science teaching materials are effective in helping students develop HIV/AIDS prevention skills and a deep understanding of HIV/AIDS" ( $M = 1.67$ ,  $SD = 0.60$ ); and "At my school, there are enough official HIV/AIDS documents available for teachers to teach from" ( $M = 1.2$ ,  $SD = 0.83$ ). The teacher survey responses specified that science teachers shared the view that the Ivorian Ministry of Education and its schools were not doing all they could to provide teachers and schools with HIV/AIDS education materials. Additionally, teachers expressed low regard toward their current teaching resources in relation to HIV/AIDS, indicating these resources were ineffective in helping Ivorian students develop prevention skills and understanding of HIV/AIDS topics. In sum, all teachers rejected the idea that there were enough official teaching HIV/AIDS resources available to them to properly teach HIV/AIDS content.

### **Lack of Training**

Factors such as the lack of training about HIV/AIDS coupled with the lack of teacher content knowledge about HIV/AIDS have enabled them to implement just two prevention initiatives such as abstinence and a "Be Faithful" campaign. The fourth item of the teacher survey, "I struggle to teach the topic of HIV/AIDS in the civics and science classroom because I have not had the necessary training to properly teach it" ( $M = 4.91$ ,  $SD = 0.52$ ), revealed the majority of the teachers strongly agreed that the lack of training on HIV/AIDS impacted their abilities to teach HIV/AIDS topics.

In Ivory Coast, science teachers are trained at a local teacher-training college also known as a normal school (*école normale*). Secondary science teachers receive a fairly general training in earth science, physical science, and in biological science. Findings from this study also revealed that science and civics teachers did not receive extensive HIV/AIDS education course-

work while they were enrolled in their teacher science education program. Data revealed that in terms of the number of courses these teachers took during their teacher preparation program that addressed topics of HIV/AIDS, 93% of them had zero, 2% of them had 1, 2% of them had 2, 2% of them had 3, and 1% of them had 4 or more. However, teachers strongly agreed that the more HIV/AIDS content knowledge they had, the more likely they would be able to cover topics of HIV/AIDS in their classrooms ( $M = 4.98$ ,  $SD = 0.25$ ) (Table 3).

On the survey items including, "What degree of confidence do you have teaching HIV/AIDS content?" ( $M = 1.87$ ,  $SD = 1.02$ ) indicated that science teachers shared the view that a strong preparation would contribute to confidence in teaching controversial science topics like HIV/AIDS content. These teachers indicate that teacher training affects their content knowledge, which in turn influences instructional quality. The majority of these teachers held the view that having a broader and deeper content knowledge about HIV/AIDS could help them to be better align the HIV/AIDS content covered with the science curriculum. Civics and science teachers strongly agreed that the more HIV/AIDS content knowledge they had, the more likely they would be to cover topics of HIV/AIDS in their classrooms ( $M = 4.98$ ,  $SD = 0.25$ ). Teachers almost unanimously agreed that the more HIV/AIDS training they received, the better prepared they were to talk about HIV/AIDS notions ( $M = 5.00$ ,  $SD = 0.00$ ).

A seven-year science teacher was particularly astute in recognizing that a lack of preparation to teach HIV/AIDS content meant that effective instruction depended on professional development and teaching materials. He reasoned that, "having a degree in biology does not make you an expert in HIV/AIDS education. Science teachers should have been given the proper resources about HIV/AIDS and ultimately the proper training about HIV/AIDS". A science teacher said the following:

"I do cover HIV/AIDS concepts in a superficial way because when I was in college, my teacher preparation program in science made no mention of HIV/AIDS education at all. It is really hard to teach something when you have no real training in it."

Additionally, a ten-year veteran teacher reported:

"I am feeling less comfortable and confident in teaching the eleventh grade HIV/AIDS lessons that are currently required in the Ivorian curriculum. I am struggling because I am missing the right HIV/AIDS terminology."

Interview data indicate that teacher comfort and knowledge about HIV/AIDS topics greatly affects their willingness to discuss approaches outside the abstinence-only mandated curriculum. Moreover, teachers who report having more preparation specifically related to teaching HIV/AIDS content, have many ways of communicating adequately with their students about HIV/AIDS concepts. A ten-year veteran science teacher shared the following:

"I spent most of my professional life learning about HIV/AIDS because I did not want to become an HIV/AIDS statistic. So I read a lot about this disease and perfected my teaching craft about HIV/AIDS. Now I am really at ease talking about HIV/AIDS to my students. I am well informed and comfortable with any issue related to HIV/AIDS and sex. I did not wait for my government to give me professional development about HIV/AIDS to start learning how to teach HIV/AIDS in my science class."

On the contrary, teachers with less preparation have some difficulty talking about HIV/AIDS in their classrooms. A 54-year-old female science teacher recognized that, "With HIV/AIDS I don't know which vocabulary words to use without sounding like a pervert." Another 38-year-old science added, "With HIV/AIDS, I am totally convinced that my students think that I am without good morals."

Although science teachers have a degree in biological science in the Ivory Coast, many of them understood their discomfort with HIV/AIDS content and they agreed that their uneasiness with HIV/AIDS topics made them choose abstinence education over human reproductive system education. One female science teacher said, "I don't have many ways of communicating adequately with my students about HIV/AIDS concepts." A second-year science teacher confirmed that "I don't have any satisfaction teaching HIV/AIDS content and I am sure my students sense that because I don't spend a lot of time on these HIV/AIDS concepts." Another science teacher noted that, "I feel sorry for the Ivorian student because there is no discussion

of HIV/AIDS information within the Ivorian science curriculum at the sixth grade level.”

### Teachers' Personal Beliefs

Teaching about HIV/AIDS provoked too many tensions within the science classrooms. Teachers reported that HIV/AIDS caused too many disturbances, classroom management problems, and insubordination from their students. A third year science teacher shared that “he was overwhelmed by his large classroom size” and believed that asking him “to teach HIV/AIDS lessons to an overcrowded classroom full of teenagers is to add oil onto a large flame.” Teachers claimed they did not have the proper expertise to overcome challenges that result from teaching HIV/AIDS lessons. “When my students hear about HIV/AIDS and sex, their behaviors get out of control,” said a second year teacher. Another third year science teacher revealed, “When insubordination surfaces in my classroom during my HIV/AIDS lesson, I respond with a lot of emotion and have some difficulty keeping my cool.” These teachers ultimately believed classroom management problems consequently affected students' learning gains in relation to HIV/AIDS. Furthermore, teacher interview data revealed that to cope with student insubordination, the majority of science teachers acknowledged voluntarily making HIV/AIDS content boring by talking about abstinence. In these instances they used abstinence education in order to keep their students calm and focused. A thirteen-year veteran teacher shared the following:

“In my high school particularly, I have 89 and even 105 students per class. Since the classroom is too overcrowded, it is hard to talk about HIV/AIDS because of its connection with sex and condom use. It is also hard to talk about HIV/AIDS and sex without arousing students, getting them to act out in class, and causing them to seek negative attention. My solution to insubordination is to bore my students with abstinence education.”

### Teachers' Religious Beliefs

In Ivory Coast, the role of condoms in preventing HIV infection is ignored in the Ivorian HIV/AIDS curriculum. Therefore, there was an ambiguous relationship that continued to persist between religion and HIV/AIDS. Many teachers who are religious viewed HIV/AIDS (as an illness) as a punishment from God. For example there is a deliberate attempt by many teachers

who are deeply religious to impose their moral code of conduct on their students regarding sex, condom use, and HIV/AIDS. Interview data from teachers revealed that the influence of Catholicism and Christianity in Ivorian culture shaped curriculum development, leading to abstinence based-education. Individual interview data from several science and civics teachers who were religious revealed that they only adhered to the ideas that abstinence is the only approach that should be taught. A civics teacher who described herself as a devoted Catholic revealed this, “I am too embarrassed to even mention words such as sex and condoms, HIV/AIDS to a bunch of young sixth graders in my classroom. My faith won't allow me to do. So I skipped the condom part and concentrated on abstinence until marriage.”

### Gerontocratic Cultural Factors

Several teachers interviewed expressed strict gerontocratic beliefs, noting that HIV/AIDS topics are not appropriate to discuss between members of different generations, and that students are too young to learn about HIV/AIDS content. In this paper, the influence of elders on Ivorian life is referred to as “gerontocratic culture” (Ado & Mensah, 2015). The concept of gerontocracy is defined as “rule by elders; specifically: a form of social organization in which a group of old men or a council of elders dominates or exercises control”(m-w.com). One study participant defined gerontocratic culture as “a process of viewing the world through the eyes of an old person”. A civics teacher reported that:

“The discussions about sex, condoms, and HIV/AIDS are considered as taboo subjects in my cultural traditions. Because of these taboos associated with HIV/AIDS, I am very shy and uncomfortable talking and addressing issues related to HIV/AIDS and sex to my sixth graders.”

Another teacher added:

“We are not comfortable teaching about HIV/AIDS because of our gerontocratic cultural views, in fact in our culture, schoolchildren are too young to engage in sex and HIV/AIDS talk. Sex and HIV/AIDS should be reserved for adults and as such talk should take place exclusively between mature adults, not between children and adults.”

These cultural beliefs are not isolated beliefs. These beliefs are deeply held within the fabric of



the Ivorian society and are fairly commonplace in the Ivory Coast.

## CONCLUSIONS

In sum, teacher preparation programs need to address the logistical challenges of huge class sizes, immature students, since the HIV language of teaching brings about many classroom disruptions. Results from this study seek to contribute to a larger picture of research issues associated with science teacher education in the age of HIV/AIDS within African school settings. This study adds to an understanding that professional training in teaching HIV/AIDS topics is nonexistent in teacher education programs in the Ivory Coast. Limited preparation in addressing HIV/AIDS and health related topics affect the quality of HIV/AIDS instruction students receive from their teachers. To ameliorate this problem, "New entrants to the field, who want and need practical know-how, might be offered more clinical work and "methods" (Lagemann, 1994, p. 3) in science curricular content. Perhaps, coaching pre-service science teachers how to teach HIV/AIDS content and in-service teachers how to coordinate HIV/AIDS curricula implementation could trigger some excitement in teachers for learning about new ways to address relevant, yet contentious topics within their classrooms. Such excitement for learning could trigger a "can do" (Marzano, 2000) HIV/AIDS teaching mentality. Although this study does call attention to the necessity of teacher-education curricula reform, "doing that will also be necessary if experimentalism in education is to endure" (Lagemann, 1994, p. 3). "In the context of total teacher education programs" (Anderson & Mitchener, 1994, p.31), the challenge for pre-service science teachers in the United States and the Ivory Coast is to receive a decent training that would allow them to handle the responsibilities brought by HIV/AIDS. Teacher preparation programs have to engage in systematic reform by including controversial topics in their methods courses so that pre-service teacher candidates can use them in their teaching toolboxes. Pre-service "teachers cannot create and sustain contexts for productive learning" (Sarason, 1996, p. 367) unless teacher preparation programs use creative strategies with reference to HIV/AIDS related-issues for their pre-service teacher development.

## RECOMMENDATIONS

Professional development about how to use HIV/AIDS language in a classroom for in-service teachers and pre-service teachers can be recommended to offer them tips about how to properly manage their students' behaviors while teaching content such as safer sexual practices, condom use, and HIV/AIDS in large classes. Findings from this study indicate that there are several implications for teacher preparation programs interested in better preparing educators to teach controversial topics. To make sure that all pre-service teachers receive adequate preparation to deal with controversial science topics within their classrooms, teacher preparation curricula must include the following activities: (1) opportunities to engage in and learn about the content of contentious subjects (e.g., HIV/AIDS information) and (2) instructional strategies, including problem-solving and coping skills, for pre-service teachers to effectively implement curriculum related to contentious topics (e.g., sex and HIV/AIDS). If pre-service teachers never experience activities related to contentious topics, they have difficulty navigating them inside their classrooms.

Little is known about what constitutes effective teaching about contentious issues in science. The obvious implication is that what pre-service teacher education candidates learn in teacher education classrooms does make a difference in terms of teachers' knowledge and particularly their understanding of controversial science topics. This study raised a number of curricular and pedagogical directions that could be addressed within the teacher preparation programs. Specification of learning outcomes and assessments for future teachers should incorporate discussion of sensitive and contentious issues. Hattie (2009) concluded that when "using particular [HIV/AIDS] teaching methods" (p.126), both pre-service and in-service teachers could make a difference after they have mastered "a broad repertoire of instructional strategies to help students accomplish their learning goals" (Goodwin, 2011, p. 19). Until pre-service teacher candidates' learning experiences in controversial science topics evolve to match their understanding of contentious science topics, they will struggle teaching their subject matter. To successfully enhance pre-service teachers' engagement with HIV/AIDS, teacher education programs need to encourage them to take a

cross-curricular approach in planning their science lessons. By showing them how to develop cross-curricular activities that are culturally relevant, as well as fun and motivating, these pre-service candidates can easily integrate health content (e.g HIV/AIDS) into science. Future interventions should incorporate some of the following implications for teacher education course design and teaching practice in teacher preparation contexts.

The primary implication this study would have for teacher preparation programs is to suggest quality science education courses that incorporate controversial science topics. For example, providing pre-service teacher education candidates with opportunities to deepen and analyze their knowledge of HIV/AIDS through a range of creative and participatory strategies can enhance their development and engagement with HIV/AIDS related issues. To help science teacher education in an era when a range of controversial science topics are evident in daily life, we recommend that pre-service teachers be exposed to reading content that might teach them how to address these topics in the science classroom. To help them become more effective teachers, pre-service teachers can be taught to research scientific and culturally relevant responses to whatever controversial topic they are addressing. Then, they can be encouraged to use strategies like metaphor drawings as a novel possibility of integration HIV/AIDS in science (Mitchell, Wash, & Moletsane, 2006). The science teacher preparation programs should make sure that their pre-service teachers have a chance to engage in debates over the role of the teacher in facilitating ethical dialogues about a range of controversial topics. A production of autobiographical and various literacy texts (Mitchel, Weber, & O'Reily-Scanlon, 2005) in connection to pre-service teachers' own teaching contexts and practices and the controversial science topic can place them at the center of their own learning. Any teacher preparation program hoping to play a role in addressing challenges of controversial science topics like HIV/AIDS should provide opportunities for its pre-service students to be involved in many role-playing scenarios (Walker & Zeidler, 2007). Having pre-service teachers participate in creating and analyzing role playing scenarios is an authentic way to explore what could otherwise be uncertain teaching situations. These types of teaching activities are as

valuable strategies for opening up reflection and discussion (Simonneaux, 2001) amongst the pre-service teachers. These conversations could also serve as models for later interactions with K-12 students.

Additionally addressing pre-service teachers' existing knowledge and beliefs about teaching controversial science content, allowing these prospective teachers to share their moral and religious values, and conducting debates about teaching sensible content related to sex and HIV/AIDS is an excellent way for these pre-services teachers to realize existing bias in their own beliefs, as well as to organize information in order to create engaging lessons and meaningful activities for their students. A combination of mastering what to teach and how to teach it during university preparation programs may remove "many of the barriers to delivering quality instruction" (Griffin, 1989, p.397). Because "content is difficult for many to grasp, even with some exposure" (Moats, 2014, p.75), teacher preparation programs must set high standards with regard to content mastering and pedagogy. The pre-service settings must prepare teacher candidates to answer students' questions and concerns about controversial science topics that will arise in their classrooms. By infusing health issues, including HIV/AIDS topics, into science teacher preparation programs, there is hope that pre-service teachers will improve learning outcomes for their students. It is essential that teacher preparation serves as a catalyst for helping pre-service science teachers to take action around controversial science issues like HIV/AIDS that can impact their everyday lives as science teachers (Pain & Francis, 2003). Pre-service teachers must consider how to answer the inevitable questions that will arise in relation to controversial science topics before they are on their own, in the classroom. If teacher education programs do not support deep thinking, role-playing, and risk-taking around how to address controversial science topics in culturally relevant ways, there is little hope that they will overcome the challenges of meaningfully addressing sensitive and contentious topics in their future classrooms.

Another implication for this study is that teacher preparation programs need to support their pre-service teachers in learning how to access HIV/AIDS resources to supplement the imposed curriculum. Since the Ivory Coast's

Ministry of Education has not provided a formal curriculum on HIV/AIDS topics, teachers themselves are in a position of locating their own resources. Thus, preparation programs must support their pre-service teachers in learning how to access and evaluate HIV/AIDS teaching resources that will allow them to dispel HIV/AIDS myths and misconceptions, and to stimulate and maintain Ivorian students' HIV/AIDS knowledge gain (Yuntadilok, Timmuang, Timsard, Guadamuz, Heylen, Mandel, & Ekstrand, 2014). The Ivorian Ministry of education can warrant that funds be available to teachers to organize field trips to HIV/AIDS treatment centers so that Ivorian students can interact with actual people living with HIV in order to make HIV/AIDS relevant to them. Finally the Ivorian Ministry of Education has to make sure that schools have electricity and other resources such as televisions or classroom projectors so that teachers can show movies on HIV/AIDS to their students.

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**Table 1. Characteristics of teacher sample population (n= 140)**

School Number	Total Participants	Gender		Religion					Years of Experience Teaching in the Ivorian Education System			
		Male	Female	Christian non-Catholic	Catholic	Muslim	Atheist	None of these	0-1	2-5	6-9	10+
1	9	6	3	4	3	1	0	1	0	2	3	4
	6%	67%	33%	44%	33%	11%	0.0%	11%	0.0%	22%	33%	44%
2	10	5	5	1	3	5	0	1	0	2	1	6
	7%	50%	50%	10%	30%	50%	0%	10%	0%	20%	10%	60%
3	10	6	4	2	4	3	0	1	1	1	5	3
	7%	60%	40%	20%	40%	30%	0%	10%	10%	10%	50%	30%
4	16	8	8	6	4	6	0	0	9	2	1	4
	11%	50%	50%	38%	25%	38%	0.0%	0.0%	56%	13%	6.3%	25%
5	10	7	3	4	2	3	1	0	8	0	0	0
	7%	70%	30%	40%	20%	30%	10%	0%	100%	0%	0%	0%
6	46	32	14	16	17	11	0	2	13	7	8	18
	33%	70%	30%	35%	37%	24%	0%	4%	28%	15%	17%	39%
7	11	8	3	3	5	3	0	0	1	1	1	7
	8%	73%	27%	27%	46%	27%	0%	0%	10%	10%	10%	70%
8	12	8	4	4	6	2	0	0	0	4	4	2
	9%	67%	33%	33%	50%	17%	0%	0%	0%	40%	40%	20%
9	10	5	5	2	5	3	0	0	0	4	3	3
	7%	50%	50%	20%	50%	30%	0%	0%	0%	40%	30%	30%
Total	140	85	49	42	49	37	1	5	32	23	26	47
		63%	37%	31%	36.6%	27.6%	1%	3.8%	25%	18%	20%	37%

Note. Some teacher respondents who took the survey did not answer all the questions creating some missing variables in the data.

**Table 2. Factors that Influence Teachers' Use of HIV/AIDS Curriculum in the Ivorian School**

Item	N	M	SD
1. My school is doing everything possible to provide me with educational materials on HIV/AIDS.	138	1.14	0.42
2. The current science teaching materials are effective in helping students develop HIV/AIDS skills and deep understanding of HIV/AIDS.	139	1.69	0.60
3. At my school, there are enough official HIV/AIDS documents available for teachers to teach from.	138	1.2	0.83
4. I struggle to teach the topic of HIV/AIDS in the civics and science classroom because I have not had the necessary training to properly teach it.	137	4.91	0.52

Note: Scale of 1-5: strongly disagree to strongly agree.

**Table 3. Ivorian Teachers' Outlooks on their Understanding and Comfort with Teaching HIV/AIDS Topics**

Item	N	M	SD
1. The more knowledgeable teachers are about HIV/AIDS the more likely they are going to cover topics of HIV/AIDS	138	4.98	0.25
2. The more HIV/AIDS teacher training is available to teachers the better prepared they are to teach HIV/AIDS.	139	5	0.00
3. How many college HIV/AIDS science courses have you taken?^	139	1.19	0.79
4. What degree of confidence do you have teaching HIV/AIDS content? *	138	1.87	1.02

Note: Scale of 1-5: strongly disagree to strongly agree.

^ Scale of 0-4+ courses

\*Scale of 1-5: Total lack of confidence to a lot of confidence.