‘KNOWLEDGE’ AND ‘ATTITUDE’ OF PRE-SERVICE TEACHERS IN SOUTH AUSTRALIA TOWARDS SEXUALLY TRANSMISSIBLE INFECTIONS (STIs) AND OTHER BLOOD-BORNE VIRUSES (BBVs)

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Glossary of Terms

Sexually transmissible/transmitted infections (STIs)	Invasion of and multiplication in bodily tissue by a microorganism (e.g., bacterium, virus, protozoan) that is usually (more than half the time) passed from one person to another during intimate bodily contact meant to give or derive sexual gratification (Shuford, 2008, para. 2).
Sexually transmissible/transmitted diseases (STDs)	Pathology (i.e., damage) with or without symptoms secondary to an infection that is usually (more than half the time) passed from one person to another during intimate bodily contact meant to give or derive sexual gratification (Shuford, 2008, para. 3).

Note: According to Shuford (2008, para. 1), these terms are often confused but they are not inter-changeable with sexually transmissible/transmitted infection being the broadest term. She further asserted that "all STDs are STIs, but not all STIs are STDs". Hence, the acquisition of infection (or the pathogenic organism) can be referred to as a STI, whereas a disease manifestation (part of the body malfunctioning because of a STI) is a STD (Fitch & Cox, 2005). Therefore, throughout the thesis, these terms are used as fitting to the context and not interchangeably as suggested by Shuford. This also justified the title of the study as incorporating the term 'STIs' and not STDs.

Blood-borne viruses (BBVs)	HIV (Human immunodeficiency virus, a retrovirus, family *Retroviridae*), hepatitis B virus (family *Hepadnaviridae)* and hepatitis C virus (genus *Hepacivirus*, family *Flaviviridae*) though often spread sexually, are grouped under the category of blood-borne viruses on the pretext of the establishment of a viremia in which the infectious virus circulates in the blood, with the primary means of transmission being an exposure to contaminated blood or other bodily fluids, such as occurring in a therapeutic blood transfusion, the usage of hypodermic injections and intravenous drug use (Strauss & Strauss, 2008, pp. 1-32).

Note: Hepatitis C, however, is not primarily sexually transmitted (see Chapter 4). Therefore, it would have been erroneous to place this disease under the broad heading of STIs/STDs. Accordingly, HIV, in spite of being considered as a BBV was clubbed under its causative agent - a virus, and hence 'Viral STIs/STDs', to ease categorization (Chapters 3 and 4). Moreover, since the BBVs are also essentially viruses, hence the term 'other' was introduced before BBVs to distinguish this cohort from the 'Viral STIs/STDs'. This accounted for the second terminology 'other BBVs' in the title of the study and considered as separate from the first 'STIs'.

Knowledge	Knowledge in a subjective or intersubjective sense is the total sum of beliefs to which an individual or a group may subscribe (Bar-Tal & Kruglanski, 1988, p. 3).
Attitude	attitudes... [are]... a state of readiness or predisposition to respond in a certain manner when confronted with certain stimuli...attitudes are reinforced by beliefs (the cognitive component), often attract strong feelings (the emotional component) which may lead to particular behavioural intents (the action tendency component) (Oppenheim, 1992, pp. 174-175).
Pre-service teachers	Pre-service teachers are students enrolled in a university's teacher education program who are working toward teacher certification. The majority of pre-service teachers are undergraduate students in their junior and senior years of college, although there are exceptions including post-baccalaureate or graduate students pursuing teacher certification and individuals pursuing alternative routes to certification and licensure (Braud, 2007, p. 16).

Abstract

The rate of sexually transmissible infections and other blood-borne viruses is high in South Australia. Young people are prone to contracting these diseases who rely on school programs for their health-related behaviours. Health-related behaviours, specifically knowledge and attitudes, can successfully disseminate from teachers to students. Hence, the present study explored the knowledge and attitudes of pre-service teachers in South Australia towards these diseases besides evoking perspectives towards disease-related issues, the role of an effective education thereof, and teacher education in addressing sexual health.

The samples (N = 320) comprised of pre-service teachers enrolled in teacher education courses at higher educational institutions in the State. Data collection from the samples took the form of a cross-sectional survey, both at the pilot and the main stages of study. The pilot study was essential to establishing the validity and reliability aspects of the knowledge and attitude scales of the developed questionnaire, which, however, was also measured at the main stage of analysis. A Rasch item analysis using the Quest Version 2.1 software established evidence of a construct validity and an acceptable reliability of both the scales at either stages of study.

Subsequent data analysis pertaining to the knowledge and attitudes largely depended on the Rasch estimates being non-parametric, and therefore, the application of non-parametric statistics using the SPSS Version 18.0 software. The open-ended perspectives with 272 valid responses, however, underwent a qualitative thematic analysis.

The quantitative analysis revealed a poor level of knowledge (mean score of 18.57 out of a possible 45) and a favourable attitude (mean score of 44.45 out of a possible 51) of South Australian pre-service teachers towards the diseases, with a low to

moderate positive relationship between the knowledge and attitude attributes ($r_s = .196$, $p < 0.01$). School, peers, and mass media campaigns constituted the major sources of information related to the diseases. There were no significant differences of either the knowledge or the attitude scores across the demographic variables gender, highest educational level, subject stream, and undertaking the related curriculum. However, attitude scores varied across age, with knowledge revealing no significant difference as earlier.

The qualitative analysis revealed that the majority of pre-service teachers perceived an information gap and an attitude and behaviour of individuals as primarily responsible for a high disease rate in the State and young people contracting these, respectively. The majority perceived that the related curriculum does not address STI-related issues and that teachers are primarily responsible for the lack of a comprehensive sex education in the State. The majority, however, was largely supportive towards the call for a compulsory sex education. Further, reflecting that they themselves lack adequate knowledge on these diseases, pre-service teachers suggested the introduction of sexual health as a core topic in teacher education.

The findings have implications for educators, policy makers, key stakeholders in the field of sexual health education, and the school and the community to raise awareness of the many areas that adolescents and young adults experience problems in, and particularly related to sexual health.

Keywords: knowledge, attitudes, pre-service teachers, sexually transmissible infections, blood-borne viruses

Declaration

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution to *Joy Talukdar* and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due references has been made in the text.

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Publications arising from the Thesis

1. **Talukdar**, **J**. (2013). The epidemiology of STDs and AIDS in early Australia. *Internet Journal of Sexual Medicine*, *2*(1).
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3. **Talukdar**, **J**., Aspland, T., & Datta, P. (2013). Sex education in South Australia: the past and the present. *Sex Education: Sexuality, Society and Learning*, *13*(1), 107-116. doi: 10.1080/14681811.2012.681037.
4. **Talukdar**, **J**. (2012). The history of sexually transmitted diseases. *International Journal of Medical and Health Sciences*, *1*(3), 83-88.
5. **Talukdar**, **J**., & Aspland, T. (2012). Is the 'Health and Physical Education' curriculum in South Australia enough? A critical review of the SACSA framework and the new SACE curriculum. *Journal of Curriculum and Teaching*, *1*(1), 25-40. doi: 10.5430/jct.v1n1p25.

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Thankfulness is the beginning of gratitude. Gratitude is the completion of thankfulness. Thankfulness may consist merely of words. Gratitude is shown in acts.

Henri Frédéric Amiel (1821-1881) Swiss writer.

Unfortunately, unlike words, the acts of gratitude cannot be painted on paper. Nevertheless, if it is only words that determine the quality of a work thus, then it should also do its job for the players behind the work. Further, how can it be that for a work expressed in quantitative and qualitative terminologies, the words of thankfulness themselves do not reiterate the same?

Accordingly, the first words of thankfulness owes to my education at school and college. The *central tendency* during those years was to skip classes; nevertheless, those attended were sufficient to instil in me the knowledge, skills, and confidence required to pursue a work in the calibre of a thesis.

A good education of a child, in turn, owes a lot to good parents. While my biological parents endowed me with the education that sustains me to date, my acquired parents (parents-in-law) made me believe that 'I can'; however, the quadruple in their constant support and encouragement helped establish a strong and positive *correlation* between my self-concept and self-esteem.

Higher education in a foreign land with different academic and cultural norms, however, can be appalling at times. This proposition was strongly proved against by Professor Tania Aspland, the Principal Supervisor. Not only she served as a *reliable* container of vent emotions, but also proved herself as a distinguished and *valid* expertise in the field. Thriving successfully through the new educational milieu was also rendered possible by the *frequency* of visits to the Co-Supervisor Dr. Igusti Darmawan's lectures, where learning was fun than an anxiety.

Learning itself, however, is incumbent on the successful run of an establishment. It is not only the administrative staff of the establishment but also the colleagues, who, in terms of their guidance, support, motivation, and endurance render a *significant difference* to learning, which in turn is reflected in quality work produced.

The work itself, however, fails to attain quality standards without the active participation of individuals worked upon. Hence, pre-service teachers volunteering for the present piece of work were instrumental in terms of their *range* of responses towards rendering it in its current form and shape.

In addition to the key players to rendering the work successful as above, the dedication, determination, and discipline of the self are perhaps the most crucial determinants of the produce. Frequent *thematic* discussions with the self swayed the mind 'to or not to'; nevertheless, it was the aforementioned determinants that finally won over.

It is not always winning over the self that works - there needs to be a constant inspiration too! How often were the bills paid, the dinner laid, and intangible inspirations conveyed? The other self, the angel in my life, my wife Poulomee, rarely did sway in her emotions even when I did *deviate* from the *standards* of conjugal bliss by committing frequent *errors*. Believe me Poulomee, I did not want to be *mean* and this I prove by dedicating this work to you!!!

> "In spite of parents yielding positive support for a school-based sex education, SA has limited activity in the context of teacher-led sex education." (Talukdar, Aspland, & Datta, 2013, p. 114)

Chapter 1:

The Context of STIs and other BBVs and the Current Study

1.1 Introduction

The rate of incidence of sexually transmissible/transmitted infections (STIs) and other blood-borne viruses (BBVs) is high in South Australia (SA) (The Kirby Institute [TKI], 2011; Sexually Transmitted Diseases Services [STDS], 2009). It is the adolescents and the young adult age groups that are particularly prone to contracting these diseases (STDS, 2009, 2010). Research advocates that Australian secondary students confide in school programs as one of their most useful sources of information regarding sexual health and relationships (Smith, Agius, Mitchell, Barrett, & Pitts, 2009). Health-related knowledge and attitudes can also successfully transfer from teachers to pupils as asserted by Alnasir (2004).

However, the lack of a comprehensive Health and Physical Education (HPE) curriculum presents an opposite picture (Talukdar & Aspland, 2012). Moreover, sex education is not compulsory in SA (Keller, 2010a, b; Talukdar, Aspland, & Datta, 2013), with most of the teachers either ill-prepared (Mitchell et al., 2011) or not prepared (Keller, 2010b) to teach it. This lack of confidence of teachers may well be linked to the improper and inconsistent training of pre-service teachers in the area of sex education (Mitchell et al., 2011).

This chapter, therefore, not only uncovers these problems but makes an argument for the significance of the research. It also outlines the major aims, objectives, and research questions of the study. Further, it draws on the historical perspective of sexually transmissible/transmitted diseases (STDs) and other BBVs in

SA in order to understand the advent and prevalence of diseases in the State. The chapter concludes with an overview of the contents of the other chapters in the thesis. The upcoming section highlights the historical perspective of STDs as setting the background of the research.

1.2 Background of the Study

This section traces the major historical developments related to STDs. It outlines the mention of these diseases in ancient and medieval history, and its advent in early Australia, and more specifically in South Australia. Further, it portrays STD-related statistics and major developments in the field of venereology with respect to South Australia until the 1990s.

1.2.1 Historical Perspective of STDs in South Australia

According to Little (2000), until the late eighteenth century, scientists failed to comprehend that there was more than one kind of STD. They were of the view that all STIs were the same disease and thus termed it collectively, venereal disease (or VD). This was primarily based on the method of contagion with the terminology *venereal* derived from Venus, the Roman goddess of love (Little, 2000). In recent times, however, the more neutral and purely descriptive *sexually transmitted diseases* replace the term *venereal disease*. Nevertheless, syphilis and the others continue to be socially unacceptable diseases (Lewis, 1998).

Talukdar (2012) traced the historical trajectory of these diseases, from its appearance as *venereal* in ancient and medieval history, till the present day form of *sexually transmitted*. He reviewed the mention of gonorrhoea in the medical papyri of Egypt (Hirsch, 1930), the Bible and the Talmud (Preuss, 1978), in Leviticus 15 (Brim, 1936; Preuss, 1978; Waugh, 1990), and scholarly writings of Hippocrates (Morton, 1977) and contemporary Asia (Lancereaux, 1868; Morton, 1977; Pereira &

Ratnatunga, 1965). Likewise, syphilis also had its reference in the Old Testament (Brim, 1936), and in ancient Chinese (Lancereaux, 1868) and Asian medical writings (Lancereaux, 1868; Morton, 1977; Pereira & Ratnatunga, 1965). Both these diseases appeared simultaneously in sixteenth, seventeenth, and eighteenth century medical literature. However, that gonorrhoea and syphilis were separate diseases could only be established in the nineteenth century with the discovery of its causative organisms (Talukdar, 2012).

Talukdar (2012) further noted that the nineteenth century also saw a quickening of medical interest in the second generation of STDs, namely, non-gonococcal urethritis (NGU), trichomoniasis and candidiasis. Thereafter, the etiology of other diseases - *Lymphogranuloma venereum* (LGV), donovanosis, genital herpes, genital warts, and hepatitis came to surface with the development of bacteriology and virology (Talukdar, 2012).

The epidemiology of these diseases in early Australia was also reviewed by Talukdar (2013). He noted that transportation of convicts as early as 1787 and 1790 at Sydney Cove was cited in scholarly writings as the major reason for the advent of VD in this settlement (Fidlon & Ryan, 1979; Hughes, 1987; Inglis, 1974; Lewis, 1998; Royle & Simpson, 1988; Smithurst, 1981; White, 1962). Gradually, VD became one of the most frequent causes of hospitalisation. Hospital admissions and case statistics were reported by the author as evidence to the prevalence of venereal diseases in nineteenth century Australia. The 1980s and the early 1990s also witnessed the rise of the second and third generation of STDs. Talukdar (2013) further found that the incidence of the first Acquired Immunodeficiency Syndrome (AIDS) case reported in Australia, however, was controversial. While the claims for the first reported diagnosed case of AIDS dated back to 1983 (Lewis, 1998), some historians (for

example, Brass & Gold, 1985; Gerrard, McGraham, Milliken, Mathys, & Wills, 1994) considered an undiagnosed case of 1981 as the first AIDS incidence in Australia (Talukdar, 2013).

According to Lewis (1998), SA, never being a penal colony, was founded as a free settlement in 1836 with a population of 546 people which rose to 63,700 in 1850. Records from the Adelaide Hospital 1841-1866 in aggregate terms for the whole period revealed the number of VD cases (syphilis, gonorrhoea and other) to be quite high in comparison to other infections; 648 of a total of 2,771 infectious disease cases or 23.4 per cent (Lewis, 1998). The author reported a downward trend in the STD rates worldwide after the discovery of penicillin. However, the triumph of penicillin was short-lived. In the period of resurgence of STDs in Australia as a whole, gonorrhoeal incidence rose in SA from the later 1960s (Lewis, 1998). In this regard, the South Australian Department of Public Health noted in 1975 that, while the notified incidence for the disease was 93 per 100,000 population for Australia, it was 172 per 100,000 in SA, as reported in Table 1.1 and indicated in bold (Report of Department of Public Health SA [RDPHSA], 1978). The apparent difference was attributed to the larger proportion of cases being notified in SA (RDPHSA, 1975).

Table 1.1. **Notifications of Gonorrhoea in South Australia and in Australia, 1966-1977**

Year	*South Australia*	*Rate per 100,000*	*Australia*	*Rate per 100,000*
1966	355	23	8,553	74
1967	599	51	9,412	80
1968	509	43	9.763	79
1969	703	61	9,648	79
1970	650	55	9,558	76
1971	817	70	10,724	81
1972	989	83	11,017	85
1973	1,492	126	11,357	85
1974	2,091	174	12,524	95
1975	2,121	**172**	12,511	**93**
1976	1,885	151	11,526	85
1977	1,921	150	12,024	85

Source: RDPH, SA (1978, p. 66)

However, prior to 1975, in September 1920, the Venereal Diseases Bill was passed in the Parliament in SA. The Honorable W. Hague had made it clear for the members of the Government that it was their duty to prevent the spread of VD, "a great scourge to humanity" which might "eventually sap the life-blood of the nation"; the Bill, like in the other States, required detention of infected prisoners until cured (SA Parliamentary Debates House of Assembly [SAPDHA], 1920, p. 717). However, according to the Annual Report of Central Board of Health SA [ARCBHSA] (1933, 1934), it was not until the early 1930s that the South Australian VD Act, 1920, had been proclaimed and VD made notifiable. Hence, as a measure to curb the spread of VD, pamphlets containing the dangers of VD and the need to seek early treatment was issued by the health authorities and distributed through hospitals, doctors, local health boards and the Central Health Board (ARCBHSA, 1933, 1934). A new Venereal Diseases Act came into force in SA in 1947, adopted on the authoritarian procedures followed during the war under the National Security (Venereal Disease and Contraceptives) Regulations (revoked in December 1946). This was seen as valuable

in detecting the sources of infection and ensuring that sufferers continued treatment with the rights of sufferers and suspects well protected (ARCBHSA, 1947, 1948).

Lewis (1998) reviewed that it was in the 1960s that the South Australian health authorities pointed out that except for compulsory anonymous notification, SA had already pursued the control measures as laid down by the National Health and Medical Research Council (NHMRC) Conference of Commonwealth and State Health Officers. These were adequate laboratory facilities, obligatory treatment, mandatory disclosure of treatment defaulters, search for infection sources and compulsory examination of suspected sources. By 1963, health authorities were investigating the contacts of patients treated by private practitioners in addition to those of the government clinic at the Royal Adelaide Hospital (Lewis, 1998). Ultimately, it was in November 1965 that gonorrhoea and syphilis were proclaimed notifiable diseases (Annual Report of Department of Public Health SA [ARDPHSA], 1960, 1963, 1965). Finger (1971) reported in this context that, once notification in SA became compulsory by virtue of which laboratories had to send copies of positive results to the Health Department, the majority of doctors' notified cases.

The SAPDHA (1984-1985, 1985, a, b) reported that the position of SA in combating HIV (Human immunodeficiency virus)/AIDS came as early as 1985 from its Health Minister J. R. Cornwall, who claimed:

- that the South Australian health authorities took concerted action to educate the general community as well as the health professionals about HIV/AIDS, and that everything forwarded by the national AIDS Task Force and by the National Advisory Committee on AIDS (NACAIDS) was passed on to local special interest groups and the public at large,
- that arrangements had been made with the Adelaide *Advertiser* to publish factual articles, and information pamphlets being prepared for general distribution,

- that every citizen was subject to an ongoing educational campaign with education programmes reaching those they were intended for and successful co-operation being established with the gay community, and,
- that in view of the clinical cases of AIDS being notifiable though the positive reactions to antibody tests were not, a policy respecting the privacy of individuals and involving individual counselling had been adopted (SAPDHA, 1984-1985, 1985, a, b).

Reviewing the position of SA in 1987, Cornwall justified the continuing low incidence of AIDS in the State. This was attributed to the absence of fast-lane gay lifestyles and the early implementation of a strategy of prevention through education and case management (SAPDHA, 1986-1987). However, according to Lewis (1998), much before Cornwall's decisive leadership regarding STDs and AIDS in the 1980s, two major landmark reforms in SA regarding homosexuality came in the early 1970s.

The other developments and contributions of SA in the field of venereology were summarised by Lewis (1998):

> (i) Since 1911, SA had provided for a system of lock hospitals and for the separate treatment of Aborigines in public hospitals where examinations were compulsory.
> (ii) As early as the 1970s, SA was uniquely among the States which required registered laboratories to notify positive venereal disease results so that even if the medical practitioner did not notify it, he or she could be telephoned and arrangements made for the doctor or the department to carry out contact tracing.
> (iii) In SA although free treatment was available from public hospitals and private practitioners (who were reimbursed by the Government), there were no full-time, properly equipped clinics. It was in early 1974 that a full-time clinic was opened on North Terrace opposite the Royal Adelaide Hospital to function in addition to the hospital-based clinics for venereal disease treatments.

(iv) In January 1970, SA implemented legislation regarding abortion (modelled on the British Abortion Act of April 1968) which legalised abortion on two main grounds, one where continuation posed a greater risk to the woman's life or a greater risk of injury to her physical and mental health than termination, and where there was substantial risk of the child having physical or mental abnormalities.

(v) In 1976, the Adelaide Venereal Diseases Control Centre reported the first isolation of a penicillinase-producing strain of gonorrhoea.

(vi) In 1979, venereology societies were formed simultaneously in SA, Western Australia, Victoria, and in New Zealand, to be followed by the national one in 1981, the National Venereology Council of Australia (NVCA).

This section outlined the major historical developments and some pertinent statistics related to STDs in SA until the 1990s. The next section analyses the major problems that were identified as underpinning the research.

1.3 Statement of Problems

This section highlights the major issues that are evident in the field of study and underpinning the need for a study such as this. Besides revealing the recent statistics related to the diseases, it uncovers issues related to sex education and pre-service teacher training in sex education in the State as the major statement of problems underpinning the study. Further, the provision of sex education in SA under the HPE curriculum is also highlighted as central to the rationale for conducting this research. The upcoming subsection focuses on recent statistics pertaining to STIs and other BBVs as one of the problem statements of the study.

1.3.1 STI and other BBV Statistics in South Australia

Since 1997, the Kirby Institute for infection and immunity in society (formerly known as the National Centre in HIV Epidemiology and Clinical Research [NCHECR]) publishes the Australian Annual Surveillance Report for HIV, viral hepatitis, and the

notifiable STIs. A snapshot of the Australian Annual Surveillance Report, 2011, for these diseases for the whole of Australia revealed that:

- Chlamydia was the most frequently reported notifiable disease condition in Australia in 2010 with 74,305 diagnoses. Even more alarming were the figures for the population rate of diagnosis reported at 310 per 100,000 population in 2010, which was a 17 per cent increase over the rate in 2009, and a continual increase observed over the past ten years.
- The number of diagnoses of gonorrhoea increased by 25 per cent, from 7,993 cases in 2009 to 10,015 in 2010.
- The rate of diagnosis of infectious syphilis increased by 60 per cent, from 4.2 in 2006 to 6.7 in 2007 and declined to 4.9 in 2010.
- However, following the introduction of vaccination against the Human papillomavirus (HPV), the proportion of young Australian resident women diagnosed with genital warts dropped from 10.9 per cent in 2007 to 3.4 per cent in 2010.
- 30,486 cases of HIV infection were diagnosed in Australia as on 31 December 2010.
- An estimated 170,000 people were living in Australia in 2010 with hepatitis B infection and, an estimated 335 deaths in 2010 were attributable to chronic hepatitis B infection.
- An estimated 221,000 people were living in Australia with chronic hepatitis C infection, including 48,000 with moderate to severe liver disease (TKI, 2011).

The relevant South Australian figures as revealed by the Annual Surveillance Report, 2011, regarding the notifiable STIs chlamydia, donovanosis, gonorrhoea and infectious syphilis are summarised in Table 1.2 (TKI, 2011).

Table 1.2. **Compiled statistics for SA regarding STIs (chlamydia, donovanosis, gonorrhoea and infectious syphilis) for the period 2006-2010**

South Australia					
Number and rate[1] of diagnosis of chlamydia, 2006 – 2010					
Year	2006 Number Rate	2007 Number Rate	2008 Number Rate	2009 Number Rate	2010 Number Rate
	3,129 202.3	3,462 220.6	3,656 229.7	3,757 231.8	4,330 264.3
[1] Age standardised rate per 100,000 population. Population estimates by State/Territory and year from *Australian Demographic Statistics* (Australian Bureau of Statistics) Source: National Notifiable Diseases Surveillance System (cited in TKI, 2011, Table 3.1.1, p. 69)					
Number of diagnoses of donovanosis[1], 2006 – 2010					
Year	2006	2007	2008	2009	2010
	0	0	0	0	0
[1] SA had no reported cases of the disease, whereas NT, QLD and WA had so, but meagre figures over the period 2006-2010 Source: National Notifiable Diseases Surveillance System (cited in TKI, 2011, Table 3.1.3, p. 69)					
Number and rate[1] of diagnosis of gonorrhoea, 2006 – 2010					
Year	2006 Number Rate	2007 Number Rate	2008 Number Rate	2009 Number Rate	2010 Number Rate
	499 32.4	460 29.6	491 31.3	372 23.4	468 28.7
[1] Age standardised rate per 100,000 population. Population estimates by State/Territory and year from *Australian Demographic Statistics* (Australian Bureau of Statistics) Source: National Notifiable Diseases Surveillance System (cited in TKI, 2011, Table 3.1.5, p. 70)					
Number and rate[1] of diagnosis of infectious syphilis, 2006 – 2010					
Year	2006 Number Rate	2007 Number Rate	2008 Number Rate	2009 Number Rate	2010 Number Rate
	47 3.1	47 3.0	49 3.1	37 2.3	20 1.2
[1] Age standardised rate per 100,000 population. Population estimates by State/Territory and year from *Australian Demographic Statistics* (Australian Bureau of Statistics) Source: National Notifiable Diseases Surveillance System (cited in TKI, 2011, Table 3.1.7, p. 71)					

Source: TKI (2011, pp. 69-71)

Table 1.2 clearly reveals the predominance of chlamydia and gonorrhoea among the STIs notifiable in the State. The number and rate of infectious syphilis reported in 2010 was less than that in 2009; nevertheless, it is an important disease condition as far as STIs are concerned (see Chapter 4). SA, however, had no

incidence of donovanosis (in spite of it being notifiable) since 2006 as of 2010. The Clinic 275 summary statistics of STDs in SA revealed that in addition to the notifiable diseases mentioned above, SA also has high incidence of the following diseases, as reported in Table 1.3 (STDS, 2009).

Table 1.3. **Summary statistics of STDs in South Australia, 2008**

Diagnoses	*Male*	*Female*	*Total*
Warts	979	345	1324
Molluscum contagiosum	181	88	269
Herpes	126	99	225
Bacterial vaginitis	Not Applicable	246	246
Candida vaginitis	Not Applicable	201	201

Source: STDS (2009)

Of the diseases mentioned in Table 1.3, molluscum contagiosum is a benign papular condition of the skin which, though often sexually transmitted in adults and can cause severe condition in patients with HIV infection, is historically considered a minor clinical problem (Holmes et al., 2008). Likewise, bacterial vaginitis (better known as bacterial vaginosis) and candida vaginitis (better known as vulvovaginal candidiasis) having few but insignificant incidences of sexual mode of transmission, are also considered by many primary care providers as trivial issues (Holmes et al., 2008). Warts and herpes, indicated in bold in Table 1.3, therefore, were chosen as the other two diseases for the present study owing to its prevalence in SA and high association with the sexual mode of transmission (see Chapter 4).

With respect to HIV infection, the rate of new HIV diagnosis in SA showed an increase, from 2.9 in 2001 to 4.0 in 2006, and then a decline to 2.6 in 2010. The rate of diagnosis of newly acquired HIV infection in SA increased to 1.0 in 2006 and then declined to less than 0.5 in 2010. The other relevant South Australian figures as

revealed by the Annual Surveillance Report, 2011, regarding HIV infection are summarised in Table 1.4 (TKI, 2011).

Table 1.4. **Compiled statistics for SA regarding HIV infection and AIDS for the period 2001-2010**

South Australia

Newly diagnosed HIV infection by year

Year	≤01[1]	02	03	04	05	06	07	08	09	10	Total[1'2]
	795	30	45	54	51	61	56	47	53	41	1,233

[1] Late HIV diagnosis for diagnoses in 2001 only. Total percentage with late HIV diagnosis in 2001 – 2010 only
[2] Not adjusted for multiple reporting
Source: State/Territory health authorities (cited in TKI, 2011, Table 1.1.1, p. 35)

Number of specimens tested for HIV antibody in public health laboratories, 2001 – 2010

Year	2001	2002	2003	2004	2005	2006	2007	2008[1]	2009[1]	2010[1]
	77,219	75,360	79,409	83,970	88,158	88,552	80,664	95,696	62,560	61,252

[1] Estimated number of specimens tested for HIV antibody, adjusted for incomplete reporting
Source: National Serology Reference Laboratory, Australia (cited in TKI, 2011, Table 1.1.7, p. 41)

Newly acquired HIV infection[1] , 2001 – 2010, by year, by sex (M-Male, F-Female)

Year	01	02	03	04	05	06	07	08	09	10	Total[2]
	M -10 F - 1	M - 6 F - 0	M - 15 F - 1	M - 15 F - 1	M - 15 F - 0	M - 17 F - 0	M-7 F-0	M - 6 F - 1	M - 6 F - 0	M - 4 F - 1	101 5

[1] Newly acquired HIV infection was defined as newly diagnosed HIV infection with a negative or indeterminate HIV antibody test result, or a diagnosis of primary HIV infection within one year of HIV diagnosis
[2] Totals include 6 people whose sex was reported as transgender
Source: State/Territory health authorities (cited in TKI, 2011, Table 1.2.1, p. 42)

Number and population rate[1] of perinatal exposure to HIV among children, 2001 – 2010

Year	2001-2002		2003-2004		2005-2006		2007-2008		2009-2010	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number[2]	Rate
	3	8.6	0	0.0	3	8.3	5	12.5	1	2.5

[1]Average annual rate of perinatal HIV exposure per 100,000 livebirths. Number of livebirths by State/Territory and year from *Births, Australia* (Australian Bureau of Statistics)
[2] Includes 1 child born in 2009-2010 whose State/Territory of birth was not reported
Source: Australian Paediatric Surveillance Unit; State/Territory health authorities (cited in TKI, 2011, Table 1.4.1, p. 46)

Source: TKI (2011, pp. 35-46)

Table 1.4 reveals that the newly diagnosed HIV infection in SA was more or less stable across the years 2001-2010. However, the number of specimens tested for HIV antibody was alarmingly high for each of the reported years. This is an indication of the severity of the disease. The viral hepatitis (A, B, C, D) rates for the State for the period 2006-2010 as per the Annual Surveillance Report, 2011, are presented in Table 1.5 (TKI, 2011).

Table 1.5. Compiled statistics for SA regarding viral hepatitis (A, B, C, D) for the period 2006-2010

South Australia

Number and rate[1] of diagnosis of hepatitis A infection, 2006 – 2010

Year	2006		2007		2008		2009		2010	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
	8	0.5	5	0.3	20	1.3	59	3.7	4	0.3

[1] Age standardised rate per 100,000 population. Population estimates by State/Territory and year from *Australian Demographic Statistics* (Australian Bureau of Statistics)
Source: National Notifiable Diseases Surveillance System (cited in TKI, 2011, Table 2.1.1, p. 53)

Number and rate[1] of diagnosis of hepatitis B infection, 2006 – 2010

Year	2006		2007		2008		2009		2010	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
	319	20.7	520	33.2	431	27.2	458	28.5	430	26.5

[1] Age standardised rate per 100,000 population. Population estimates by State/Territory and year from *Australian Demographic Statistics* (Australian Bureau of Statistics)
Source: National Notifiable Diseases Surveillance System (cited in TKI, 2011, Table 2.1.3, p. 54)

Number and rate[1] of diagnosis of newly acquired hepatitis B infection, 2006 – 2010

Year	2006		2007		2008		2009		2010	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
	7	0.5	12	0.8	11	0.7	10	0.6	21	1.3

[1] Age standardised rate per 100,000 population. Population estimates by State/Territory and year from *Australian Demographic Statistics* (Australian Bureau of Statistics)
Source: National Notifiable Diseases Surveillance System (cited in TKI, 2011, Table 2.1.5, p. 55)

Number and rate[1] of diagnosis of hepatitis C infection, 2006 – 2010

Year	2006		2007		2008		2009		2010	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
	573	37.1	626	40.2	584	37.0	553	34.9	531	33.1

[1] Age standardised rate per 100 000 population. Population estimates by State/Territory and year from *Australian Demographic Statistics* (Australian Bureau of Statistics)
Source: National Notifiable Diseases Surveillance System (cited in TKI, 2011,Table 2.1.9, p. 58)

Number of diagnoses of newly acquired hepatitis C infection, 2006 – 2010

Year	2006	2007	2008	2009	2010
	54	48	43	35	46

Source: National Notifiable Diseases Surveillance System (cited in TKI, 2011, Table 2.1.11, p. 58)

Number of diagnoses of hepatitis D infection, 2006 – 2010

Year	2006	2007	2008	2009	2010
	0	0	0	0	0

Source: National Notifiable Diseases Surveillance System (cited in TKI, 2011, Table 2.1.15,p. 61)

Source: TKI (2011, pp. 53-61)

Table 1.5 reveals that except for hepatitis D infection which had zero incidences in SA across the years 2006-2010, the other forms of viral hepatitis are indeed prevalent in the State. Therefore, three forms of viral hepatitis that is A, B, and C were included in the present study barring hepatitis D infection which had no incidence whatsoever in SA. The State also publishes the Quarterly Surveillance Report since 1996 till date (published by the Government of SA, SA Health). The latest Quarterly Surveillance Report issued September, 2010, revealed the recent statistics of STDs from an age perspective for the period April to June 2010. This was done on a comparative basis with that of the previous quarter April to June 2009, while also revealing the figures year to date (STDS, 2010).

Table 1.6 outlines HIV infection in males in SA for the periods 01/04/09-30/06/09, 01/04/10-30/06/10 and year to date, highlighting the case category by age at diagnosis. The data pertained only to males as for each of the periods 01/04/09-30/06/09 and 01/04/10-30/06/10, only two female cases were detected with HIV infection (STDS, 2010).

Table 1.6. HIV infection in males in SA, 01/04/09-30/06/09, 01/04/10-30/06/10 and year to date. Case category by age at diagnosis

Case category	*01/04/09-30/06/09 Age group (years)*			*01/04/10-30/06/10 Age group (years)*			*Year to date Age group (years)*		
	<25	*25-39*	*≥40*	*<25*	*25-39*	*≥40*	*<25*	*25-39*	*≥40*
Newly acquired[1]	−	1	1	−	1	1	−	1	2
Greater than 12 mths[2]	−	1	−	−	3	1	−	7	1
Uncertain duration[3]	1	2	2	1	−	3	1	2	3
Known positive (0/seas)*	1	1	−	−	−	1	−	3	2
Total	2	5	3	1	4	6	1	13	8

[1]Incident case - negative serology or diagnosed seroconversion illness in the preceding 12 months
[2]Infection likely to be greater than 12 months - risk behaviour confined to more than 12 months ago or diagnosed seroconversion illness more than 12 months ago
[3]Uncertain duration- tested for the first time this year and no seroconversion illness or AIDS defining illness present
*Aware of HIV infection on entry to Australia

Source: STDS (2010, Table 1.3, p. 5)

Table 1.7 outlines genital chlamydial infection in SA for the periods 01/04/09-30/06/09, 01/04/10-30/06/10 and year to date, highlighting the age group by sex (STDS, 2010). It should be noted that under the diseases to be notified to the National Notifiable Diseases Surveillance System Australia, SA reports only genital tract specimens of chlamydial infections and does not include *Chlamydia trachomatis* identified from cervical, rectal, urine, urethral, throat and eye samples (Communicable Diseases Intelligence [CDI], 2010).

Table 1.7. **Genital chlamydial infection in SA, 01/04/09-30/06/09, 01/04/10-30/06/10 and year to date. Age group by sex**

Age Group	*01/04/09-30/06/09*			*01/04/10-30/06/10*			*Year to date*		
	Male	*Female*	*Total*	*Male*	*Female*	*Total*	*Male*	*Female*	*Total*
10-14	4	3	7	1	11	12	1	13	14
15-19	63	181	244	79	205	284	149	416	565
20-24	171	289	460	181	235	416	344	489	833
25-29	103	98	201	88	95	183	200	198	398
30-34	51	45	96	49	42	91	98	76	174
35-39	21	9	30	32	30	62	56	57	113
40-44	16	12	28	21	13	34	45	30	75
45-49	12	3	15	14	6	20	25	16	51
≥ 50	18	8	26	8	13	21	25	18	43
Total	459	648	1107	650	650	1123	943	1313	2256

Source: STDS (2010, Table 2.1, p. 8)

Table 1.8 outlines gonococcal infection in SA for the periods 01/04/09-30/06/09, 01/04/10-30/06/10 and year to date, highlighting the age group by sex (STDS, 2010).

Table 1.8. **Gonococcal infection detected in SA, 01/04/09-30/06/09, 01/04/10-30/06/10 and year to date. Age group by sex**

Age Group	*01/04/09-30/06/09*			*01/04/10-30/06/10*			*Year to date*		
	Male	*Female*	*Total*	*Male*	*Female*	*Total*	*Male*	*Female*	*Total*
10-14	–	2	2	1	–	1	1	–	1
15-19	16	23	39	13	13	26	17	21	38
20-24	15	14	29	22	14	36	45	19	64
25-29	9	11	20	28	15	43	45	18	63
30-34	11	12	23	12	5	17	21	9	30
35-39	6	6	12	8	2	10	12	5	17
40-44	1	3	4	8	6	14	14	9	23
45-49	3	1	4	2	1	3	8	1	9
≥ 50	3	2	5	4	–	4	11	–	11
Total	64	74	138	98	56	154	174	82	256

Source: STDS (2010, Table 3.1, p. 11)

Finally, Table 1.9 outlines syphilis infection in SA for the period 01/01/09-30/06/09 and 01/01/10-30/06/10, highlighting the age group by sex (STDS, 2010).

Table 1.9. **Syphilis infection in SA, 01/01/09-30/06/09 and 01/01/10-30/06/10. Age group by sex**

Age Group	*01/01/09-30/06/09*			*01/01/10-30/06/10*		
	Male	*Female*	*Total*	*Male*	*Female*	*Total*
20-24	5	1	6	2	–	2
25-29	4	–	4	1	–	1
30-34	4	–	4	3	–	3
35-39	1	–	1	–	1	1
40-44	2	–	2	–	–	–
45-49	1	–	1	–	1	1
50-54	4	–	4	–	–	–
55-59	1	–	1	–	–	–
≥ 60	–	–	–	–	–	–
Total	22	1	23	6	2	8

Source: STDS (2010, Table 4.2, p. 13)

The second part of the data (Tables 1.6 - 1.9), therefore, highlights the age group of the individuals at risk of contracting these diseases. The age group 25-39 (in males only) was the most susceptible to HIV infection followed by the age group ≥40 years (Table 1.6). With respect to genital chlamydial and gonococcal infection, the age group 20-24 (both gender combined) was the most vulnerable for the respective diseases (Tables 1.7 and 1.8, respectively). However, for both the diseases, the adolescent age group 15-19 years also reported a high incidence. Regarding syphilis infection too, it was almost the same trend with the age group 30-34 reporting high incidence to be followed by the 20-24 cohort (Table 1.9). These statistics helped to uncover that it is the adolescents and the young adults who are at risk of contracting STIs. The statistical dimensions in the context of the number, rate, and age groups prone to contracting the diseases outlined in this section, the next subsection therefore, highlights the major issues with respect to sex education in SA as the other problem statement.

1.3.2 Sex Education in South Australia

The link between STI rates and an effective sex education has been asserted by numerous advocates. That sex education plays an important role in reducing STI incidences emerged not only from numerous researches (Donovan, 1998; Kirby, 1993; Kohler, Manhart, & Lafferty, 2008), but also from the stand point of numerous organisations (Commonwealth of Australia, 1999; Gordon, 2007; The Washington State Department of Health & The Office of Superintendent of Public Instruction, 2005; United Nations Educational, Scientific and Cultural Organisation [UNESCO], 2009).

According to Mitchell et al. (2011, p. 4), "sexuality education has been taught in Australian schools for over a century but for much of that time has been a controversial add on taking its place as a result of the advocacy and intervention of outside organisations". In their recent historical review, Talukdar et al. (2013) also confirmed this assertion by noting that sex education, particularly in SA has been controversial since inception. They added that the framing of a national framework and the implementation of the Sexual Health and Relationships Education (SHARE) project have indeed contributed to the field, however, not without controversies. Notable incidents recalled by Talukdar et al. (2013) with respect to sex education in SA were mass media campaigns (Gibson, 2009; Oakley, 2003), parliamentary motions (Holmes, 2003; SAPDHA, 2003), and the re-orientation of the SHARE project to the present-day-form of Focus Schools (SHine SA, 2005). Talukdar et al. (2013) particularly stressed the lack of a teacher-led sex education in SA, and cited Gibson's (2009) assertion that the religious schools offering sex education is consistent with their religious teachings. The State, therefore, not only lacks a

comprehensive sex education curriculum but also is inconsistent in dealing with the subject.

The inconsistent nature of dealing with the topic of sex education in Australia has been uncovered by many authors. In Australia, teachers of sex education are drawn predominantly from the disciplines of physical education, home economics and science (Commonwealth Schools Commission 1987; Anderson and Rosenthal 1995, Smith et al., 2011), or conscripts from other disciplines such as sociology and English, or school chaplains and counsellors (Mitchell et al., 2011). However, Mitchell et al. (2011) added that it is generally up to the individual schools to assign teachers to courses which cover sex education. They also reported that out of the six States in Australia, only Victoria and New South Wales outline specific qualification requirements for teachers who will specialise in HPE. Out of that too, it is New South Wales which specifically mentions sexual health in this context.

This was validated by Keller (2010a) in her recent Article in the *Advertiser* 'Getting the big picture on sex' where she mentioned New South Wales as the only State in Australia to mandate sex education in schools. According to her, SA still leaves it to the individual school to tackle the sensitive issue. In addition, in SA, parents retain the right to withdraw their children from lessons about sex, health and relationships. In yet another Article entitled 'Teachers embarrassed, unprepared for taboo sex subject' which also appeared in the *Advertiser*, Keller (2010b) asserted that many South Australian teachers feared backlash from schools and parents or were not prepared to teach sex education. However, research with parents has yielded positive support for a school-based sex education in SA (Berne et al., 2000; SHine SA 2005). The next subsection highlights the issues associated with pre-service teacher training in sex education in the State as the third problem statement.

1.3.3 Pre-service Teacher Training in Sex Education in South Australia

An important component of effective sex education in schools takes the form of teacher training as identified by the UNESCO (2010) and by Australian teachers themselves (Smith et al., 2011). Factors shown to impact on teachers' willingness and confidence to teach sex education include the amount of teacher training, the fit with existing curricula, senior management support, and experience in using interactive teaching methods (Buston, Wight, Hart, & Scott, 2002). The amount of training received in sexual health and the anticipated negative reactions from parents are cited as two of the most important barriers towards a teachers' willingness to teach sex education (Cohen, Byers, Sears, & Weaver, 2001). Brennan and Stewart's (2006) study of sex education teachers in primary schools in Australia and Smith et al.'s (2011) recent survey of Australian secondary sex education teachers, support the findings of Cohen et al.'s (2001) research.

Mitchell et al.'s (2011) survey on the status of sex education in Australia addressed the pre-service training perspective among other sexuality-related issues. They found that it was the tertiary institution providing teacher training that decided on the degree and extent of sex education being included in the pre-service curriculum. Moreover, the local State and Territory curriculum frameworks had no say in the training content as there was no underlying formal policy.

The results of Mitchell et al.'s (2011) survey with respect to SA revealed that four institutions were providing 19 pre-service teacher training courses. Out of these 19 courses, five had a substantial inclusion, eight a basic inclusion, and two a general inclusion, with the remaining four no inclusion of sex education units (either core or elective). In addition, those institutions which offered sex education had the majority of courses designated only a few hours of course time (Mitchell et al., 2011).

Eleven phone interviews conducted with particularly interested institutions provided some additional findings for the national data set in Mitchells et al.'s (2011) report. The majority of the respondents commented that the content related to sex education in pre-service teacher training was largely dependent on the expertise and the interest of the staff within the Faculty. Most often, the lectures on these topics were approached by outside organisations or guest lecturers. These were primarily the Family Planning Organisations, and organisations like the SHine SA, Concord Training Services (in Western Australia) and tertiary institutions. While all of the respondents agreed and expressed their view on the inclusion of sex education within pre-service teacher training, they also noted that generally it was not included at all. Many competing demands for other topics and the limited course time of study were cited as the major constraints for the non-inclusion of sex education in teacher training (Mitchell et al., 2011). The HPE curriculum in SA under the banner of which most of the sex education takes place in the State is outlined next as the final identified problem.

1.3.4 The Health and Physical Education Curriculum in South Australia

It is the field of HPE within which most sex education in Australia takes place. In the South Australian context, it is the South Australia Curriculum Standards and Accountability Framework (SACSA) and thereafter the new South Australian Certificate of Education (new SACE), that are responsible for the development of the Curriculum and Learning Provisions respectively for the Years R-10 and Years 11 and 12. The subject Health is also provided in modified form (Modified Subjects) for students with identified intellectual disabilities, under the new SACE Curriculum (Department for Education and Child Development [DECD – formerly Department

for Education and Children's Services DECS], 2012). The HPE, however, is compulsory until Year 10 only (Mitchell et al., 2011).

Talukdar and Aspland (2012) critiqued the Health of Individuals and Communities Strand of the SACSA as well as the subject Health of the new SACE under the Learning Area HPE. They established that both the Curriculum and Learning Provisions of the SACSA as well as the new SACE fails to comprehensively deal with the topic of STIs and its concomitant prevention. Moreover, the elective nature of the new SACE does not guarantee sufficient learning as far as STIs and sexual health are concerned, even for those who opt to go in for the subject. The authors, therefore, stressed the need for a more comprehensive curriculum as addressing STI-related issues.

Mitchell et al. (2011) suggested the incorporation of issues relevant to sex education into subjects such as Science, English, and Civics and Citizenship. They, however, noted the absence of a national curriculum in this area. Until recently, the federal government has endorsed a national curriculum reform in this field. The Australian Curriculum, Assessment and Reporting Authority (ACARA) released a new draft Senior Secondary Australian Curriculum for English, Mathematics, Science and History in early 2010. A national HPE curriculum was later announced as being undertaken as part of phase three of the national curriculum development plan (Ministerial Council on Education, Employment, Training and Youth Affairs [MCEETYA], 2010).

This section investigated the major identified problems that guided the research as pertaining to STI and other BBV rates in SA, and the issues related to sex education, pre-service teacher training in sex education, and the HPE curriculum. The

following section, therefore, justifies the importance of the research while linking it back to the identified problems.

1.4 Significance of the Study

The Australian Institute of Health and Welfare [AIHW] (2008, 2010) noted that the health and wellbeing of Australians is a major concern. Of particular mention as an imminent health risk in both the reports is the increasing rate of STIs, specifically among the young people (AIHW, 2008, 2010). The short term as well as the long term impacts of STIs has been investigated by numerous authors as outlined next (for example, Genuis, 1992; Meeker, 2002). Genius and Genius (2004) asserted in this regard that the insidious yet potentially devastating short and long term effects of STDs has been and still remains a potential challenge for medical professionals and public health officials to combat with.

Although some STDs cause symptoms in the short-term, many STIs become manifest over a longer period and present as a variety of medical problems (Genuis, 1992; Meeker, 2002). Of considerable focus is the correlation of various STDs including HPV, hepatitis B, and chlamydia, with certain cancers that develop some time after an initial STD infection (Kadow, Regueiro-Ren, & Weinheimer, 2002; Munger, 2002; Wallin et al., 2002). Added to this, the psychosexual and psychosocial sequelae of contracting a STD although difficult to quantitatively measure should not be underestimated (Genuis & Genuis, 2004) as STDs bring along with it, emotional distress (Hammarlund & Nyström, 2004; Hammarlund, Lundgren, & Nyström, 2007). Infected individuals may experience increased feelings of anger, depression, isolation, rejection, and guilt (Campion et al., 1988; Clarke, Ebel, Catotti, & Stewart, 1996; Rosemberg, 1991; Silber, 1992; Vanderplate & Aral, 1987; Vezina & Steben, 2001; Voog & Lowhagen, 1992). Research also indicates that STDs may have a long-term

negative effect on sexual enjoyment (Vezina & Steben, 2001). Vezina & Steben's (2001, pp. 125-137) research revealed that infected patients may experience a "partial or complete cessation of sexual activity", "a total or partial loss of interest in sex", a "more inhibited and less spontaneous" sex life, or "anxiety related to sexual desirability". Further, vertical transmission associated with many STDs has its own serious and debilitating effects (Genuis & Genuis, 2004).

The broader society also suffers in the form of an increased economic burden due to the costs of treatment, sick leave and in some cases hospital care (Mason, 2005; Phillips, Dudgeon, Becker & Bopp, 2004). However, despite the many attempts over the last number of years to address the enormous prevalence of STDs, rising infection rates suggest that objectives are not being met and that reassessment of prevention strategies should be a priority (Genuis & Genuis, 2004). The authors therefore, called for a re-evaluation of the current strategies and recognized a need to address the underlying lifestyles and behaviours in an attempt to manage STDs. The World Health Organization (WHO) in this regard noted that many serious diseases in adulthood which includes STIs and HIV have their roots in adolescence (WHO, 2011).

Adolescents on their part continue to remain uninformed about STIs other than HIV/AIDS (Clark, Jackson, & Allen-Taylor, 2002). A lack of knowledge of the diseases are often coexistent with risky behavioural lifestyles, for example, multiple sex partners (Yacobi, Tennant, Ferrante, Pal, & Roetzheim, 1999), inconsistent condom use (Burazeri, Roshi, & Tavanxhi, 2004), delaying treatment of disease (Fortenberry, 1997) and failing to return for STI screening results (Kahn, Goodman, Huang, Slap, & Emans, 2003). In line with the above assertion, three national research projects in Australia (two with young people and one with youth and adults) each

encompassing the primary aim of evaluating the knowledge, attitudes, beliefs and behaviours of the target population towards STIs, HIV/AIDS and sexual health, reported the following results.

The first one conducted by Smith et al. (2009) and the fourth of its kind in Australia, involved nearly 3,000 Year 10 and Year 12 students and represented more than 100 secondary schools from the Government, Catholic and Independent school systems from every jurisdiction in Australia. The survey revealed poor STI knowledge specifically related to chlamydia, hepatitis A, B, and C, and HPV and cervical cancer, with the majority of students reporting some form of sexual activity and the existence of multiple partners. Less than 1 in 10 students believed that they were at risk of infection with HIV/AIDS, an STI and hepatitis B or C. Not using a condom during sex was only associated with an increased perceived risk of infection with HIV/AIDS and STIs where a student's sexual partner was someone they had met for the first time (Smith et al., 2009).

The second study conducted by the Stancombe Research & Planning P/L [SRP] (2009) and the first of its kind in Australia, involved sexually active young Australians aged between 16 and 29 years and entailed 2,524 online interviews. The survey reported scanty knowledge level regarding STIs (with the exception of HIV/AIDS) specifically in the area of symptom recognition. Safe sex was synonymous with condoms, but more likely in the context of contraception rather than STI protection. Though the perceived risk status of contracting an STI revealed an increase among those with six or more sexual partners in the past 12 months, the majority of the research sample did not see themselves as at risk (SRP, 2009).

The third research reported by de Visser, Smith, Rissel, Richters, and Grulich (2003) and Grulich, de Visser, Smith, Rissel, and Richters (2003a, b) and also the first

of its kind in Australia, was conducted with 19,307 respondents between the ages of 16 and 59 years in Australia through telephone interviews. The findings revealed a poor knowledge of transmission routes and health consequences of the most common STIs (Grulich et al., 2003b). Condom use was associated with partner type and not using another form of contraception (de Visser et al., 2003), and sexual and injecting risks were associated with indices of lower socio-economic status and bisexual identity (Grulich et al., 2003a).

In view of the existing knowledge gap of adolescents regarding STIs and BBVs, the role of an effective education has been emphasized in global (WHO, 2006a), national (Commonwealth of Australia, 1999; Department of Health and Ageing [DHI], 2010a, 2010b, 2010c, 2010d; Sexual Health & Family Planning Australia, 2010) as well as regional (HIV/Hepatitis C Policy and Programs Communicable Disease Control Branch SA Health, 2009a, 2009b) initiatives. Blum and Libbey (2004), Libbey (2004), and Resnick (2000) argued that the role of the connectedness to school during adolescence remains undoubted in the context of building protective factors for positive educational outcomes and lowering the rates of health-risk behaviours. The Gatehouse Project too asserted in this regard that "schools are probably the only point of close to universal access to young people at a time during which both emotional problems and behaviours with long-lasting harmful effects on health are emerging" (Royal Children's Hospital Melbourne, 2008, para. 1). Research also shows that Australian secondary students rely on school programs as one of their most useful sources of information regarding sexual health and relationships (Smith et al., 2009). The pivotal role of pre-service teachers and pre-service teacher education programs gains importance at this point, since pre-service

teachers are responsible as future educators to be equipped with the necessary skills and tools (Wyatt, Oswalt, White, & Peterson, 2008).

Pre-service teacher education is crucial to the professional development of teachers (Chong, Wong, & Lang, 2005). Besides aiding pre-service teachers to developing new perspectives, it also prepares them with the necessary knowledge and skills (Wilke, 2004). For James, Minor, Onwuegbuzie, and Witcher (2002), the characteristics that pre-service teachers bring with them (for example, experiences, knowledge, dispositions, beliefs, attitudes, perceptions) upon entry into formal preparation programs greatly influence their subsequent development as both students and practitioners of the noble profession. The Australian College of Educators (2003, para. 2) acknowledged that "what teachers know, do, expect and value has a significant influence on the nature, extent and rate of student learning".

Nevertheless, pre-service teachers hold a variety of views on teacher education. Kagan's (1992) study confirmed that pre-service teachers enter teacher education programmes with personal beliefs about images of good teachers, images of themselves as teachers, and memories of themselves as students. Feiman-Nemser, McDiarmid, Melnick, and Parker (1989) in their study argued that pre-service teachers believe that teaching is easy and that teaching merely involves transmitting information. Feiman-Nemser et al. (1989) and Joram and Gabrielle (1998) further found that pre-service teachers believe that the majority of knowledge about teaching will come from practice in the field through trial and error when they enter the classroom. As Chong et al. (2005) asserted, to pre-service teachers, a teaching personality is more important than cognitive skills or pedagogical or subject-matter knowledge which is in line with the cultural myth that teachers are born, not made.

Whitbeck (2000) also noted that while some students enter the college of education to master effective teaching, others believe that they are born teachers.

Contrary to the above findings, Walkington (2005) found that pre-service teachers generally expect the university to assist them with the subject knowledge, pedagogical aspects and, most particularly, behaviour management strategies throughout their teacher education degree. Hollingsworth (1989) and Powell's (1992) research findings were similar to Walkington's (2005) assertion where they reported that pre-service teachers enter into the program believing that good teaching is related to content knowledge and the ability to convey that knowledge to others. According to Wilke (2004), knowledge in this context includes disciplinary content or subject knowledge, and pedagogical content knowledge or knowledge of how to teach. Schempp (1995) argued that this forms the basis for quality practice.

Shulman (1987) highlighted that the breadth and depth of teachers' own understanding of their specific subjects affect their curricular and instructional practices. Pintrich, Marx, and Boyle (1993) stressed that inaccurate knowledge hinders students' development, and lack of it makes it impossible for them to progress. On the other hand, addressing misconceptions through instruction and alerting students beforehand that new knowledge may be inconsistent with what they already know, helps them to learn (Biemans & Simons, 1995). For teacher candidates themselves, crucial is the role modelling provided by their own teachers when they were elementary and secondary students (Klein & Breck, 2010), since in his Social Cognitive Theory, Bandura posited that individuals learn vicariously through the observation of others (McAlister, Perry, & Parcel, 2008). Similarly, students in a classroom observe the knowledge, attitudes and behaviours of their teachers

specifically on topics of sex education (Klein & Breck, 2010), the topic of interest in this dissertation.

Alnasir (2004) purported that it is this background of health knowledge and perceptions that helps develop the health attitudes of school teachers, which in turn reflect on their students' health practices and behaviour. In addition to knowledge, teacher's attitudes, beliefs and values towards sexuality also affect their teaching (Tijuana, Finger, Ruland, & Savariaud, 2004). There are theoretical and demonstrated links between role modelling of positive health behaviours from teacher to student (Bandura, 1986; Cardinal, 2001; Clark, Blair, & Culan, 1988). It is this ideology that formed the basis for the present study given that teachers are gatekeepers or role models for their students (Leane & Shute, 1998), and attitudes and knowledge - in particular those which are related to health, could be disseminated from people who bear them to those who lack it, especially from teachers to students (Masvidal et al., 1995).

This research, therefore, addressed the knowledge and attitude perspectives of pre-service teachers in SA towards STIs and other BBVs. This was considered important in the face of the increased disease incidences in the State, the non-comprehensive nature of both sex education and the HPE curriculum, and the lack of adequate teacher training in the area. Moreover, the fact that the sex education teachers in Australia are drawn from a number of subject areas with a lack of proper pre-service training required the exploration of the knowledge entity, in particular. This was imperative to understanding the knowledge base of pre-service teachers, and accordingly, articulating the need for teacher education in this area. The review of related literature (see Chapter 3) also revealed that not much research has been conducted focusing on the knowledge and/or attitude attributes of pre-service teachers

towards STIs and other BBVs. Thus, the present study also addressed the gap in the related literature. Hammarlund, Lundgren, and Nyström (2008, p. 104) summated the burden associated with STIs as "If we cannot reduce STIs among young people today the consequences in the future might be infertility and different health problems involving several different health care professionals".

The preceding sections highlighted the background, reasons, and significance of the study. The subsequent sections outline the underlying research details and the snapshot of the drafted chapters of the thesis, respectively.

1.5 The Present Study

1.5.1 Research Aims

The broad aim of this study was to explore the knowledge and attitude attributes of pre-service teachers in SA towards STIs and other BBVs. To that end, a number of specific research objectives were identified which are outlined in the next subsection.

1.5.2 Research Objectives

The specific research objectives as addressing the overall aim of the study were:

(i) to explore the knowledge and attitudes of pre-service teachers in SA towards STIs and other BBVs

(ii) to ascertain the impact of gender, age, highest educational level, subject stream, and undertaking the HPE curriculum, on the knowledge and attitude attributes of pre-service teachers in SA regarding STIs and other BBVs

(iii) to identify the major sources of information regarding STIs and other BBVs with respect to pre-service teachers in SA

(iv) to explore the perspectives of pre-service teachers in SA towards STI-related issues, the role of an effective education in containing the spread of STIs, and the place of teacher education in addressing sexual health

1.5.3 Research Questions

The main research questions that emerged from the aims and the objectives in relation to South Australian pre-service teachers' knowledge and attitudes towards STIs and other BBVs are as follows:

1. What is the knowledge of pre-service teachers in SA towards STIs and other BBVs?
2. What are the attitudes of pre-service teachers in SA towards STIs and other BBVs?
3. What is the relationship between the knowledge and attitude attributes of pre-service teachers in SA regarding STIs and other BBVs?
4. How does the knowledge of pre-service teachers in SA regarding STIs and other BBVs differ with respect to gender, age, highest educational level, subject stream, and undertaking the HPE curriculum?
5. How does the attitude of pre-service teachers in SA towards STIs and other BBVs differ with respect to gender, age, highest educational level, subject stream, and undertaking the HPE curriculum?
6. What forms the major sources of information for pre-service teachers in SA regarding STIs and other BBVs?
7. What are the perspectives of pre-service teachers in SA towards STI-related issues?
8. What are the perspectives of pre-service teachers in SA towards the role of an effective education in containing the spread of STIs?
9. What are the perspectives of pre-service teachers in SA towards the place of teacher education in addressing sexual health?

1.5.4 Research Participants

The Teachers Registration Board of South Australia recognizes four higher educational institutions as running the necessary undergraduate and postgraduate teacher education programs in SA (Teachers Registration Board of South Australia, 2010). Hence, the samples for the present study comprised of pre-service teachers enrolled in the teacher education courses at these higher educational institutions.

1.5.5 Research Assumptions

Personal traits like knowledge and attitudes though cited as measurable in the social sciences are indeed complex attributes dependent on a number of factors. Ivancevic and Ivancevic (2007) stated that knowledge, abilities, attitudes, and personality traits are often difficult to measure.

Therefore, one of the most crucial assumptions underlying the present research was that the knowledge and attitude data obtained from the respondents were truly reflective of these traits. However, it is also important to note here that the results obtained thereof pertain only to a sample of South-Australian pre-service teachers and not the pre-service community as a whole. This in turn, led to the limitation of the study as outlined next.

1.5.6 Research Limitation

The research participants were limited to SA only. This could be enriched if pre-service teachers across all the States of Australia could be sampled. This larger cohort would also allow for an effective comparison of results across the groups.

1.5.7 Research Delimitation

The nine diseases chosen under the banner of STIs and other BBVs were based on its prevalence characteristics in SA and as such did not include the whole spectrum of these diseases.

1.6 Thesis Structure

Chapter 1 outlined the context of the present study. The historical perspective of STDs in SA traced the advent and prevalence of diseases in the State until the 1990s. Recent statistics related to the diseases helped to uncover one of the major statements of problems as underpinning the research. The inadequacies of the HPE curriculum and the lack of a comprehensive sex education and pre-service teacher training were also outlined as central to the rationale for conducting this research. This chapter highlighted these problems and made an argument for the significance of the research. It also described the major aims, objectives, and research questions of the study.

With the major reasons and guiding principles grounding the research described in this chapter, Chapter 2, therefore, outlines the theoretical basis of the study. The theories underpinning knowledge and attitude phenomenon, their respective measurement, and importance in education and daily living are discussed in details. The agents of socialization that impact the knowledge and attitude attributes of an individual are also discussed.

Chapter 3 provides insights into the related research in the field. The details of these studies provide critical insights into research already conducted and further research implications arising out of these. The detailed analysis of these studies also forms the basis for the development of the items of the attitude scale of the questionnaire as employed in the present study.

Chapter 4 is also linked to literature but specifically focuses on the details of the diseases under study. It essentially serves as the guiding principle towards framing the items of the knowledge scale of the questionnaire as employed in the study.

With the underlying theories, background, and literature described, Chapter 5 outlines the methodology adopted for the study. The operationalization of research

along with the details of the sampling procedures, the ethical considerations, and the essential data entry and data analysis techniques as applied in the study are discussed in this chapter.

Chapter 6 describes the basics of measurement and psychometric testing as adopted in the study. It also provides a detailed analysis of the Item Response Theory used in establishing the validity and reliability measures of the respective scales of the developed questionnaire.

The subsequent Chapters 7 and 8 presents the detailed findings of the study. Chapter 7 reveals the standalone knowledge and attitude scores as well as its relation between themselves and with the other variables under investigation. The major sources of information pertaining to the diseases are also identified in this chapter. On the other hand, Chapter 8 deals with the findings of the open-ended responses of the survey and specifically addresses the related research questions.

Chapter 9 juxtaposes the quantitative and qualitative findings and existing literature. It draws upon related findings in the field either as synonymous or contrary to the current research. This is crucial not only towards addressing the gaps in the related literature but also paving the path for future research.

The final chapter (Chapter 10) recapitulates the whole study by way of summarising. Based on the major findings, this chapter articulates the implications for policy and practice, and for future research.

> "Attributes like knowledge and attitude are integral not only for teachers entering the profession but also for enhanced student learning outcomes." (Talukdar & Aspland, 2013, p. 65)

Chapter 2:

Theoretical Background

2.1 Introduction

Social cognition deals with how people perceive their social world and relationships (Taylor, 1981). As such, knowledge and attitudes are both important social cognitive terms. However, the complexity associated with each of these entities in terms of its relationship to one another and to other related terminologies of social cognition often renders its understanding as elusive (Bar-Tal & Kruglanski, 1988). The authors related knowledge with diverse social cognitive terms such as hypothesis, judgements, inferences, attributions, perceptions, attitudes, preferences, values, ideologies, goals, or intentions (p. 3). Similarly, attitudes have been linked to belief, opinion, value, habit or trait (Oskamp & Schultz, 2005, pp. 13-15).

According to Bar-Tal & Kruglanski (1988, p. 3), "human knowledge has no a priori boundaries" which makes it possible to be categorized in a number of ways. Thus, James, as early as 1890, drew a distinction between the "knowledge of acquaintance" and "knowledge about" (James, 1890, p. 222). Russell (1948, p. 103) differentiated "knowledge by acquaintance" and "knowledge by description", whereas Ryle (1949, p. 27) differentiated "knowing how" and "knowing that". Attitudes too, despite its venerable and influential history (Fleming, 1967), was described as somewhat confounding in terms of its understanding and identification (McGuire, 1985). Ostrom (1969, p. 12) identified attitude as an "element of evaluation", whereas Fazio (1986, p. 209) argued attitudes as "fulfilling a knowledge function".

The study of both knowledge and attitudes, however, is important as it aids an individual to make up his/her mind based on arguments and evidences. It also helps individuals in structuring their complex social environments (Bar-Tal & Kruglanski, 1988; Fazio, 1986). Therefore, this chapter highlights the basic concepts of knowledge and attitudes, as well as the underlying theories, the measurement approaches, and the orientation of the study as related to these concepts. The chapter also describes the agents of socialization that impact the knowledge and attitude attributes of an individual. The agents of socialization are integral towards understanding knowledge and attitude formation and changes (Oskamp & Schultz, 2005). However, in this study, the agents of socialization were mainly conceptualized as the sources of information for pre-service teachers regarding STIs and other BBVs.

2.2 Knowledge

The first philosophical attempt to define knowledge was derived from Plato's dialogue of the *Theaetetus* where knowledge was described as "justified true belief" which introduced truth as a required feature of knowledge in order to distinguish it from errors (Marietta Jr., 1998, p. 76). This tripartite view of knowledge, however, was in contrast to Williamson's assertion that knowledge, rather being a hybrid state of the mental component of justified belief and the non-mental component of truth, is itself a "distinct type of mental state" that is epistemically basic (Williamson, 2000, p. 21). Bar-Tal and Kruglanski (1988, p. 3) viewed "knowledge in a subjective or intersubjective sense as the total sum of beliefs to which an individual or a group may subscribe".

Deng and Luke (2008) further extrapolated the ideology of knowledge as categorized under three conceptions based on disciplinary and epistemological knowledge classification schemes. The first conception, the disciplinary conception of

knowledge is based on the canonical knowledge in the established disciplines. The second conception relates to the practical conception of knowledge represented by procedural knowledge and deriving itself from the wisdom of practice. The third form of knowledge, the experiential conception of knowledge is based on Dewey's (1916) postulation that knowledge is located and based on human experience.

Epistemology, the study of knowledge acquisition and representation is by itself a branch of philosophy. The epistemological theories underpinning the evolving views of knowledge can be classified into three perspectives namely the positivist, postpositivist and postmodern (Schraw, 2006). In the positivist approach characterized by a belief in learning through experience (Phillips & Burbules, 2000), knowledge is viewed as stable and objective and knowledge acquisition and transmission takes place either through experiences or by formal means (Schraw, 2006). The postpositivist approach, however, views knowledge as consensual understanding (Peters & Burbules, 2004) which is changeable rather than static in the sense that knowledge is negotiated among individuals to reach an agreed-on consensus (Schraw, 2006). The postmodern theories visualise knowledge as highly subjective and self-constructed which is not transmitted or transacted on with others but derived through individual experiences (Schraw, 2006). Schraw (2006) commented that the three perspectives differ in their position on constructivism in which a learner actively constructs rather than passive assimilation of information. Accordingly, Schraw (2006, p. 246) posited that "positivists do not fully endorse constructivism", "postpositivists endorse a constructivism based on consensual understanding" and "postmodernists endorse a subjective constructivism".

According to Borgatti and Carboni (2007, p. 450), the "theories involving knowledge remain a tissue of conjectures" unless knowledge can actually be

measured. They outlined two common approaches to measuring knowledge that can be tested empirically. The first one, using standardized tests and based on the classical test theory, is a translation of an objective body of knowledge into a set of propositions whose truth or falsity is known. This usually takes the form of a series of true/false, multiple choice, or other questions and relies on the existence of an answer key containing the set of correct answers. The second approach, termed direct subjective ratings rests on the subjective rating as representative of an individual's knowledge level. Three variants, in turn, underlie the basic ratings method. In the meta-knowledge self-report variant, respondents rate their own level of knowledge. This, however, is subject to bias, distortion and validity concerns. The second variant, in addressing these concerns, employ "socially relevant others" (p. 452) as judging an individual's knowledge. This too evokes concerns of susceptibility to other biases, specifically when individuals with greater levels of knowledge are assessed by those with less knowledge. In the third variant approach, individuals identify people with whom he or she is especially familiar, who in turn, estimate the former's knowledge level. This also results in bias and a high positive affect (Borgatti & Carboni, 2007).

That measurement essentially implies assigning a number to a characteristic (for example, knowledge) of an object (for example, an individual) or event according to a set of rules was highlighted by Hunt (2003). According to him, multiple-choice tests or any other epistemetric methods are the set of rules by which the numbers (scores) or measurements are produced, thus defining knowledge operationally. The author also asserted that the present day tests used for measuring an individual's knowledge on a topic are aimed at composing test items that represent the topic. Ideally, the test should be fair and unbiased and not influenced by the test takers'

characteristics other than the parameter under measure (in this case, knowledge) (Hunt, 2003).

Hunt (2003) further explained that current testing practice has its base on the alternative selected by the individual on the response format. The only two possible alternatives according to him is either the respondent knowing the correct answer (if a correct answer is selected) or not knowing it (if the correct answer is not selected). However, the author exerted caution towards interpreting an incorrect answer as uninformed. According to him, the respondent may be sure of his/her response option as being correct and may be misinformed in contrary to being uniformed. He related hidden misinformation to bad decisions and errors in performance as well as to counterproductive learning (Hunt, 2003).

The scale designed to assess the knowledge dimension of the study, therefore, drew on both Borgatti and Carboni (2007) and Hunt's (2003) work. The test items measuring knowledge were based on facts pertaining to STIs and other BBVs. A true/false/don't know format was employed to elicit information pertaining to the knowledge items (see Chapter 5).

The enormous potential of knowledge in shaping an individual's life was also outlined by Hunt (2003). He envisaged knowledge as providing orderliness to one's life. This further gave way to the conceptualization of goals, the anticipation and perception of events, and the responsiveness in terms of changing needs, purposes and desires. Most importantly, an individual's behaviour and performance are both dependent on knowledge, which in turn is acquired through learning, practice and experience (Hunt, 2003). Tambyah (2008) also asserted that knowledge is undoubtedly an important aspect of teaching and student engagement. That attitude is also an important attribute is outlined in the next section.

2.3 Attitude

Thurstone (1928, p. 529), one of the first persons to investigate the problem of attitude measurement, described an attitude as the "affect for or against the psychological object". Though an affective nature of attitude was established, the cognitive and the behavioural aspects of the entity were not taken into account (Suzuki, 2007). Likert (1932, p.8) in an attempt to emphasise the behavioural aspect of attitude used a much less precise definition, and referred attitudes to a "certain range within which responses move". Allport (1935) synthesized his own ideology based on the assertions of Thurstone (1928) and Likert (1932) and explained attitude as a "mental and neural state of readiness to respond, organised through experience, and as exerting a directive and/or dynamic influence on behaviour" (p. 810). In 1947, Doob suggested that attitudes were "attempts at solution" (Doob, 1947, p. 135). This was followed by Krech and Crutchfield, who, taking a new approach stressed that attitudes have "aspects of problem solving" and therefore, people learn something new (Krech & Crutchfield, 1948, p. 152). Rhine (1958, p. 363) posited that evaluation is an important feature of attitude and a distinguishable component from mental states and considered an attitude as a "concept with an evaluative dimension". This idea was reasserted by Eagly and Chaiken (1993, p. 1) when they stated that "an attitude is a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor". It was however, Johnstone and Reid (1981) who indicated that any definition of attitude involved three main components, cognitive, emotional (affective) and action-tendency (behavioural). In 1992, Oppenheim summarised all the definitions and suggested the modern interpretation for the concept of attitudes (Oppenheim, 1992), which according to Ramsden (1998, p. 128), would be "acceptable to most researchers":

> attitudes... [are]... a state of readiness or predisposition to respond in a certain manner when confronted with certain stimuli...attitudes are reinforced by beliefs (the cognitive component), often attract strong feelings (the emotional component) which may lead to particular behavioural intents (the action tendency component). (Oppenheim, 1992, pp. 174-175)

The Tri-Componential Viewpoint, therefore, views attitude as a single entity but as having three components namely affective, behavioural and cognitive (Oskamp & Schultz, 2005). Two other theories have been forwarded by Oskamp and Schultz (2005) as framing the essential nature of attitudes, namely the Separate Entities Viewpoint and the Latent Process Viewpoint. The Separate Entities Viewpoint views the three components of the Tri-Componential Viewpoint as separate entities which may or may not be related, depending on the particular situation. The Latent Process Viewpoint postulates a hidden process occurring within the individual termed as the attitude which is used as an explanation of the relationship between stimulus events and the individual's responses (Oskamp & Schultz, 2005).

According to Eagly and Chaiken (2007), the concept of attitude has had many different definitions over the years. It has been described as a "hypothetical construct" at times, and at other times as "real" (Krosnick, Judd, & Wittenbrink, 2005, pp. 21-24). It has also been assumed to be "conscious" as well as "unconscious" (Greenwald & Banaji, 1995, p. 4). Most often, it has been referred to as the "behavioural, cognitive, and/or emotional reactions" (Zanna & Rempel, 1988, p. 316). Despite these variations, the uncontroversial commonality lies in the fact that attitudes have an "evaluative component" (Petty, Brinol, & DeMarree, 2007, p. 658).

The evaluation of attitudes can be both explicit as well as implicit (Oskamp & Schultz, 2005). According to the authors, the explicit techniques are most commonly employed in attitude measurements which rely on the evaluations that an individual is actually aware of and can express. The implicit evaluations are automatic and

function without an individual's awareness or ability to control them (Greenwald & Banaji, 1995; Dovidio, Kawakami, & Gaertner, 2002). The explicit measure of attitudes particularly in the form of Likert scales, have dominated attitude measurement since its inception in the 1930s. It has been successful towards the measurement of social issues, people, groups, objects, and activities, as well as a vast array of other entities (Oskamp & Schultz, 2005).

The Likert-type scale was developed by Rensis Likert in 1932 (Likert, 1932). It is also known as a summated rating scale and comprises of a series of item statements that are reacted to on a continuum of pre-designated responses (Stacks, 2011). Summated ratings indicate that the respondents' attitude scores are determined by adding their ratings for all of the items (Oskamp & Schultz, 2005). Stacks (2011) stated that the Likert-type scales can range from a 3-response continuum (agree, neither agree nor disagree, and disagree) to as much as an 11-response continuum. He outlined the minimum requirements of the scale in that it is essentially interval in nature, with the ends of the continuum measured being bipolar and as having a neutral point. According to Oskamp & Schultz (2005), the Likert method of attitude scale construction quickly became and still remains the most popular method for attitude measurement.

The scale designed to assess the attitude dimension of the study, therefore, was based on the Likert-type scale of measurement. The test items measuring attitude explored pre-service teachers' attitudes towards STI-related issues. An agree/neither agree nor disagree/disagree format was employed to elicit information pertaining to the attitude items (see Chapter 5).

Thurstone (1928) evaluated the enormous potential of attitudes. He related attitudes to the sum total of an individual's inclinations and feelings, prejudice or bias,

pre-conceived notions, ideas, fears, threats, and convictions about any specified topic. Suzuki (2007) also asserted that an attitude towards something or someone is developed in the brain which may not be overt at all, and the attitude arises because the person with some kind of knowledge, experience and feeling, evaluates the person or thing in some way. Attitudes tend to influence behaviour and therefore, can be seen as an important aspect of education (Reid, 2006). The next section explores the influence of societal attributes on an individual in the form of agents of socialization that also impact the knowledge and attitude parameters.

2.4 Agents of Socialization

Beck and Kosnik (2006) argued that all aspects of a person are connected. They further went on to assert in the light of the social constructivist view, that the knowledge of an individual is not only dependent on social interaction but on other aspects of the person as well, namely, attitudes, emotions, values and actions. The authors viewed the paradigm as strongly holistic. On the other hand, attitudes, apart from being linked to genetic and physiological factors also have other mediators or moderators bridging between the experience and formation perspectives (Oskamp & Schultz, 2005). Olson, Vernon, Jang, and Harris (2001) identified the mediating characteristics as sociability, physical attractiveness and aggressiveness.

Socialization is defined as the "process of learning one's culture and learning how to live within it" (Pandit, 2009, p. 37). According to the author, socialization essentially provides the individual with the resources necessary for acting and participating within the society. Family members, school, peer groups, mass media and other agents are identified as the primary agents of socialization. People and groups that essentially influence the development of an individual's self-concept,

emotions, attitudes and behaviour have been defined as the agents of socialization (Pandit, 2009). This is schematically shown in Figure 2.1.

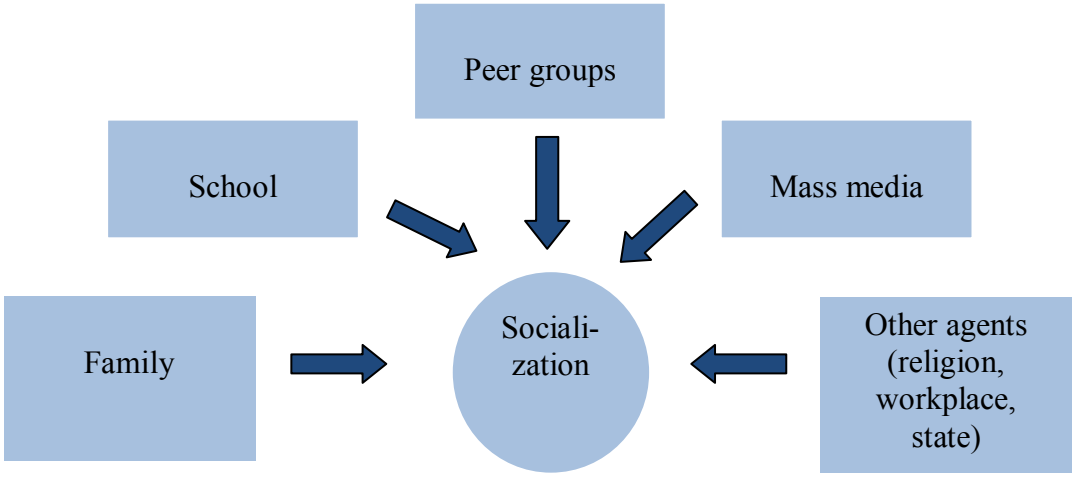

Figure 2.1. **Agents of socialization** (Adapted from Pandit, 2009, Figure 2.2, p. 42)

According to Pandit (2009), the members of a family, specifically the parents form the first step to socialization, whereby an individual develops personality in addition to learning language, speech, attitude, values and habits. The family also helps determine one's attitude towards religion as well as aid the establishment of career goals. Most importantly, the role of the family environment is critical in behaviour development and behaviour related diseases. The concept of imitation is recognized, whereby the individual imitates the behaviour of the parents, the usual norm being the male following the father and vice versa (Pandit, 2009). Families, therefore, are referred to as "cultural conveyor belts, the carriers of images, traditions, the meanings of life" (Edgar, 1991a, p. v cited in Russell, 1995, p. 70). Understandably, families exert enormous influence on the life of an individual, whereby the latter in varying degrees adopt the behaviours, attitudes and ways of knowing the world (Russell, 1995).

Considered as the second agent of socialization, the school helps mould the ideas and attitudes of an individual. It also helps in framing the socializing phenomenon of young people, specifically regarding particular skills and values in society (Pandit, 2009). Schools are envisaged to play an important role in the development of identities apart from being agents of socialization (Holmes, Hughes, & Julian, 2007). With a compulsory education in Australia, Edgar, Earle, and Fopp (1993, p. 329) posited that "the socialization responsibilities of educators are enormous".

Peer groups evolve as important socializing agents with a decrease in the parental influence and manifested particularly during emerging adolescence (Harper, 1997). Pandit (2009) asserted that identified as individuals of roughly the same age and/or sharing other social characteristics, peer groups are important agents of socialization. The peer group helps an individual acquire "cooperative morality" in addition to some informal aspects of culture - fads, fashions, crazes and modes of gratification to name some. Most importantly, "forbidden knowledge", like knowledge of sex and sexual relationships are shared within the peer groups (Pandit, 2009, p. 43).

The mass media does play an important role in socialization, more so in recent times (Pandit, 2009). According to Holmes et al. (2007), the terminology media also referred to as mass communication pertains to different forms of broadcast messages and information, primarily in the form of print, cinema, radio and television. Print media essentially comprises of daily and weekly newspapers, magazines and even the abundance of literature at bookstores and libraries, whereas the television and radio constitute the dominant electronic forms. The newer kinds of interactive media specifically that of the internet and the World Wide Web does differ from the

traditional broadcast media in the sense that they are not dialogical; however, their influence on contemporary social life is undoubted. Advertising signage also form an integral part of broadcast media (Holmes et al., 2007). The authors asserted that Australians exhibit high degrees of literacy towards newspapers and magazines. In addition, according to the authors, Australia has the fifth-highest density in the world on a composite index across telephone, television and personal computers. Harper (1997) posited that the role of the media is unquestioned in influencing people's attitudes and values. He added that the uniqueness of the media as a socializing agent lies in that the message is communicated from the medium to the receiver primarily on a one way basis.

Religion, workplace and the State are identified as the other agents of socialization by Pandit (2009). The author explained that religion helps to mould the beliefs and lifestyle of an individual, whereas the workplace helps the individual to learn specific behaviour. The State, in turn, acts as the "authoritarian agent" (Pandit, 2009, p. 43). Workplaces do gain their importance as agents of socialization with an individual commencing a career and the workplace continues to socialize its members throughout their working lives (Harper, 1997). Religion, critically distinctive into the substantive (beliefs, actions and feelings as religious) and functional (what religion does and how it affects the wider society) also acts as an agent of social control and social change (Holmes et al., 2007). Religious diversity has been a key characteristic of contemporary Australian society (Bouma, 1996; Cahill, Bouma, Dellal, & Leahy, 2004). The State too, has a pervasive influence on the lives of its citizens with its regulation and control in the social, political and economic realms (Harper, 1997).

Though the family forms the primary basis of the development of socialization in an individual, the societal roles in the form of schooling, peers and mass media do

play their part as well. In addition to the other agents of socialization as outlined above, training and workshops and related organisations were also conceptualized as the sources of information for South Australian pre-service teachers regarding STIs and other BBVs (see Chapter 5).

2.5 Summary

This chapter described the underlying concepts, theories, measurement approaches, and importance of knowledge and attitudes. It also highlighted the concept of the agents of socialization that impact the knowledge and attitude attributes of an individual. Most importantly, the chapter explained the importance of studying knowledge and attitudes of individuals and its underlying measurement approaches.

The next chapter outlines some of the related studies in the field. It not only aids in understanding how other researchers approached the topic of knowledge and/or attitude attributes of individuals related to diseases, but also what results came of it. Moreover, the detailed analysis of these studies also forms the basis for the development of the items of the attitude scale of the questionnaire as employed in the present study.

> "Most of the previous research conducted in the field continues to demonstrate the gap in knowledge related to STIs and the lack of confidence of pre-service teachers/teachers to deal with this particular component of the health education curriculum content." (Talukdar & Aspland, 2013, p. 76)

Chapter 3:

Review of Related Literature

3.1 Introduction

The total number of identified STDs is at least 20 (Little, 2000). The total number of distinct sexually transmitted or transmissible pathogens exceeds 35 (Holmes et al., 2008). The present study specifically dealt with eight of them (with the last one Hepatitis C having a minimal mode of sexual transmission - see next Chapter 4). Hence, the present literature has been grouped according to the distinct disease types 'bacterial', 'viral', 'other BBVs', and 'combined STDs' for those dealing with a range of the diseases.

The literature search on the topic of interest revealed that not much research had been attributed to studying the knowledge and attitude perspectives of pre-service teachers. Research related to HIV/AIDS, however, was an exception. Hence, for most of the individual diseases, knowledge and/or attitude studies conducted with the nearest cohort to pre-service teachers that is college and university students, and young adults and adults were reviewed. The age of the respondents in these studies were also taken into consideration for the review which resembled the age range of pre-service teachers in the current study.

3.2 Bacterial STDs

No previous research reported on the knowledge and attitude of pre-service teachers or even teachers regarding the individual bacterial STDs namely chlamydia,

gonorrhoea and syphilis. Nevertheless, knowledge and attitude research towards *Chlamydia trachomatis* infection had been documented on male university students and male adults and general university students as a whole. Prior research was also done regarding *Chlamydia trachomatis* infection as highlighting the knowledge, education and behaviour of young people and female urban adolescents, and knowledge and awareness among sexually active women. Research highlighting the knowledge of gonorrhoea had been done with adolescent females with a prior history of STD. However, apparently no one has yet explored the knowledge and/or attitude regarding syphilis as a disease entity alone.

3.2.1 Chlamydia

Akemi et al. (1999) conducted their study with male university students and male adults in Japan regarding the knowledge and concerns about *Chlamydia trachomatis* infection. Though the methodological details of the study could not be obtained, the abstract of the research revealed that both groups expressed their concern about STDs in general, and concern regarding *Chlamydia trachomatis* infection in particular was less. Male college students were concerned more about AIDS, whereas male adults tended to have concerns regarding syphilis or gonorrhoea. The male adults also obtained higher scores in the knowledge parameter about chlamydia infection as compared to the college students. The researchers stressed the necessity of school based education as covering and providing information regarding STDs in general. Peer counselling was suggested as one effective teaching strategy (Akemi et al., 1999).

Zakher and Kang (2008) also had university students as the target group in their research. The study was conducted with students (N=185) in the age range of 16-25 years attending a class each from the largest faculties of Science, Education, and

Arts at the University of Sydney, Australia. This pilot study primarily aimed to investigate the attitudes of Australian university students towards chlamydia screening in primary care. Nonetheless, information was also collected about the demographics, sexual history, and most importantly, chlamydia knowledge. A modified form of the National Survey of Adolescents and Young Adults - Sexual Health Knowledge, Attitudes and Experiences questionnaire designed by the Kaiser Family Foundation (the United States of America), was used as the survey instrument.

In terms of the baseline knowledge about chlamydia infection, 63.2 per cent of the total respondents in Zakher and Kang's (2008) study felt that they had little to no information about the disease. No significant difference, however, was found when the knowledge entity was compared across the faculties. The researchers concluded that the age group most susceptible to chlamydia infection was not well educated about their risk of infection. The attitudes expressed by the sample population towards chlamydia screening in primary care were contingent on the low level of baseline knowledge. This was evident from the fact that out of 110 students who were sexually active, 66 reported that they would not get tested as they thought that they were not at risk (Zakher & Kang, 2008).

Young people aged 15-19 years comprised the study sample for Lengen, Jäger, and Kistemann (2010). The participants consisted of students from one German school in Bonn (N=93) and students from two Danish schools in Aarhus (N=97). The study primarily sought to explore the association of knowledge of sex and STDs with that of sex education, and sexual behaviour with knowledge of sex and STDs and sex education. A standardised questionnaire was used for the purpose containing questions related to the demographic and socio-demographic characteristics of the respondents, in addition to inputs towards sex education, relationships and sexuality

and knowledge about sexually transmitted diseases, particularly knowledge about chlamydia infection.

The results of Lengen et al.'s (2010) study revealed strong associations between self-estimated sex knowledge and sex education by the family on the one hand, and active STD knowledge and sex education by media and experts on the other hand. Sexual behaviour was dependent particularly on the sex education gained through the television, Internet and the print media. The two groups differed significantly in their knowledge towards chlamydia and HIV/AIDS. While the pupils from Bonn had a better sexual knowledge than their Danish colleagues, they knew less about chlamydia than the Danes. They believed that HIV was more frequent than chlamydia or that both the diseases were rare, which was an incorrect information (Lengen et al., 2010).

Griesinger, Gille, Klapp, Von Otte, and Diedrich (2007) although primarily sought to link the sexual behaviour of German female urban adolescents (N=521; age range 14-20 years) with that of *Chlamydia trachomatis* infection, they also reported on the knowledge of the disease. This ad-hoc observational study was conducted in the metropolitan area of Berlin in 2004. A self-structured questionnaire (partly tick-style) was used for the purpose of eliciting information regarding demographics (age and educational level), contraceptive use and participant's knowledge regarding *Chlamydia trachomatis* infection. The study revealed poor knowledge regarding the disease with 80.8 per cent of the respondents reporting no previous knowledge or the adverse health consequences of the disease. However, no association was found between *Chlamydia trachomatis* prevalence and age, educational level, previous knowledge about chlamydia or condom use. The researchers asserted the need for

health education to address the knowledge and prevention of a *Chlamydia trachomatis* infection for female adolescents (Griesinger et al., 2007).

Women attending either an abortion or family planning clinic in Aberdeen and Leeds, United Kingdom constituted the sample (N=1200; age range 13-56 years) for Macmillan, Walker, Oloto, Fitzmaurice, and Templeton (1999). A tick-style questionnaire was employed to provide demographic and genito-urinary chlamydial infection information. An other and/or don't know option was included in the questionnaire to prevent guessing. In two questions, regarding transmission and sequelae, the participants were given more than one option to tick. Knowledge was tested in the areas of the type of infection, transmission, immunity, symptoms, and sequelae.

Awareness was poor, as half of the study population in Macmillan et al.'s (1999) study had never heard of chlamydia. Overall, less than one-quarter demonstrated adequate knowledge regarding transmission, immunity, symptoms, and sequelae. Better knowledge was found in women over the age of 25 years, in those cohabiting, in those with a professional/management occupation, and in those attending family planning clinics. An urgent need to assess the impact of the different approaches to education regarding sexually transmitted infection was suggested as an outcome of the research. The researchers also stressed the importance of education in the provision of balanced information, knowledge attainment, and behaviour modification (Macmillan et al., 1999).

3.2.2 Gonorrhoea

Biro, Rosenthal, and Stanberry (1994) examined how a previous infection with gonorrhoea or another STD impacted on patients' knowledge of gonorrhoea. Adolescent girls (N=248; age range 12-21 years) from a primary-care adolescent

clinic within a large urban teaching hospital in Cincinnati, Ohio, in the United States of America constituted the sample. The questionnaire used was a standardised one utilising the 5-point Likert format and contained items regarding the symptoms and sequelae of STDs.

The results of Biro et al.'s (1994) study revealed that girls with a personal history of gonorrhoea had more correct responses than those with no history of a STD. However, they were not statistically different from those with a non-gonococcal STD. Regarding the knowledge score, no group had a mean correct score greater than 6.66 out of a possible 13. Overall, the adolescents were reported to have an inaccurate foundation of knowledge regarding the symptoms and sequelae of gonorrhoea (Biro et al., 1994).

One of the limitations outlined by Biro et al. (1994) regarding the above study was its attempt to serve as a naturalistic study of information obtained by adolescents through routine health care, rather than an evaluation of the various methods of imparting information. Thus, the need for future research to examine the direct efforts to impart information regarding the risk of asymptomatic infections was suggested as an outcome of the research. Nonetheless, according to the researchers, the major public-health issue of concern was the lack of an accurate knowledge of asymptomatic infection. The researchers concluded that a lack of knowledge regarding STD symptoms and sequelae, as well as inaccurate knowledge regarding the asymptomatic nature of several STDs, will continue to place sexually active adolescents and their partners at continued risk for STDs (Biro et al., 1994).

3.2.3 Syphilis

Apparently, no previous research reported on the knowledge and/or attitude measures of syphilis as a disease entity alone.

3.3 Viral STDs

In great contrast to the bacterial STDs, extensive research had been done highlighting the knowledge and attitude perspectives of pre-service teachers and teachers towards HIV/AIDS. Only one study focused on teachers' knowledge of the HPV, responsible for genital warts. Other studies pertaining to HPV knowledge and attitudes had been conducted with women, college students, university students, parents, and as general/national surveys. Regarding the viral STD genital herpes, knowledge and attitude research had been completed with populations of women, patients and clinicians, and general practitioners, though not with pre-service teachers or teachers.

3.3.1 Genital Warts

In a survey conducted by Beatty, O'Connell, Ashikaga, and Cooper (2003) entailing HPV education in 79 middle and high schools in Vermont, in the United States of America, 60 per cent responses were elicited from nurses and 40 per cent from teachers. The survey addressed knowledge level, behaviour, attitudes, enabling factors, motivators, and barriers to HPV education. Less than 60 per cent of combined respondents answered correctly to questions addressing the basic knowledge of HPV. The majority, however, felt that it was important to teach about HPV relative to HIV/AIDS when actually less classroom time was spent teaching it. The main motivations for teaching about HPV were attached to its importance, and a desire to increase student knowledge and prevention skills. The main barriers perceived were lack of time and materials and curricula, and a need for more knowledge about HPV. The most prominent needs indicated included brochures for students, an increase in the educators' knowledge base, and a high school curriculum. The researchers found that health educators in Vermont schools did recognize the importance of teaching

adolescents about HPV, but they lacked the basic knowledge and resources for doing so (Beatty et al., 2003).

Holguin (2009) carried out a cross-sectional quantitative study with 18 to 26-year-old women (N=212) to determine their knowledge, attitudes, and perceptions regarding cervical cancer, HPV and the HPV vaccine. The research was conducted in health clinics in Utah, the United States of America, with a sample of convenience. Age, race and highest educational level outlined the major demographic characteristics. Regarding the accuracy of knowledge of the respondents towards cervical cancer, HPV and the HPV vaccine, 81.1 per cent reported that they had heard about the virus. The remaining was not at all familiar with the name of the virus. Sixty three per cent of the sample correctly answered questions regarding HPV transmission. However, the majority (57.5 per cent) could not correctly identify ways of decreasing their risk of becoming infected with HPV. The link between HPV to genital warts and cervical cancer was correctly identified by 76.9 per cent of the women. Most women (79.2 per cent) could also identify ways to prevent themselves from acquiring cervical cancer despite their inability to identify ways to decrease their risks of becoming infected with the virus. The majority (71.7 per cent) were aware of the modern day HPV vaccine, Gardasil. Regarding the severity of HPV and cervical cancer, 80.7 per cent reported that HPV is indeed a serious issue. Approximately 90 per cent either strongly agreed or agreed that getting cervical cancer is a serious health issue as well. The researcher stressed the necessity of future qualitative research using focus groups and interviews to elicit and validate the quantitative self-reported findings (Holguin, 2009).

A qualitative research method in the form of focus groups was employed in Homer's (2004) research. The primary aim was to evaluate what college males

(University of Florida's College of Journalism and Communications in the United States of America; age range 19-40 years) knew about HPV and also their general STD knowledge and attitudes towards HPV. During the focus groups (five focus groups of approximately eight to 15 participants in each), participants first were asked questions regarding general sexual health awareness and concerns about STDs. After responding to the preliminary questions, participants were given a few minutes to study and reflect on a HPV fact sheet. They then were asked questions related to HPV awareness, concern, and future considerations. Age, race, sexual orientation, and number of sex partners constituted the demographic variables of the study (Homer, 2004).

Different themes were designed in Homer's (2004) study for evaluation of the findings. In one such theme the 'Ranking STDs', most of the major STDs were mentioned by the participants. In general, the males did not know much about many of the STDs beyond their names; however, all were unanimous towards not contracting them. When asked to rank the STDs in terms of seriousness, number one and two on the list were HIV/AIDS and herpes, respectively. In yet another theme 'HPV, Share and Tell', participants' views regarding both interpersonal communication and mass communication about HPV were addresed. Girlfriends emerged as the main person for communication regarding HPV. Friends ranked second; however, the researcher found that the majority of the males mentioned this on a light note. The participants were sceptical regarding the interpersonal communication mode about HPV. Nonetheless, most of the participants agreed upon the mass media coverage as an effective means to identify the serious issue of HPV to the public (Homer, 2004).

Sandfort and Pleasant (2009) performed their research with university students. The quantitative research was carried out at a large, public university in the Northeast United States of America in 2008. It aimed to assess students' (N=1,282; age range 17-45 years) HPV knowledge in terms of its prevalence, transmission, cervical cancer risk and stigma, sexual behaviour, vaccination status, as well as past and preferred sources of information about HPV and sexual health. The paper-based survey consisted of 30 questions with both Likert scales and true/false response formats. Age, sex, marital status and race were the demographic variables for the study (Sandfort & Pleasant, 2009).

The results of Sandfort and Pleasant's (2009) study revealed a moderate level of knowledge about HPV among university students. Most were not informed regarding specific aspects of the disease like the prevalence of HPV infections (13.6 per cent), and HPV transmission via skin-to-skin contact (51.5 per cent) and oral sex (49.6 per cent). Additionally, half of the participants were unclear about the fact that condom use does not fully protect against transmission of HPV, whereas only 28 per cent correctly identified that HPV cannot be transmitted via bodily fluids (blood, semen). Participants were also misinformed about the fact that most women with HPV infections will not develop cervical cancer. Statistically, men exhibited lower levels of knowledge on an average (Sandfort & Pleasant, 2009).

Sandfort and Pleasant (2009) further reported that a greater level of knowledge was demonstrated about the cervical cancer risk factors. On average, 85.76 per cent of the participants understood the risk factors associated with an increased risk of developing cervical cancer. The HPV stigma scale indicated that stigma was not excessively prevalent or strong in this population overall. However, men demonstrated a significantly higher level of stigma than did women. Eight per cent of

the sample reported of never having heard of the HPV, whereas 22 per cent were not aware of its vaccine. Of those who had heard of HPV, the most reported sources of information were television commercials (65.7 per cent), friends (37.7 per cent), high school/college class (37.7 per cent), and the Internet (32 per cent). These were in contrast to the preferred cited sources - family physicians (67.1 per cent), gynaecologists (45.3 per cent), and the Internet (43.4 per cent). In general, men preferred to obtain information about their sexual health from their family doctor, the Internet, academic articles, newspapers, and books. Women were in favour of their gynaecologist, family, TV commercials, and TV drama/comedy shows. As an outcome of the research, the dissemination of knowledge regarding the ongoing scientific process in the field to the general public was suggested as an empowerment towards sexual health (Sandfort & Pleasant, 2009).

Another study which employed university students was done by Wong and Sam (2010). This study aimed to assess knowledge and attitudes towards HPV infection, HPV vaccination and cervical cancer among female university students, in an effort to provide insight into the development of HPV educational information. The cross-sectional survey using a convenience sample consisted of a total of 650 (mean age 21.47 years) ethnically diverse female students attending a public university located in Kuala Lumpur, Malaysia. Ethnicity, religion, academic status and relationship status outlined the demographic characteristics of the respondents (Wong & Sam, 2010).

Under the knowledge and awareness criteria in Wong and Sam's (2010) study, 21.7 per cent of the respondents had heard of HPV, and only 10.3 per cent had heard of the HPV vaccine. Of those who had heard about the vaccine, the major sources of information cited were newspapers (49.3 per cent), followed by friends (31.3 per cent)

and other public media (magazines 25.4 per cent, television 20.9 per cent, and radio 6.0 per cent). Only 1.5 per cent learned about the HPV vaccine from health care professionals. Participants of 21 years of age or older were more likely than younger participants to have heard of the HPV vaccine (65.7 per cent as compared to 34.3 per cent). Regarding ethnicity, the Chinese were the most likely to have heard of the vaccine (44.8 per cent), followed by the Malays (41.8 per cent), the Indians (11.9 per cent) and others (1.5 per cent). However, there was a lack of knowledge about the vaccine among the 67 students who had heard it before. This was evident as only 59.7 per cent correctly answered that the vaccine is to protect against cervical cancer (Wong & Sam, 2010).

Wong and Sam (2010) further reported that the mean knowledge score for HPV and genital warts was only 0.62 out of a possible 6.0. Most of the students lacked information about the relation of HPV to cervical cancer (72.8 per cent) while the mode of transmission of HPV was only known by 10.0 per cent. 74.3 per cent indicated that they were unaware of HPV as a common infection. Likewise, knowledge of cervical screening and cervical cancer risk factors was also poor with a mean score of 2.63 out of 8.0. Understandably, the mean total knowledge score was also poor and recorded at a 3.25 out of a possible 14. Statistically significant differences were noted in the total mean knowledge scores among the ethnic groups, with relatively lower scores among Malays and Indians. Significantly lower knowledge scores were seen in first and second-year undergraduates as compared to third and fourth-year undergraduates (Wong & Sam, 2010).

The regression model of the attitude scores in Wong and Sam's (2010) study revealed that the intention to receive an HPV vaccine was significantly associated with the scores for knowledge of HPV and genital warts, and knowledge of cervical

screening and cervical cancer risk factors. Perceived embarrassment at receiving an STI vaccine was also significantly associated with knowledge of cervical cancer and cervical cancer risk factors. The research findings revealed widespread lack of knowledge in all areas related to the HPV infection. Accordingly, the researchers suggested the urgent need for public education that explicitly addressed such knowledge deficiency among women in institutions of higher learning. An HPV education leaflet for future HPV educational intervention for female university students was developed based on the findings. Future research to test the efficacy of the HPV education leaflet was asserted by the researchers (Wong & Sam, 2010).

Toffolon-Weiss et al. (2008) targeted a convenience sample of Alaska Native parents or guardians to explore their knowledge and attitudes on cervical cancer, HPV and the HPV vaccine. The mixed-method study composed of 11 focus groups (N=80; 25 in the age range of 31-40 years and 55 in the age range of 41-50 years) and was conducted in 1 small village, 2 towns and 1 large urban centre in Alaska in the United States of America. The quantitative survey findings regarding knowledge about cervical cancer, vaccines, HPV, and the HPV vaccine revealed that the majority of parents (70 per cent) knew the role of the Pap test as applicable for screening cervical cancer. This knowledge was more prevalent among the participants in the hub communities (96 per cent) as compared to the urban (79 per cent) and village communities (46 per cent). However, regarding the HPV vaccine in particular, only 56 per cent of the respondents informed that they were aware of an existing one. Far fewer associated the vaccine with the prevention of cervical cancer. Again, the hub communities were clearly more knowledgeable (83 per cent) than the urban (58 per cent) and the village (36 per cent) counterparts. The terminology HPV was familiar to most; however, most were unaware of the link between HPV and cervical cancer. Of

those who were familiar, the major sources of information cited were commercials, news reports, clinic visits or from an experience of working in medical settings. Regarding HPV transmission, knowledge was again predominant among the hub communities (74 per cent), followed by those at the urban (63 per cent) and village (36 per cent) settings. In both the urban and hub communities, a similar percentage of parents (38 per cent) knew that there was an association between HPV and genital warts, while only 6 per cent of village-based parents were aware of this association (Toffolon-Weiss et al., 2008).

In the focus group discussions in Toffolon-Weiss et al.'s (2008) study, STDs emerged as one of the major three health-related concerns, the other two being cancer and general wellness. The major themes identified in the focus groups included but were not limited to the types, spread, symptoms, tests, consequences, risk factors, prevention and treatment of HPV and cervical cancer. Regarding what information should be included as effective educational campaigns targeted as an educational intervention, the parents were unanimous in all the communities towards a focus on prevention. Both urban and hub parents thought that the educational campaign should involve families and more than one generation. Teachers were quoted as one of the major sources of the deliverance of information regarding HPV and its vaccine with major health-care providers being the rest. Parents were also supportive of the television, radio, Internet, newspaper advertisements, community forums, and school education programs as effective mediums of transmittance of information (Toffolon-Weiss et al., 2008).

Friedman and Shepeard (2007) explored, in the form of focus groups, the general public's knowledge, attitudes, and beliefs about HPV and a hypothetical HPV vaccine as well as their communication preferences for HPV-related educational

messages. The focus groups were stratified by gender, race/ethnicity and an urban or rural location. These were randomly selected from six different geographical areas in the United States of America identified on the basis of previous data regarding cervical cancer mortality and syphilis prevalence rates. Individuals selected for the study had to be in the age range of 25-45 years in addition to satisfying other parameters for an inclusion. Thirty-five focus groups emerged as the final sample numbering to 314 individuals. The primary focus group themes identified were 'About HPV', 'HPV Epidemiology', 'HPV-Cancer Link', and 'Concerns of Secrecy' (Friedman & Shepeard, 2007).

Regarding the general attitudes towards STDs in Friedman and Shepeard's (2007) study, these were not listed as a major health threat or concern to participants across gender, racial/ethnic, or geographic groups, with the exception of HIV/AIDS. The participants mentioned the terms promiscuity, infidelity, shame, embarrassment, guilt, and divorce, as associated with STDs. Though the participants listed gonorrhoea, syphilis, genital herpes, hepatitis B, HIV, pubic lice, and chlamydia as the common STDs, still genital warts emerged as the most frequently encountered disease in the focus group discussion. The participants could explain that genital warts is benign, treatable, and not of great health concern. However, misconceptions regarding genital warts were common and the fact that HPV was rarely discussed reflected on the low HPV awareness across all groups. By and large, participants were also not informed of the link between HPV and cervical cancer. Once informed by the moderator about the nature of HPV and its link to cervical cancer, participants expressed concern that genital warts were more serious than they had originally believed. Across all racial and geographic groups, HPV awareness was slightly more common in females than males. Females cited gynaecologists, friends who had HPV,

magazine articles, and an abnormal Pap test result as the main sources of information regarding HPV (Friedman & Shepeard, 2007).

Across all groups in Friedman and Shepeard's (2007) study, participants wanted to know more about the symptoms, transmission, consequences, testing options, curability, and treatability versus life threatening consequences of a HPV. Urban African American males and rural Hispanic females also wanted to know about vertical transmission. All groups wanted a list of organizations or resources to contact for more information. The stigma associated with STDs was seen as a major hindrance towards knowledge acquisition. However, across the groups, HPV information was preferred from the same primary channels as other health-related information – the Internet and their health care provider. Gynaecologists were preferred as the message channel for women. Clinics, schools, magazines, local television news, and national television advertisements were cited as other appropriate sources of information regarding health-related issues. It is interesting to note that salons or hairdressers were suggested as an appropriate venue for reaching the African American audiences. However, the majority of participants did not prefer the mail on account of the stigma and privacy concerns related with STDs (Friedman & Shepeard, 2007).

Suggested messages for the public arising out of Friedman and Shepeard's (2007) research included adequate education covering all aspects of the natural history, transmission, prevention and treatment of HPV. The accurate portrayal of the risk of HPV avoiding undue anxiety and complacency was also stressed upon. Most importantly, a transparent sharing of current knowledge to the general public regarding HPV was observed as an effective educational intervention in the light of an evolving scientific knowledge (Friedman & Shepeard, 2007).

Another study aimed to ascertain the HPV-related knowledge and attitudes of the general population was conducted in the Gwagwalada Area Council of Nigeria by Nnodu et al. (2010). 400 participants aged 15-45 years were selected from Gwagwalada town and the adjourning Giri village in Nigeria. The response format was a multiple choice, free response questionnaire designed to obtain information on the respondents' demographics, knowledge of STDs, HPV and cervical cancer, and health and communication resources in their communities. This was supplemented by focus group discussions among religious and tribal groups within the urban and rural communities. Age, education, religion, occupation, marital status, number of children, number of co-wives, and residency status (urban/rural) constituted the demographic information (Nnodu et al., 2010).

The majority of the respondents in Nnodu et al.'s (2010) study were aware of STDs. Knowledge differed significantly across the individuals in terms of the demographic variables of study. The urban tended to know more than the rural community, and high educational level also had the same trend when compared to the low education subgroup. Muslims had better STD knowledge than the Christians, though age and marital status were not statistically significant. Majority of the respondents, however, were not informed about cervical cancer and the HPV. Results indicated the same trend in HPV and cervical cancer knowledge as did the general STD knowledge. Old age, high education, an urban location and 'others subgroup' (as opposed to married respondents) were significant predictors of high knowledge regarding the HPV virus. Health officials, television, next of kin, friends, magazines, and school were referred to as the major sources of information regarding cervical cancer. For HPV, the sources were primarily confined to the health officials and the school. Health officials emerged as the most important source of information on these

diseases. A majority of the respondents, however, felt that cervical cancer and HPV disease conditions cannot be prevented (Nnodu et al., 2010).

Nnodu et al. (2010) further reported that the focus group discussions conveyed the willingness to know more and to avail themselves of any preventive interventions. As such, the researchers also strongly suggested the role of an effective educational awareness and other interventions in the community as a means to prevent the spread of HPV infections (Nnodu et al., 2010).

3.3.2 Genital Herpes

Vonau, Low-Beer, Barton, and Smith (1997) evaluated the knowledge and attitudes of women (N=100) attending an antenatal clinic at the Chelsea and Westminster Hospital, central London, towards genital herpes. A self-structured questionnaire employing a yes, no and not sure format was administered for the purpose. The results revealed that the majority of the respondents (80 per cent) were aware of the fact that genital herpes is a sexually transmitted disease. The fact that the disease can be transmitted to the baby during pregnancy was also known by a significant proportion of the sample (60 per cent). Only 34 per cent thought that genital herpes is always symptomatic and this revealed the awareness towards this asymptomatic disease. The attitudes were also positive and the majority was prepared to go in for an antenatal serum screening (80 per cent) as well as encouraging their partners to get tested (76 per cent) (Vonau et al., 1997).

Vonau et al.'s (1997) study revealed a good level of knowledge and positive attitude among the respondents. However, the researchers were cautious of the fact that the majority of the samples were anglo-saxon, secondary-school educated women who were better informed about health issues. Accordingly, an extension of this

research was suggested by the researchers both on the male partners as well as on other social groups and non-metropolitan areas (Vonau et al., 1997).

A study measuring general practitioners' knowledge and opinions regarding genital herpes was conducted in Coventry, a United Kingdom metropolitan city by Narouz, Allan, and Wade (2002). General practitioners in and around Coventry (N=183) completed a questionnaire devised by the researchers. The questionnaire contained items related to general questions about genital herpes, the shedding, transmission and clinical presentation and type specific serotesting of the disease. The attitude questions related to genital herpes serotesting and the whole questionnaire was in yes, no, and not sure format. For the knowledge items, a correct answer elicited a score of one and all others a zero. Scores were summed to give the total knowledge measure (Narouz et al., 2002).

Regarding the overall knowledge score in Narouz et al.'s (2002) study, 56 per cent of correct responses were reported with 15 per cent incorrect, 26 per cent not sure, and 3 per cent with no answer. The general questions regarding herpes had an overall 62 per cent correct answer with 18 per cent incorrect, 15 per cent not sure, and 5 per cent eliciting no response. The shedding, transmission, and clinical presentation category reported a 63 per cent correct response, with 17 per cent being incorrect, 19 per cent not sure, and 1 per cent with no answer. The type specific serotesting of genital herpes had the lowest percentage of correct answers (41 per cent) with the majority of respondents (49 per cent) not sure of the answer. In this category, eight per cent were incorrectly informed and two per cent had no answer to the questions asked (Narouz et al., 2002).

Another study conducted in Coventry was described by Narouz, Allan, Wade, and Wagstaffe (2003). In addition to ascertaining the seroprevalence and correlates of

antibodies to the HSV-1 and HSV-2 virus types, this study also focussed on the knowledge, feeling and attitude perspectives of patients (N=223) towards genital herpes infection. A self-administered questionnaire using a true, false, not sure format for the knowledge items and Likert and tick-style for the remaining measures was employed for the cross-sectional study. Patients attending the genitourinary medicine clinic in Coventry constituted the study sample. Age, education, ethnicity, and occupation constituted the major demographic variables in addition to other disease-related attributes (Narouz et al., 2003).

The measured outcomes in Narouz et al.'s (2003) study were reported both before and after counselling (pre-test counselling). The sample sizes for most of the measured outcomes was different owing to the missing and blank data and participation rates. Regarding the knowledge measure by all participants (N=217) before counselling, 59 per cent fell under the correct, 12 per cent incorrect, and 28 per cent under the not sure category. After counselling, these changed to 92 per cent correct, 5 per cent incorrect and 3 per cent not sure categories. The majority of the participants were aware that genital herpes is a STD [83 per cent (184/222) before and 93 per cent (204/218) after counselling]. The knowledge of the fact that genital herpes is caused by a virus increased after counselling from 66 per cent (147/222) to 97 per cent (211/218). Only 55 per cent (122/222) were aware that virus-causing cold sores can lead to genital herpes which increased to 94 per cent (206/218) after counselling. Fifty-four per cent of the answers to the questions about unrecognised infection and asymptomatic shedding were correct, which increased to 90 per cent after counselling (Narouz et al., 2003).

Narouz et al. (2003) further reported that before counselling, about two thirds of the participants expected the effect on them, if they or their partners had been

diagnosed with genital herpes infection, to be moderate to severe [68 per cent (152/222) and 61 per cent (135/222), respectively]. One fifth of the participants expected the effect, in both situations, to be very severe. This opinion was not significantly changed after counselling. Genital herpes was viewed to be worse than chlamydia or gonorrhoea by 31 per cent (61/196) and 45 per cent (90/201) respectively, before and after counselling. The researchers in this study noted previous works which showed poor knowledge about genital herpes among both patients and clinicians alike. They, therefore, attributed the significant improvement of knowledge to the appropriate counselling offered to the patients (Narouz et al., 2003).

3.3.3 HIV/AIDS

Agrawal, Rao, Chandrashekar, and Coulter (1999) carried out a cross-sectional descriptive study with 990 pupils (Year 12; age range 15-25 years) and 46 trainee teachers (attending one teacher training college; age range 18-25 years) in Udupi taluk, Dakshina, in the Kannada district of south-western Karnataka, India. A self-administered, anonymous questionnaire was used which contained 43 closed-ended and four open-ended questions. The scoring format for the knowledge questions were as follows – no level of knowledge for respondents who scored less than 14, some level of knowledge in the score range of 15-20, fair knowledge in the 21-29 score range and good knowledge for those who scored above and equal to 30 (Agrawal et al., 1999).

Both the school pupils as well as the trainee teachers in Agrawal et al.'s (1999) study reported a lack of knowledge about HIV/AIDS. The mean scores of both students and trainee teachers were in the fair group (21-29) with trainee teachers having slightly more knowledge. There were many misconceptions, however, about

the modes of spread and prevention regarding HIV/AIDS. Teachers were more knowledgeable than the students and knew that HIV and AIDS were different. However, more pupils (84.3 per cent) knew that HIV/AIDS was caused by a virus than trainee teachers (56 per cent), and 24.3 per cent of pupils and 6.3 per cent of trainee teachers thought there was a cure for HIV/AIDS. In all, 27.4 per cent of the pupils and 14 per cent of the trainee teachers thought there was a vaccine to prevent HIV/AIDS infection, whereas 20 per cent did not know anything as such. The impact of the demographic parameters (English versus local language medium of instruction, private versus government schools, science versus non-science students, rural versus urban students, and gender comparisons) on knowledge outcomes were, however, analysed from the student perspectives only. Results revealed English medium students, private schools, students studying science, rural students, and males as scoring higher in the knowledge domain when compared to their respective counterparts (Agrawal et al., 1999).

Regarding the attitudes of trainee teachers towards HIV/AIDS in Agrawal et al.'s (1999) study, 96 per cent thought that HIV/AIDS was a problem for India as a whole. Ninety per cent of the trainee teachers also felt that they should be told if a colleague had HIV/AIDS. Forty-two per cent further reflected that a colleague with the disease should not be allowed in their class and 60 per cent were of the opinion that a teacher with the disease should not be allowed to teach in their school. The researchers in this study were particularly concerned at the lack of essential knowledge and the prevalence of many misconceptions about HIV/AIDS, among both pupils as well as trainee teachers. Many forms of cure were quoted by the respondents. According to the researchers, misinformation concerning a cure for AIDS is one of the risk factors for contracting the disease. Mass media emerged as the

main source of information regarding the acquisition of knowledge. However, the lack of sex education was expressed as a concern and the researchers strongly supported the expansion of a health education programme involving parents (Agrawal et al., 1999).

Avina and O'Connell (2006) recruited a convenience sample of 72 trainee teachers attending science classes (biology, n=27; ecology, n=17, and physics, n=28) of an institution for teacher training in Russia. The instruments that were employed for the measurement of knowledge and attitudes were the HIV/AIDS Knowledge Scale for Teachers and the HIV/AIDS Attitudes Scale for Teachers, respectively. The knowledge scale measured two specific areas. Sixteen general knowledge items addressed HIV-related aspects, including causes, symptoms, diagnosis, effects and treatment. Another 15 transmission items addressed the possible modes of transmission. The attitude scale adopted a 5-point Likert and measured attitudes of the respondents towards HIV/AIDS and HIV/AIDS education. Demographics, attitudes and experience teaching HIV prevention or sex education were examined as factors as influencing the knowledge domain. Gender, religion, number of teaching years, city of residence, setting of school (urban, rural, suburban), grade level and subjects taught and support of HIV prevention in the schools, constituted the major demographic variables (Avina and O'Connell, 2006).

Scores on the knowledge scale in Avina and O'Connell's (2006) study ranged from 2-21 out of a possible 31 (a mean score of 13.14; 44 per cent correct). This low average score revealed the lack of HIV/AIDS-related knowledge among the representative teacher trainees. Specifically, knowledge scores related to HIV transmission indicated that teachers better understood how HIV is transmitted than how it is not. The knowledge score correlated with the attitude score and the authors

asserted that as knowledge increased, attitude became more positive. The mean attitude score was 60.1 out of a possible range of 20 (most unsupportive) to 100 (most supportive) (Avina & O'Connell, 2006).

Avina and O'Connell (2006) further reported that knowledge inversely correlated with age; however, religion and school location did not result in any significant correlation with the knowledge score. The other two demographic factors, experience with teaching HIV prevention or with teaching sex education also did not correlate with the knowledge score. This indicated that teachers who did present HIV prevention education and/or sex education were not any more knowledgeable than their peers. The researchers called for more effective training in an effort to raise the level of knowledge regarding HIV/AIDS for trainee teachers. The researchers further asserted that an increment of knowledge of teacher trainees would be imperative if a positive impact on students' learning was to be achieved (Avina & O'Connell, 2006).

Cinelli, Sankaran, McConatha, and Carson (1992) implemented a study that aimed to assess the knowledge and attitudes of pre-service teachers majoring in education. The study also aimed to develop pre-service HIV/AIDS curricular guidelines. 216 elementary, health/physical education, and school health majors enrolled in health education courses constituted the sample for the self-structured survey. Issues relating to AIDS education like the symptomatology, modes of transmission, risk behaviours, consequences, prevention and control measures, classroom policies as well as attitudes towards testing, confidentiality, providing support, and comfort level with HIV/AIDS classroom instruction were the measured outcomes. The methodological details of the research could not be obtained. Nevertheless, the survey was described as successful towards the development of pre-service HIV/AIDS curricular guidelines. Curriculum development was carried out in

collaboration with the West Chester Area School District, the United States of America as an outcome of the research (Cinelli et al., 1992).

McGinty and Mundy (2009) undertook to measure the knowledge, attitudes, and concerns of the Namibian Bachelor of Education students (third year – B.Ed., Senior Secondary Program, Faculty of Education, University of Namibia) in relation to HIV/AIDS education. 121 students constituted the final sample. A mixed-method approach was followed whereby, a self-structured questionnaire tested the knowledge (17 items, true/false format), attitudes and concerns (4-point Likert) and demographic characteristics of the respondents. One-on-one interviews allowed for a broader understanding and an opportunity to clarify and expand upon the data obtained in the questionnaires. A second form of qualitative approach was the use of non-participant observation where the Contemporary Social Issues Course was critically analysed and the lecturers observed in an effort to gain an understanding of the education offered to the students and their responses to it. The focus was on the content of the course, pedagogical implementation, and student involvement and interaction (McGinty & Mundy, 2009).

Analysis of the questionnaire in McGinty and Mundy's (2009) study revealed only a basic level of understanding of HIV/AIDS and its related issues among the student teachers. On an average, an individual responded incorrectly to 18 per cent of the posed questions in the questionnaire. In general, students fared the worst in questions relating to HIV/AIDS transmission and prevention than to prevention and risk reduction and living positively. Only two third of the respondents were aware that there is a medication available for people living with HIV/AIDS. Slightly more than a half (51 per cent) of the respondents knew that body piercing or tattoos can also be a mode of HIV/AIDS transmission. In the individual interviews also, gaps in

knowledge were evident. Over one third of the respondents (22 out of a total 60 surveyed) felt that they did not have sufficient knowledge to answer questions pertaining to HIV/AIDS, posed to them by secondary students (McGinty & Mundy, 2009).

McGinty and Mundy (2009) further reported that the Contemporary Social Issues Course appeared to have no impact on the knowledge scores, statistically. This was also validated through the interviews where the majority felt that the course did not serve as a major source of information. Only 30 per cent of the respondents regarded the University of Namibia as providing sufficient information relating to HIV/AIDS and most of the students expressed that the university needed to do more. The respondents (both questionnaire and interview findings), however, bore a positive attitude towards teachers as responsible for the dissemination of information regarding HIV/AIDS to students (68 per cent strongly agreed). Acknowledging the crucial role of the school towards HIV/AIDS education, most of the student teachers, however, indicated a lack of preparation. Over one quarter felt that they did not have sufficient knowledge to teach students about HIV/AIDS. Training in HIV/AIDS knowledge, pedagogical methods, home-based care techniques, and counselling and stress management emerged as the critical areas of concern towards teacher preparation in this area (McGinty & Mundy, 2009).

McGinty and Mundy (2009) also reported that positive attitudes towards teaching were undermined by the feelings of discomfort and embarrassment issues related to HIV/AIDS. Stigma and discrimination were inherent inhibitors towards HIV/AIDS prevention education. A high level of knowledge was a significant predictor of the willingness to teach the Life Skills Course. The researchers, therefore, stressed the importance of the incorporation of adequate knowledge and pedagogical

method in teacher training. They felt that this would be crucial towards the building of confidence and self-efficacy of the teachers. An attitudinal and cultural component inclusion in the proposed teacher-training curriculum was also suggested as an outcome of the research. This would allow the students to examine and reflect upon the current sexual practices that lead to the continual spread of HIV/AIDS (McGinty & Mundy, 2009).

Pontzer (2010) addressed the need for HIV/AIDS education for pre-service teachers. A qualitative and comparative study examined pre-service teachers' knowledge, attitudes, perceptions, and beliefs about HIV/AIDS and individuals with HIV/AIDS. Though the methodological details of the study could not be obtained, specialized training for pre-service teachers was outlined as an essential element of teacher education in order to deliver an appropriate and effective HIV/AIDS education curriculum. The realities, barriers, and challenges faced by in-service teachers were suggested as the guiding parameters towards the design of an effective HIV/AIDS curriculum for the pre-service colleagues (Pontzer, 2010).

Chifunyise, Benoy, and Mukiibi (2002) evaluated the changes in Zimbabwean student teachers' knowledge, attitudes, and sensitivity towards HIV/AIDS issues after an educational intervention. The research instruments used in the evaluation were a baseline questionnaire (used twice – once at the introduction of the intervention in 1994 and in the present study in 1998), follow-up questionnaires, and a set of focus group discussions. The follow-up questionnaire had 15 additional questions added in order to test attitudes that were related to gender. The sample for the follow-up study comprised of 1562 student teachers with an average age of 25.7 years (age range 17-52 years). Fifteen focus group discussions entailed 207 student teachers (Chifunyise et al., 2002).

In general, Chifunyise et al.'s (2002) study had an increased level of knowledge regarding HIV/AIDS as compared to the baseline study four years previously. Increased knowledge was depicted in the areas of condoms (though abstinence was favoured more as a means to prevent HIV infection rather than condoms), population at risk, symptoms of HIV infection, and diagnosis and treatment of STDs. The follow-up study also revealed a nine per cent increase in the knowledge that there is an increased risk of contracting HIV if one has repeated episodes of STDs (Chifunyise et al., 2002).

The attitude measure of the follow-up study in Chifunyise et al.'s (2002) research was also instructive. Sixty-one per cent of the respondents were in favour of individuals being tested for HIV. A majority (86 per cent) agreed on the communication of a HIV positive result to his/her partner. The focus groups were unanimous in agreeing that AIDS was a serious disease that needed to be prevented. Another outcome of the discussion was the fact that, since it was the sexually active age group that were the most affected by HIV/AIDS, therefore, information for prevention was very important for this group. A majority of the respondents were portrayed as being compassionate and helpful towards people suffering from HIV/AIDS. However, the students were negative towards HIV positive individuals who continue to have unprotected sex. The percentage bearing this attitude markedly increased in the follow-up study (83 per cent) as compared to the baseline one (76 per cent). Feelings evoking this response were linked to a sense of responsibility of those individuals towards the society. Regarding their attitudes towards their future role as teachers, most student teachers recognised the difficult and sensitive nature of a HIV/AIDS education. They felt that they should be more knowledgeable on the topic with updated research and scientific information to act as role models for the students.

Parental involvement was stressed on account of the fact that most parents face communication problems with their children on issues of sexuality (Chifunyise et al., 2002).

Other relevant literature highlighting the knowledge and/or attitude of teachers (in-service) towards HIV/AIDS as compiled by Talukdar and Aspland (2013, Table 4, pp. 73-75) is summarised in Table 3.1 (i-iii) below.

Table 3.1 (i). Overview of research regarding teachers' HIV/AIDS related knowledge and attitudes

Researcher(s)	*Location*	*Primary measured attributes*	*Sample size (N) and age range of respondents (in years)*	*Findings*	*Recommen-dations*
Chatterjee et al. (2001)	Higher secondary schools in North Calcutta, India	Awareness	Not detailed	Poor knowledge, and positive attitudes	Effective teacher training
Ndegwa et al. (2002)	4 primary and 1 secondary school in the Riruta location of Nairobi Province of Kenya	Knowledge, attitude, and practices	N=70; n=0 (<25 years) n=69 (25-50 years) n=1 (>50 years)	Excellent knowledge, and positive attitudes	More effective curricula, and workshops/ seminars for teachers
Mumah (2003)	Primary schools in Rachuonyo district, Kenya	Knowledge, attitude, and sexual practices	N=240 (male teachers only); 19-55 years	Widespread knowledge (except for domains of the nature, causes and symptomatology of the disease), and indifferent attitudes	Integration of HIV/AIDS education into the educational systems
Peltzer and Promtussananon (2003)	Secondary schools in South Africa	Knowledge, and attitude	N=150; 21-61 years	Knowledgeable, and positive attitude	Reinforcement of the HIV/AIDS curriculum as part of the life skills program
Agoreyo, Menakaya, and Okonofua (2007)	Public secondary schools in Onitsha metropolis, Anambra State, Nigeria	Knowledge, attitude, and practice	N=209; n=103 (20-30 years) n=69 (31-40 years) n=30 (41-50 years) n=7 (>50 years)	Poor knowledge, and gender-specific mixed attitudes; media was the most popular source of information	Intensive teacher training as well as senior management support

Table 3.1 (ii). Overview of research regarding teachers' HIV/AIDS related knowledge and attitudes (contd.)

Researcher(s)	*Location*	*Primary measured attributes*	*Sample size (N) and age range of respondents (in years)*	*Findings*	*Recommen-dations*
Bankole and Mabekoje (2008)	Secondary schools in Ogun State, Nigeria	Awareness, and opinions	N=514; n=86 (20-29 years) n=168 (30-39 years) n=188 (40-49 years) n=72 (≥50 years)	Moderate knowledge (with frequent misunderstandings on the likelihood of HIV transmission), and favourable attitudes; media was the most popular source of information	Effective teacher training
Ghosh, Chhabra, Springer, and Sharma (2008)	Public and private schools in Himachal Pradesh, India	Knowledge, attitude, and sensitivity	N=80; 25-54 years	Private school teachers scored higher on all three measures	Experiential teacher training and school-based intervention programs
Mazloomy and Baghianimoghadam (2008)	10 high schools in Yazd city, Islamic Republic of Iran	Knowledge, and attitude	N=290; n=75 (25-34 years) n=95 (35-44 years) n=120 (≥45 years)	Moderate knowledge, and positive attitudes; radio and television were the most popular source of information	Strategies for educating adolescents about HIV/AIDS as a part of the professional development for teachers
Mulumba (2008)	Primary and secondary schools in the Petauke district of the eastern province of Zambia	Knowledge, attitude, and prevention practices	N=541 (primary school teachers); N=172 (secondary school teachers); 21-60 years	Good knowledge, with non-discriminative attitudes	In-service training and educational programmes

Table 3.1 (iii). Overview of research regarding teachers' HIV/AIDS related knowledge and attitudes (contd.)

Researcher(s)	*Location*	*Primary measured attributes*	*Sample size (N) and age range of respondents (in years)*	*Findings*	*Recommen-dations*
Oyewale (2008)	Junior secondary schools in the six area councils in Abuja, Nigeria	Knowledge, and attitude	N=1251; 20-45+ years	Knowledgeable, but poor attitude; schooling and formal training were the most popular sources of information	Intensive teacher training
Lohmann, Tam, Hopman, and Wobeser (2009)	Schools in all six districts in Belize, Central America	Knowledge, attitude, comfort teaching sensitive topics, and instructional confidence	N=91; n=31 (20-29 years) n=39 (30-39 years) n=21 (≥40 years)	Average range for all four outcomes. Some subgroup had lower comfort and instructional confidence	HIV/AIDS training for the subgroups with lower comfort and instructional confidence

Source: Talukdar and Aspland (2013, Table 4, pp. 73-75)

Table 3.1 (i-iii), therefore, highlights knowledge/awareness and/or attitude research related to HIV/AIDS and conducted with teachers (in-service). The studies were conducted in different countries and ranged from the years as early as 2001 till the recent 2009. The results varied widely from poor to excellent knowledge and unfavourable to favourable attitudes regarding HIV/AIDS. Nevertheless, most of the studies were unanimous towards recommending effective teacher training as enhancing the knowledge and/or attitude attributes of teachers.

3.4 Other BBVs

Similar to the bacterial STDs, no previous research focusing on the knowledge and/or attitudes of pre-service teachers or teachers on the individual BBVs, namely Hepatitis A, B and C is evident. However, past research has been documented that highlight

college students knowledge of Hepatitis B, and university students knowledge of Hepatitis B and C.

3.4.1 Hepatitis A, B, and C

Chhabra, Grover, and Agrawal (2002) used a self-administered questionnaire to assess the knowledge of Hepatitis B in the first, third, and final year of a Medical College in Delhi. Areas covered were the Hepatitis B vaccine, the disease itself, and the mode of spread, sequel and prevention. The methodological details of the study could not be obtained. Nevertheless, the researchers reported that the knowledge aspect was highest among the final year students as compared to first and third years. Knowledge regarding vaccination, transmission through fomites, and universal precautions for prevention was not good within any level of the student cohort (Chhabra et al., 2002).

Anjum, Siddiqui, Ahmed, Rizvi, and Usman (2005) also explored the knowledge of medical students (N=267; mean age 21 +/– 1.5 years) towards Hepatitis and HIV/AIDS, but in a private Medical University in Karachi, Pakistan. A pre-tested structured questionnaire was used for eliciting knowledge regarding the etiology, mode of transmission, and prevention of these diseases (Anjum et al., 2005).

Anjum et al. (2005) reported that almost all the students had heard about HIV/AIDS and Hepatitis B and C. The majority of them (32 per cent) listed the five common types of the Hepatitis virus but 13 per cent could not mention any type. Books (85 per cent), the media/Internet (85 per cent), teachers (84 per cent), and friends and relatives (70 per cent) were cited as the major sources of information regarding these diseases. Ninety-five per cent of the respondents knew that a vaccine is available for hepatitis B; 52 per cent said that there is no vaccine for hepatitis C and 84 per cent were correct in that there is no vaccine for HIV/AIDS. There was no significant difference in the knowledge of preclinical and clinical students regarding

hepatitis B and HIV/AIDS vaccine availability, whereas for Hepatitis C, there was a significant difference in the knowledge between the two groups (Anjum et al., 2005).

Anjum et al. (2005) further reported that the percentage of students aware of the post exposure treatment availability for Hepatitis B was 85 per cent, and for Hepatitis C, 65 per cent. 59 per cent students, on the other hand, claimed that no post exposure treatment is available for HIV/AIDS. When comparing the responses regarding the knowledge of the availability of post exposure treatment between the preclinical and clinical students, a difference was found for Hepatitis B and HIV/AIDS, whereas no difference was seen for Hepatitis C. The study established a lack of awareness among the medical students entering the profession. Continuing education programmes was suggested as crucial to render paediatricians more knowledgeable in the area (Anjum et al., 2005).

Another study conducted at a Medical University (Zahedan University of Medical Sciences in Iran) to assess medical students' knowledge about viral hepatitis was reported by Ansari, Masoudi, Rakhshani, Kord-Mostafapour, and Arbabi-Sarjo (2008). A structured questionnaire was used for the research and 356 students (mean age 23 +/– 2.2 years) participated in the study. Gender, academic field, and academic terms were the major demographic variables under study. The rest of the questionnaire items assessed the knowledge in terms of all types of hepatitis transmission, prevention, and symptoms (Ansari et al., 2008).

The mean of the total knowledge score in Ansari et al.'s (2008) study was 40.2 +/– 18.2. There was statistically significant relationship between knowledge of the students and their academic field, academic term and semester average. No significant difference was observed in the knowledge domain with respect to gender. In general, the knowledge of the prevention of the different types of hepatitis was greater than the

symptoms, treatment, and transmission of the diseases. It was deemed that appropriate educational programs would be an appropriate means to enhance the knowledge of the health professionals (Ansari et al., 2008).

3.5 Combined STDs

Only one body of literature exists that has analysed the knowledge and attitudes of school teachers regarding a range of STDs. Westwood and Mullan (2007) investigated the knowledge and attitudes of secondary school teachers in central England regarding sexual health and sexual health education. One hundred and fifty-five teachers (94 female, 61 male; 22 per cent 20-29 years old, 13 per cent 30-39 years old, 35 per cent 40-49 years old and 30 per cent 50-59 years old) representing nineteen co-educational state secondary schools in central England comprised the final sample. The questionnaire devised by the researchers entailed closed questions related to contraception, sexual health and sex and relationships education. Twenty-eight items tested the knowledge attribute and nine questions addressed teacher's attitudes towards sex and relationships education and the knowledge or information in the area (Westwood & Mullan, 2007).

The overall knowledge score in Westwood and Mullan's (2007) study was good with 84 per cent attaining a score of 20 or above and only 17 per cent scoring less than 20. However, many teachers failed to identify well-known STIs such as hepatitis B, genital warts, non-specific vaginitis, non-specific urethritis and chlamydia. 63 per cent of the teachers also felt that they did not have adequate information about STIs and 43 per cent reported that they lacked information on contraception (Westwood & Mullan, 2007).

Nearly half (45 per cent) of the sample in Westwood and Mullan's (2007) study neither agreed nor disagreed regarding the statement concerning the current

provision of sex education in the school. The majority (46 per cent) were of the opinion that nurses and other healthcare professionals should teach all sex and relationships education. In fact, 45 per cent of the teachers agreed or strongly agreed that sex and relationships education should be taught by other agencies from outside school. Only 6 per cent were in favour of teachers teaching the subject. Eighty-three per cent, however, felt that the subject would be better dealt with by a combination of teachers, healthcare professionals and other outside agencies (Westwood & Mullan, 2007).

Westwood and Mullan (2007) reported that although the teachers stressed that sex and relationships education is useful to pupils, yet approximately, a third of the teachers did not like teaching the course. The majority also felt that the resources were not adequate for them to teach the subject successfully. Seventy per cent of the teachers reported that they were were not up to date with the recent information regarding the diseases. The location of school, area of residence of participant, gender or age of participant, however, was not statistically significant for any of the questions asked (Westwood & Mullan, 2007).

Westwood and Mullan (2007) asserted that sexual health education in this context was not providing secondary school pupils the knowledge they needed in order to protect their own sexual health. This was particularly worrying for the researchers in light of the increased prevalence of HIV/AIDS in the United Kingdom. A continuous professional development and extension of both the teaching skills and the knowledge base of teachers, therefore, were suggested by the authors for teachers expected to contribute towards sex and relationships education. The authors also felt that teachers interested in teaching the subject should be taken into consideration

more than those who do not, when planning the subject. This would reduce the likelihood of students getting inadequate information (Westwood & Mullan, 2007).

3.6 Summary

This chapter outlined the relevant research in relation to each of the individual STDs and other BBVs under investigation. It became evident that only research related to HIV/AIDS was in abundance when considering the perspectives of pre-service teachers as well as in-service teachers. A single study each was found for genital warts and STDs in general which also had teachers as its subject. The literature on the remaining STDs as well as the BBVs, therefore, focused on research which had knowledge and/or attitude as its measures, but conducted with college and university students, young adults, and adults somewhat resembling the pre-service cohort of the present study. To this end, the age of the respondents in those studies became a determining criterion for inclusion in the review of related literature. Moreover, the deep insights that emerged from these studies formed the basis for the development of the items of the attitude scale of the questionnaire as employed in the present study.

The next chapter focuses on the theoretical aspects of each of the STIs under investigation. This is important in understanding the basics of the diseases that were considered in the present study. It essentially serves as the framework towards developing the items of the knowledge scale of the questionnaire as employed in the present study.

> "Whatsoever the factors may be, it was evident from the different Australian State statistics that the triumph of the penicillin-based control of the classical venereal diseases was short-lived." (Talukdar, 2013, para. 11)

Chapter 4:

STIs and other BBVs

4.1 Introduction

Nelson (2006a, p. 1) in citing the Centers for Disease Control and Prevention (CDC) explained that STIs are a group of contagious diseases most commonly transmitted "from person to person by close, intimate contact" and although most of this contact has traditionally been sexual intercourse, many categories of sexual practices permit transmission from "person to person" with vertical transmission from mother to newborn also possible. Nelson (2006a) further asserted that it is the means of transmission that is a characteristic feature of these diseases, not etiologies, symptoms, or clinical consequences and that the pathogens causing STIs represent a wide spectrum of microorganisms ranging from spirochetes, bacteria, protozoans, viruses, and obligate intracellular organisms. In this regard, the WHO has identified more than 30 pathogens that are transmissible through sexual intercourse (WHO, 2006b). Likewise, the Sexuality Information and Education Council of the United States of America (SIECUS) and the Institute of Medicine (IOM) have all reported that more than 25 infectious organisms are primarily spread through sexual activity (Eng & Butler, 1997).

According to Strauss and Strauss (2008), the HIV (a retrovirus, family *Retroviridae*), hepatitis B virus (family *Hepadnaviridae)* and hepatitis C virus (genus *Hepacivirus*, family *Flaviviridae*) though often spread sexually, are grouped under the category of BBVs. This is on the pretext of the establishment of a viremia in which

the infectious virus circulates in the blood. The primary means of transmission are through exposure to contaminated blood or other bodily fluids, such as occurring in a therapeutic blood transfusion, the usage of hypodermic injections and intravenous drug use (Strauss & Strauss, 2008). BBVs may also be transmitted if blood, semen or vaginal fluids pass from a person who is infected with the virus into the bloodstream of another person via a break in the skin or mucous membrane (Communicable Disease Control Directorate [CDCD], 2004). Hepatitis C is not classified as a STI since the risk of transmission via semen or vaginal fluids is low, though sexual transmission is possible if sex involves trauma or bleeding such as anal sex or sex during menstruation (CDCD, 2004). It is interesting to note, however, that the CDC discussed 24 conditions in its 2006 STD Treatment Guidelines, whereby, hepatitis A, B and C were also included under the vaccine-preventable STIs category (CDC, 2006). Nonetheless, the fact that hepatitis C has a low rate of transmission by sexual contact is endorsed by many authors (Adler, Cowan, French, Mitchell, & Richens, 2004; Geller & Herman, 2006; Holmes et al., 2008; Larsen, 2009; Shoquist & Stafford, 2004). It is for this reason that the major hepatides hepatitis A, B and C (HIV excluded since the mode of sexual transmission is uncontroversial) were grouped under 'other BBVs' in the present study. HIV, therefore, was grouped under 'Viral STIs' on the basis of its causative agent, a virus.

There is no controversy as to some of the STIs being life threatening (HIV, syphilis), others predisposing to malignancy (hepatitis B, HPV, HIV), and yet others destroying fertility (gonorrhoea, chlamydia). In this context, the WHO points out that STIs are a major global cause of acute illness, infection, long-term disability, and death, with severe medical and psychological consequences for millions of men, women, and infants (Nelson, 2006a). This chapter highlights the basic pathological

aspects of each STI and BBV under study, grouped under the responsible causative pathogen (bacteria/virus).

4.2 Bacterial STIs

4.2.1 Chlamydia

According to Phillips (2006, p. 127), the term chlamydia is derived from the Greek word *chlamys* meaning "cloaked" or "draped", which is descriptive of the intracytoplasmic inclusion bodies that are draped around the host cell nucleus with the majority of the infections being asymptomatic in both men and women. As the name implies, chlamydia is caused by *Chlamydia trachomatis* (one of the four species of the genus *Chlamydia*), an obligate intracellular organism responsible for a wide range of infections (Phillips, 2006).

Primarily transmitted via sexual means, vertical transmission of the pathogen is also possible (Sweet & Gibbs, 2002). In fact, the researchers asserted that vertical transmission of *C. trachomatis* is more efficient than horizontal transmission and more than 60 per cent of newborns who deliver through a chlamydia-infected cervix will acquire the infection. Combination hormonal contraceptive use has been a proposed risk factor for chlamydial infection which apparently increases cervical ectopy (Jacobson, Peralta, Graham, & Zenilman, 2000). Infertility, ectopic pregnancy and pelvic pain are some of the conditions in both symptomatic and asymptomatic Pelvic Inflammatory Disease (PID), with the risk of infertility increasing with the number of episodes and severity of the inflammation (Phillips, 2006).

A comprehensive review of the literature in 2001 by the National Institute of Allergy and Infectious Diseases (NIAID) under the auspices of the National Institutes of Health (NIH), United States of America, regarding condom usage in reducing chlamydial infection concluded that there was not sufficient evidence to allow an

accurate assessment of the degree of protection against chlamydia offered by correct and consistent condom use (NIAID, 2001). Contrary to the above, there are numerous studies and organisations that advocate for correct and consistent condom use as an effective means of reducing chlamydial infection (CDC, 2010; Holmes, Levine, & Weaver, 2004; Warner, Stone, Macaluso, Buehler, & Austin, 2006).

4.2.2 Gonorrhoea

According to Nelson (2006b, p. 153), gonorrhoea, one of the most recognized medical conditions in ancient times was described in Chinese writings dating 2500 years ago, in the Papyrus of Ebers and by Hippocrates and was named by Galen in 130 AD, for "flow of seed". Its more common name, "clap", derives from the Middle French word "clapoir" for "bubo" and historically, *Neisseria gonorrhoeae* was the second bacterial pathogen ever identified with infections in women most often being asymptomatic (Nelson, 2006b, p. 153).

Nelson (2006b) further stated that the disease condition is characterised by a highly infectious bacterial infection, whereby the pathogen is transmitted in adults almost exclusively by sexual activity with exposure to infectious cervical/vaginal secretions or ejaculate during oral, vaginal, or anal sex. A vaginally delivered neonate has a 30-35 per cent chance of developing conjunctivitis or positive of gastric aspirate if the mother has a cervical infection and though the precise estimates of transmission rates for rectal infections are not available, but the organism is known to be quite infectious in that setting too. Multiple or new sex partners, inconsistent condom use, living in urban areas having a high prevalence of the disease, being an adolescent woman, low socioeconomic status, using drugs (including alcohol), and exchanging sex for drugs or money have been identified as some of the classic risk factors associated with gonorrhoeal infections by the CDC (Nelson, 2006b).

In addition, prepubertal girls are more likely to manifest vulvar and vaginal infections, whereas young boys are more likely to have pharyngeal or rectal infections with the most obvious risk factor for pharyngeal infections being oral-genital sex. Infection with *N. gonorrhoeae* increases a woman's susceptibility to HIV infection and likewise, infection in the man may increase HIV transmission because it may increase viral shedding (Nelson, 2006b).

Correct and consistent use of condoms has been shown to reduce the risk of gonorrhoeal infection in men, though the available evidence at the 2001 NIH Conference did not allow for an accurate assessment of the degree of protection in women (NIAID, 2001). Nevertheless, newer studies and meta-analyses have shown that the use of male condoms is associated with a significant reduction in the risk of gonorrhoea for both men and women (Holmes et al., 2004).

4.2.3 Syphilis

According to Sutton (2006), syphilis, a chronic systemic infection is caused by the anaerobic spirochete *Treponema pallidum*, and often categorized as a genital ulcerative disease. It is known as a "great imitator" owing to its clinical presentations mimicking so many other conditions (Sutton, 2006, p. 207).

Sutton (2006) further stated that *Treponema pallidum* is spread through contact with infected lesions or body fluids with the most common mode of transmission being a direct contact with moist mucosal or cutaneous lesions during anal, vaginal, or oral-genital sex. Populations at increased risk for contracting and transmitting syphilis include those who engage in high-risk behaviours, those who are diagnosed with other STDs (including HIV infection), men who have sex with men (MSM), commercial sex workers, those who exchange sex for drugs, incarcerated individuals, and those who are in contacts of an individual with active syphilis (CDC,

2004). Syphilis if left untreated could progress in stages, with varied and often subtle clinical manifestations, which can result in serious and potentially life-threatening cardiovascular and neurological disease (Sutton, 2006).

Having mutually monogamous sex with only one uninfected partner is perhaps the best way to prevent syphilis along with proper and consistent condom usage (Larsen, 2009). However, it is important to note that condoms might not provide a total protection because an infected person can have sores that expose others to skin contact beyond the condom's coverage (Shoquist & Stafford, 2004). Avoiding contact with infected tissue and body fluids of an infected person also ensures non-acquisition of infection, though washing or douching after sex fails not to prevent syphilis (Larsen, 2009).

4.3 Viral STIs

4.3.1 Genital Warts

According to Goldman (2006), the HPV is a group of more than 120 viruses. At least 30 types of these can infect the anogenital areas, some with no symptoms, other types causing genital warts and still others causing invasive squamous cell anogenital carcinoma (Goldman, 2006).

Goldman (2006) further stated that HPV is most commonly transmitted during sexual activity involving skin-to-skin contact, and with or without visible lesions since microabrasions in the area of contact permit the virus to be transmitted from one sexual partner to another. An estimated 60-66 per cent of sex partners of HPV-infected people will develop detectable HPV lesions, although they may be very subtle in appearance or may be located in areas that escape normal detection (Munoz et al., 2003). Co-infection with other STDs and early age at first intercourse also increases the risk of HPV infection, with the condition more heightened with a

simultaneous HIV infection which increases the risk of developing HPV-related disease (Goldman, 2006).

A quadrivalent vaccine against HPV types 6, 11, 16, and 18 is available for women in the age range of 11–26 years. Nevertheless, the psychological impact of the diagnosis of HPV infection may be even more profound than that of other STIs (Goldman, 2006). In addition to the issues of relationship fidelity, the issue of oncogenic potential may require additional counselling (Linnehan & Groce, 1999).

4.3.2 Genital Herpes

According to Parks (2006, p. 47) in citing Roizman and Whitley (2001), more than 2500 years ago, Hippocrates first used the word herpes derived from the Greek word "to creep", in an effort to describe how the lesions of this contagious ulcerative disease seemed to creep or crawl along the skin. Over time, herpes was used to describe many skin conditions ranging from lupus to zoster and it was in the 1830s that recurrent genital herpes was described. Sixty years later, it was identified as a "vocational disease", a STI, though the virus itself was not identified until the 1950s (Parks, 2006, p. 47).

Parks (2006) further stated that herpes, a highly contagious disease has genital-to-genital skin contact with an infected partner (who is shedding virus symptomatically or asymptomatically) as the primary route of transmission. Older age and young age at sexual debut are also important factors for contracting the disease (Wald, 2004). Pharyngitis may develop with oral exposure (Parks, 2006), with HIV-infected individuals at higher risk of developing the more serious clinical manifestations including dissemination, encephalitis, and meningoencephalitis (Schacker, 2001). However, genital herpes cannot make an individual sterile (Herpetica, 2005; International Herpes Resource Center, 2007).

Counselling of patients with recurrent herpes emphasize that there is no known therapy to prevent establishment of latency of the herpes virus or to prevent recurrent disease, implying that there is no cure for herpes (Parks, 2006). A recent trial of a glycoprotein D adjuvant vaccine was found to yield promising results, though the researchers demonstrated that an early vaccination would be necessary if this vaccine is to be utilized (Stanberry et al., 2002).

4.3.3 HIV/AIDS

According to Rieg (2006, p. 99), initially, an infection with the HIV appeared to be associated only with homosexual activities which led it to be termed the "gay-related immune deficiency syndrome". However, the role of heterosexuality and direct blood contact in transmitting the newly recognized pathogen was soon apparent (Rieg, 2006).

Rieg (2006) further stated that sexual contact is undoubtedly the most common route of HIV transmission and although the risk of HIV transmission through direct, skin-penetrating blood exposure (for example, needle-stick injuries, needle sharing, and transfusions) is well defined, the rate of HIV transmission through sexual contact is much more variable. Different sexual practices are associated with different rates of transmission, with anal intercourse posing the highest risk of sexual HIV transmission followed by the penile-vaginal intercourse (Rieg, 2006). Though several studies report the transmission of HIV through oral sex (Edwards & Carne, 1998; Richters, Grulich, Ellard, Hendry, & Kippax, 2003; Rothenberg, Scarlett, del Rio, Reznik, & O'Daniels, 1998), the rate of HIV transmission through oral sex appears rather low and thus oral sex is considered to have the lowest risk of HIV transmission (Rieg, 2006). HIV can be detected in saliva also in small concentrations (Rothenberg et al., 1998). However, the components of saliva have an inactivating

effect on HIV which further decreases the transmissibility of HIV, though any oral lesions and/or bleeding could increase the concentration of HIV and hence the risk of transmission (Rieg, 2006).

Vertical transmission via early transplacental infection has also been demonstrated with transmission generally occurring at birth (Rieg, 2006). Approximately 15-25 per cent of infants born to HIV-infected mothers are HIV-infected (CDC, 2002). Pregnancy has no impact on the clinical course or progression of an asymptomatic HIV infection, with an elective abortion not affecting HIV infection progression by any means; nevertheless, maternal infection may have serious adverse impacts on foetal outcome. Concurrent infection with syphilis increases vertical transmission (Rieg, 2006). Transmission of HIV-1 infection with breastfeeding occurs in about 16 per cent of cases (Nduati et al., 2000). However, recent studies have documented that exclusive breastfeeding reduces mother-to-child HIV transmission compared with mixed feeding (Coovadia et al., 2007; Fowler, 2008).

Preventive and therapeutic measures include, but are not limited to the usage of microbiocides (topical agents, which are applied to the vagina/rectum to prevent HIV transmission), greater implementation of the highly active antiretroviral therapy - HAART (for infected people to reduce transmission) and, treatment of STIs (since other STIs contribute to an increased risk of HIV transmission) (Rieg, 2006). An aggressive treatment of other STIs has been shown to lower the risk of HIV transmission by up to 40 per cent (Grosskurth et al., 1995).

4.4 Other BBVs

4.4.1 Hepatitis A

According to Geller and Herman (2006), the hepatitis A virus (HAV) is the most common cause of acute infectious hepatitis worldwide. Hepatitis A is not generally considered an STI except perhaps among MSM (Geller & Herman, 2006).

Geller and Herman (2006) further stated that faecal-oral transmission through contact with infectious sources in combination with poor hygiene or sanitation is the major route of HAV acquisition, with other modes being person-to-person contact (likely attributed to household or sexual contact), illegal drug use and in rare cases, via transfusion of blood or blood products. Sexual transmission is an increasingly important contributor to HAV infection (Geller & Herman, 2006), with both heterosexual and homosexual behaviour likely contributing to a large amount of HAV transmission via unapparent or gross faecal contamination (Cuthbert, 2001; Ross, Ghanem, Tariq, Gilleran, & Winter, 2002). Injection drug use is also a major risk factor for HAV infection, although it is uncertain whether equipment sharing activities or poor hygiene is more significant in this mode of viral transmission (Roy et al., 2004).

The incidence of maternal HAV infection in pregnancy is 1 in 1000 (Leikin, Lysikiewicz, Garry, & Tejani, 1996), with no incidence of perinatal transmission (ACOG educational bulletin, 1998). Unlike hepatitis E virus (HEV), pregnancy is not a risk factor for progression to liver failure (Geller & Herman, 2006).

Hepatitis A infection is one of the most frequently reported vaccine-preventable diseases (CDC, 1999). Prevention of disease can occur by implementing general infection precautions. These can take the form of improved personal hygiene especially during food preparation, improved sanitation of water processing and

sewage disposal techniques, avoidance of illegal drug use and reducing contact with infected individuals as well as active and passive immunization efforts (Geller & Herman, 2006).

4.4.2 Hepatitis B

According to Geller and Herman (2006), the hepatitis B virus (HBV) is a double-stranded DNA hepadnavirus with seven genotypes (A-G), which vary geographically. Infection with HBV can be either acute and self-limited or can become chronic, with approximately 50 per cent of acute infections being symptomatic (Geller & Herman, 2006). Only 1 per cent of acute infections result in acute liver failure and/or death in adults (CDC, 2006). Chronic HBV infection can be asymptomatic; however, nonspecific symptoms (such as fatigue) can develop insidiously. In all carrier states, exacerbations of hepatitis can occur which can lead to progressive liver fibrosis (Geller & Herman, 2006). Rapid progression is more likely in those who are co-infected with the hepatitis C virus (HCV) and more severe liver disease is seen in co-infection with HIV (Housset et al., 1992; Roudot-Thoraval et al., 1997).

HBV is found in the highest concentrations in the blood and also in other body fluids such as semen and vaginal secretions, and can be transmitted perinatally, percutaneously, or across mucous membranes by sexual contact or close person-to-person contact through open cuts and sores. It has been estimated that HBV is 20 times more sexually contagious than HIV (Geller & Herman, 2006). About 25 per cent of regular sexual contacts of HBV-infected people will become HBV-positive (Practice Committee of the American Society for Reproductive Medicine [PCASRM], 2004). High-risk patients from non-endemic areas include MSM, injection drug users, dialysis patients, HIV-infected patients, sexual and household contacts of HBV-

infected patients, health care workers, recipients of certain blood products and people with a recent history of multiple sex partners or a STD (Lok et al., 2004).

Hepatitis B vaccine which is safe and well-tolerated is recommended by the CDC for use in universal immunization of infants and previously unvaccinated children, as well as in vaccination of adolescents and adults at increased risk of infection (Geller & Herman, 2006). Despite reports in the past of a possible association between the hepatitis B vaccine and multiple sclerosis, several studies have failed to demonstrate a statistically significant association (Ascherio et al., 2001; Confavreux et al., 2001).

4.4.3 Hepatitis C

According to Zein (2003), the story of hepatitis C began a little more than two decades ago, when researchers transmitted non-A, non-B hepatitis from patients with transfusion-associated hepatitis to chimpanzees, demonstrating that the disease resulted from a transmissible agent. A major breakthrough came in 1989 with the cloning of the HCV genome and shortly after that, it became apparent that this newly identified virus is the principal causal agent for non-A, non-B hepatitis (Zein, 2003).

HCV is a BBV primarily transmitted by parenteral exposure to infected blood with the most efficient mechanism of transmission being a large, repeated and direct percutaneous exposure (Geller & Herman, 2006). Frequent small percutaneous exposures such as those seen in patients receiving long-term haemodialysis, impart a moderate risk (CDC, 1998). Low-risk transmission is seen in unapparent percutaneous or mucosal exposure and can occur through an occupational mucosal exposure to blood (for example, conjunctival splashes) or needle-stick injuries, household contact (for example, sharing razor blades and toothbrushes) and sexual transmission (Geller & Herman, 2006).

A history of intravenous drug use is by far the most recognizable risk factor for the acquisition of HCV (Alter et al., 1999). The role of sexual exposure in transmission is likely minimal, but the CDC surveillance reports that 15-20 per cent of infected patients report high-risk sexual behaviour in the absence of other risk factors (CDC, 1998). However, a study including MSM often at high risk for acquiring other blood-borne STIs found infection rates similar to that of heterosexuals (Thomas et al., 1995), calling into question the concept of sexual transmission of HCV (CDC, 2006). Nevertheless, in the absence of a proven biological mechanism, sexual transmission is suggested by multiple case reports of temporal sexual relationships with an HCV-infected partner that resulted in HCV infection, when the possibility of nonsexual transmission has been excluded and highly concordant viral genomic sequence homology has been demonstrated (Geller & Herman, 2006).

Vertical transmission is possible (Geller & Herman, 2006) with the average rate of HCV infection in infants born to HCV-infected mothers being 5 to 6 per cent (Ohto et al., 1994). The rates increase to approximately 14 to 17 per cent if the mother is co-infected with HIV (Thomas et al., 1998). Most infants delivered to HCV-infected mothers progress to chronic hepatitis (PCASRM, 2004), and vaginal delivery does not appear to increase the risk of perinatal infection (Zanetti, Tanzi, & Newell, 1999).

Geller and Herman (2006) asserted that in view of the non-availability of a vaccine till date to prevent the acquisition of HCV, the mainstay of primary prevention of HCV encompasses education of individuals at risk for transmitting or acquiring infection. Covering open wounds is recommended though it is not necessary to avoid close contact with infected people or to avoid sharing meals or eating utensils. Given the very low risk of acquisition of HCV from an infected sexual

partner, individuals in stable monogamous sexual relationships with HCV-infected persons need not change their current sexual habits (Geller & Herman, 2006).

4.5 Summary

This chapter described the basic theoretical aspects underlying each of the diseases relevant to the study. Every possible effort had been made to render the text comprehensible to a non-specialist reader. The aim of the chapter was not to investigate the pathophysiology of the diseases. Rather, different aspects of each of the diseases were highlighted to gain a detailed understanding of these diseases. This chapter is important in understanding the basis for the development of the items of the knowledge scale of the questionnaire.

The next chapter focuses on the methodology adopted for the study. The operationalization of research along with the details of the sampling procedures, the ethical considerations, and the essential data entry and data analysis techniques as applied in the study are discussed in this chapter.

> "Developing a methodology … requires that the steps used in selecting and studying a problem be described and that justifications for using particular approaches be explained." (DeFleur, 1997, p. 212).

Chapter 5:

Methodology

5.1 Introduction

Mende (2005) in describing research as a process of knowledge production drew an analogy between research processes and other productive processes. He justified his argument by citing Kantorovich's (1993) and Singleton, Straits, and Straits's (1993) position that researchers embarking on a research project need to know the kinds of knowledge products required and the kinds of research processes to be used. Morrison (2012, p. 16) argued that for the research evidence to be "understood", "patterned", "reasoned", and "compiled", researchers often "draw implicitly or explicitly upon a set of beliefs or epistemological assumptions called paradigms". Bogdan and Biklen (1998, p. 22) defined paradigm as "a loose collection of logically related assumptions, concepts, or propositions that orient thinking and research", whereas Cohen and Manion (1994, p. 38) viewed paradigm as "the philosophical intent or motivation for undertaking a study".

Bassey (2002) described the key paradigms used in educational research. The positive research paradigm views the existence of a reality in the world irrespective of people with the reality discovered by people using their senses and observing. The interpretive research paradigm, on the other hand, views reality as a construct of the human mind with people making sense of the world in ways which are often similar but not necessarily the same. The action research paradigm, reflecting on research

designed to improve action, involves people trying to improve the phenomena of their surroundings (Basey, 2002).

Mende (2005, p. 196) argued that positivist empiricism "is the pervasive research fashion today". The French philosopher, Auguste Comte (1798-1857), regarded as the founder of positivism, viewed that knowledge should be based on positive and directly observable events rather than on unobserved entities, forces, or causes underlying a phenomenon (Comte, 1896). Empiricism, on the other hand, the brainchild of the English philosopher John Locke (1632-1704), views knowledge as stemming from experience (Locke, 1974). Bhana and Kanjee (2001) posited that research undertaken within an empiricist or positivist paradigm assumes that the phenomena under study can be observed and quantified. These observations and measurements are then collated and systematically organised into data sets for a rigorous analysis (Bhana & Kanjee, 2001).

Singh (2006) claimed that all forms of research, whether experimental or non-experimental, draw some inferences regarding a well-specified and identifiable group on the basis of some selected measures. He defined the well-specified and identifiable group as the population or universe, the selected number of persons or objects as the sample, and the generalized conclusions as the statistical inferences. That in psychological and educational research in general, the population is imaginative as opposed to a measure upon the entire population which is called a parameter, was also stressed by Singh (2006). Further, the author, in drawing upon tests, measurements, and research methods in behavioural sciences, outlined the differences between two related terms, research method and research methodology. He asserted that while research method is one of the aspect and/or dimension of the multidimensional and wider scoping research methodology, the latter is broadly a science in itself,

encompassing not only the research method but also the rationale behind it (Singh, 2006).

The key decision areas in research as highlighted by Coolican (1994) are variables, design, samples, and analysis (Figure 5.1).

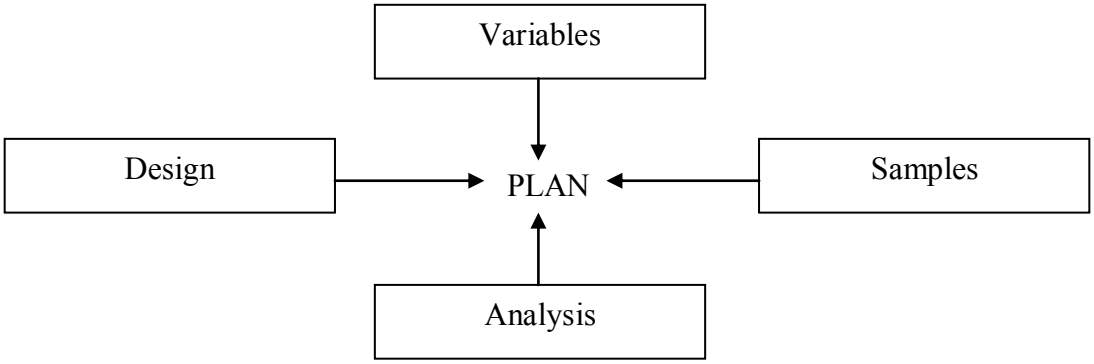

Figure 5.1. **Key decision areas in research** (Adapted from Coolican, 1994, Figure 1.2, p. 17)

With respect to the key decision areas as represented in Figure 5.1, Coolican (1994) defined variables as identified measurable events which change in value, design as the overall structure and strategy of the research, samples as the individuals under study, and analysis as the method of measuring variables. Therefore, this chapter is based on these key decision areas and outlines the conceptualization of the variables involved, the design strategy to measure it, the data collection procedures from the samples, and subsequent data entry and analysis as applied in the study.

5.2 Variables

According to Kumar (2011, p. 63), a variable is "a concept that can be measured on any one of the four types of measurement scale, which have varying degrees of precision in measurement". The author referred to Steven's (1951) classification schema of measurement scales and found it simpler as opposed to Duncan's (1984) classification. Thus, based on Steven's (1951) classification of measurement scales as nominal or classificatory, ordinal or ranking, interval, and ratio, Kumar (2011, Table

5.4, p. 75) outlined the main characteristics of each of the measurement scales as reported in Table 5.1.

Table 5.1. **Characteristics of the four measurement scales**

Measurement scale	*Characteristics of the scale*
Nominal or classificatory	Each subgroup has a characteristic/property which is common to all classified within that subgroup
Ordinal or ranking	It has the characteristics of a nominal scale, e.g. individuals, groups, characteristics classified under a subgroup have a common characteristic PLUS Subgroups have a relationship to one another. They are arranged in ascending or descending order
Interval	It has all the characteristics of an ordinal scale (which also includes a nominal scale) PLUS It has a unit of measurement with an arbitrary starting and terminating point
Ratio	It has all the properties of an interval scale PLUS It has a fixed starting point, e.g. a zero point

Source: Kumar (2011, Table 5.4, p. 75)

Though the degree of precision with which concepts can be measured markedly varies from one measurement scale to another, it is important for the concepts to be converted into variables (either directly or through a set of indicators) as they are often subject to measurement (Kumar, 2011). Hoy (2010) asserted in this regard that research ideas should lead to concepts, which in turn should be converted into variables. According to him, theoretical definitions are not sufficient alone; operational definitions are required. An operational definition, therefore, "explicates the variable as a set of specific operations that are measured or manipulated" (Hoy, 2010, p. 35). Corbetta (2003) termed this passage from concepts to variables as operationalization. Table 5.2 outlines the operational definitions that represented the knowledge, attitude, and agents of socialization concepts of the study, along with the underlying measurement scales, response modes, and response formats.

Table 5.2. **Operationalization of research**

		Study Parameters		
		Knowledge	*Attitude*	*Agents of socialization*
Attributes	*Concept* (*theoretical definition*)	"...the total sum of beliefs to which an individual or a group may subscribe" (Bar-Tal & Kruglanski, 1988, p. 3)	"...a state of readiness or predisposition to respond in a certain manner when confronted with certain stimuli...attitudes are reinforced by beliefs (the cognitive component), often attract strong feelings (the emotional component) which may lead to particular behavioural intents (the action tendency component)" (Oppenheim, 1992, pp. 174-175)	"...the process of learning one's culture and learning how to live within it" (Pandit, 2009, p. 37)
	Variable (*operational definition*)	Knowledge of the facts pertaining to STIs and other BBVs	Attitudes towards STI-related issues	The major sources of information pertaining to STIs and other BBVs
	Type of scale	Ordinal	Ordinal	Nominal
	Response mode	Multiple choice	3-point Likert scale	Multiple choice
	Response format	True/false/don't know	Disagree/neither agree nor disagree/agree	Best three options
	Item Number(*s*)	1-45	46-62 (main study; 2 items were deleted after the validity and reliability estimation – see Chapter 6)	63

Table 5.2, therefore, reveals the operational definitions for knowledge, attitudes, and the agents of socialization as applied in the present study. The response modes, response formats, and item numbers for each of the above attributes are discussed in details later and hence not repeated here. It is important to note, however, that the statements for the knowledge items were based on an extensive review of literature uncovering recent information (facts) related to the diseases as outlined in Chapter 4. The items of the attitude scale of the questionnaire pertaining to STI-

related issues were also based on the review of related literature as outlined in Chapter 3. It is also important to mention that both the knowledge and attitude measures in terms of its raw scores were categorised as representing the ordinal level of measurement on the premise that the response format for both (true/false/don't know and disagree/neither agree nor disagree/agree, respectively) represented a degree of order (M. Thompson, personal communication, June 19, 2012). However, each of these was expressed as a linear/interval scale after Rasch scaling (see Chapter 6).

Cohen, Manion, and Morrison (2007) stated that operationalization, therefore, is the translation of general research aims or purposes into specific, concrete questions to which specific, concrete answers can be given. This assertion was embraced by Hoy (2010) who argued that often in the education field, pencil and paper questionnaires are used to operationalize the concepts. Specific questionnaires addressing the knowledge and attitude attributes towards STIs do exist as compiled in the 'Handbook of Sexuality-Related Measures' (Davis, Yarber, Bauserman, Schreer, & Davis, 1998). However, some of these focuses on the individual diseases and not on a range of STIs, and yet others have a different target population and not pre-service teachers or teachers. This is outlined in Table 5.3 along with the salient features of each.

Table 5.3. **STI-related (knowledge and/or attitude) questionnaires/scales**

Questionnaire/scale	*Author(s)*	*Target population*	*No. of items and response format*
Venereal Disease (Gonorrhea and Syphilis) Knowledge and Attitudes	Arafat and Allen	College students	25 *multiple-choice, yes/no/don't know, open-ended* (knowledge); 6 *multiple-choice* (perceived knowledge and behavioural posture); 8 *yes/no* (attitude)
STD Attitude Scale	Yarber, Torabi, and Veenker	Young adults	27, *5-point Likert*
STD Health Behaviour Knowledge Test	Yarber	Young adults	10 *multiple-choice*
Herpes Knowledge Scale	Bruce and McLaughlin	Students (but can be used for other populations)	54 *true/false/don't know*
Herpes Attitude Scale	Bruce and McLaughlin	Students (but can be used for other populations)	40, *5-point Likert*
Genital Herpes Perceived Severity Scale	Mirotznik	General	7, *6-point Likert* (The Fear Scale); 5, *6-point Likert* (The Family Impediment Scale); 7, *4-point Likert* (The Emotional Response Scale)
The HIV-Knowledge Questionnaire	Carey, Morrison-Beedy, and Johnson	Community	45 *true/false/don't know*
The Meharry Questionnaire: The Measurement of Attitudes Toward AIDS Related Issues	Ernst, Francis, Perkins, Britton-Williams, and Kang	Workers in health care facilities	13, *6-point Likert*
The Nurses' Attitudes About AIDS Scale	Preston, Young, and Koch	Nurses	53, *5-point Likert*
The Stereotypes About AIDS Scale	Snell, Finney, and Godwin	General	115, *5-point Likert*
HIV/AIDS Knowledge and Attitudes Scales for Hispanics	Luquis and Koch	College students with Hispanic ethnic backgrounds	21 *true/false/don't know, multiple-choice* (knowledge); 26, *5-point Likert* (attitude)
AIDS Attitude Scale	Shrum, Turner, and Bruce	Students (but can be used for other populations)	54, *5-point Likert*
Alternate Forms of HIV Prevention Attitude Scales for Teenagers	Torabi and Yarber	Teenagers/ adolescents	30, *5-point Likert*
HIV Prevention Knowledge Test for Teenagers	Yarber and Torabi	Teenagers	30 *multiple-choice*
Assessment of Knowledge and Beliefs About HIV/AIDS Among Adolescents	Koopman and Reid	Adolescents	45 *true/false*, 7 *multiple-choice*, 36, *4-point Likert*
Adolescent AIDS Knowledge Scale	Zimet	Adolescents	22 *yes/no/don't know*
HIV/AIDS Knowledge and Attitudes Scales for Teachers	Koch and Singer	Teachers (can be used with pre-service teachers as well as practicing educators)	35 *true/false/not sure*, *6-point Likert* (knowledge); 25, *5-point Likert* (attitude)

Source: Davis et al. (1998)

It can be seen from Table 5.3 that only HIV/AIDS have a knowledge and attitude scale targeted at teachers/pre-service teachers (indicated in bold). Moreover, no questionnaires/scales seek to investigate the knowledge and/or attitude attributes of individuals towards chlamydia, genital warts, and hepatitis A, B, and C. Therefore, it was important in the context of the present study to design a questionnaire that was able to address the gap of the existing tools, incorporated the diseases that the present study investigated, and was applicable for pre-service teachers. According to Johnson and Christensen (2010, pp. 162-163), "a questionnaire is a self-report data-collection instrument that each research participant fills out as part of a research study" so that researchers "can obtain information about the thoughts, feelings, attitudes, beliefs, values, perceptions, personality, and behavioural intentions of research participants". An item in the questionnaire, on the other hand, is "a single task or question that usually cannot be broken down into any smaller units" (Bean, 1953, p. 15). Scales are defined as the "...collections of items combined into a composite score, and intended to reveal levels of theoretical variables not readily observable by direct means" (DeVellis, 2003, pp. 8-9). Babbie (2011) contended that scales not only summarize several indicators in a single numerical score, but maintain the specific details of all the individual indicators too. Sim and Wright (2000), however, exerted caution in terming a questionnaire as a multi-item instrument unless it consists of one or more multi-item scales.

Dörnyei and Taguchi (2010) asserted that the main attraction of questionnaires lies in their unprecedented efficiency in terms of researcher time, researcher effort and financial resources, though an ill-constructed one can invariably yield unreliable and invalid data. In an effort to overcome the potential problems associated with self-completed questionnaires and to facilitate an effective questionnaire construction, a

series of steps and procedures has been suggested by Dörnyei and Taguchi (2010, pp. 11-12) including the following:

- Deciding on the general features of the questionnaire such as the length, the format, and the main parts
- Writing effective items/questions and drawing up an item pool
- Selecting and sequencing the items
- Writing appropriate instructions and examples
- Translating the questionnaire into a target language if it was not originally written in that language, and
- Piloting the questionnaire and conducting item analysis

It is "an established fact that careful and creative questionnaire construction can result in an instrument that motivates people to give relatively truthful and thoughtful answers, which can then be processed in a scientifically sound manner" (Dörnyei & Taguchi, 2010, p. 11). Thus, for the purpose of the current study, matching the questionnaire items with the research objectives (Johnson & Christensen, 2010) and adhering to the principles of an effective questionnaire construction as outlined above (the piloting details outlined in the upcoming section) formed the basis for the development of the questionnaire. The questionnaire for the main study (after the deletion of two attitude items resulting out of validity and reliability estimation and discussed in Chapter 6) is attached in Appendix A.

The questionnaire developed consisted of five Sections namely A, B, C, D, and E. These included the demographic variables (Section A), the knowledge (Section B) and attitude (Section C) items (scales), and the sources of information (Section D). Section E explored the perspectives of pre-service teachers towards STI-related issues, the role of an effective education in containing the spread of STIs, and teacher education as addressing sexual health, respectively. In addition to these, the title, purpose of study, concluding salutation, researcher/supervisor details, and discrete

instructions for each Section along with examples (specific to Sections B and C) formed a part of the questionnaire. The incorporation of a title, purpose, concluding salutation and clear instruction in a questionnaire has been justified by Johnson and Christensen (2010). Likewise, Moore (2006) suggested the inclusion of the researcher and supervisor(s) contact details in the form of an additional information sheet to the questionnaire.

The demographic variables namely gender, age, highest educational level, subject stream, and whether or not the respondent was undertaking the HPE curriculum were incorporated under Section A of the questionnaire. The subgroups of gender (male, female) and age (≤20 years, 21-30 years, 31-40 years and >40 years) aimed to compare the knowledge and attitude attributes of the respondents, as under the respective categories and consistent with the objectives of the study. Likewise, the subgroups of the highest educational level (completed) as applicable to Australia/South Australia under the heads senior secondary (Australian Education International [AEI], 2011a), undergraduate and postgraduate (AEI, 2011b) also aimed to highlight the differences of the knowledge and attitude attributes of the respondents as categorised by these grouping. Subject stream was differentiated into the subgroups of arts, science, commerce, professional (Law, Engineering and Medicine) as relevant to the Australian/South Australian context (AEI, 2011c), and other (for those who failed to identify themselves under these). It assessed the differences in the knowledge and attitude characteristics of the respondents as according to these major fields of study. Knowledge and attitude differences were further assessed based on the respondents' undertaking/not undertaking the HPE curriculum and categorised in the form of a yes/no response. According to McLafferty (2010), the categorical responses

thus created allow effective analysis of data and also elicits a better response from the respondents.

Items pertaining to the knowledge attribute of the respondents were compiled under Section B of the questionnaire. Each item constituting the knowledge scale was of the closed-ended (Dörnyei & Taguchi, 2010; Johnson & Christensen, 2010; Kline, 2005), true/false (Greenhalgh, 2006; Martin, 1992; Thomas, 2003) and don't know (Brace, 2008; Crano & Brewer, 2002; De Vaus, 2002; Pierce, 2008) type. Close-ended options require participants to choose from a limited number of responses that are predetermined by the researcher providing primarily quantitative data (Johnson & Christensen, 2010). The additional don't know option allows for the continuity of interest of the respondent towards the items thus increasing the likelihood of completion of all items of the questionnaire (Brace, 2008; Crano & Brewer, 2002). Brace (2008) and McLafferty (2010) added that a don't know option is a legitimate response by itself thus offering the fullest range of responses. Pierce (2008, p. 141) also agreed with this assertion and argued that the don't know option is "not inherently different than respondents" but "typical and representative".

Forty-five items (1-45) assessed the knowledge variable of the respondents, with each of the nine diseases allocated a set of five statements pertaining to STI and other BBVs. Ten items had to be re-worded following the validity and reliability estimation; no item, however, was deleted from the pilot to main study transition (see Chapter 6). A correct answer elicited a score of one (1), whereas zero (0) was awarded for an incorrect or don't know response (Hou, 2006). Thus, the number of items answered correctly is reflective of the total score of the respondent (Baumgartner, 2006). Thus, scores ranged from 0-45 with a higher total score reflecting a better knowledge of the respondents towards STIs and other BBVs.

However, as discussed in Chapter 9, the categorisation of the overall (and not individual) knowledge dimension of the present study as poor or good was based on the mean of the total possible score. The correct answers for the items of the knowledge scale are: true for items 1, 3, 5, 7, 9, 11, 12, 13, 15, 16, 20, 21, 23, 25, 27, 28, 29, 31, 33, 34, 35, 37, 39, 42, 44, and 45, and false for items 2, 4, 6, 8, 10, 14, 17, 18, 19, 22, 24, 26, 30, 32, 36, 38, 40, 41, and 43.

The items for evaluating the attitude aspect of the respondents compiled under Section C of the questionnaire were also of the closed-ended type. Kumar (2011) argued that the strength of attitudinal scales as used in quantitative research to measure attitudes towards an issue lies in their ability to combine attitudes towards different aspects of the issue and to provide an indicator that is reflective of an overall attitude. He also posited that the Likert scale is the most popular based on its ease of construction. Thus, a three-point Likert scale, the use of which is justified in research (Bernard, 2000; Dörnyei & Taguchi, 2010; McLafferty, 2010) was used for the purpose of framing of the attitude component of the questionnaire, with disagree, neither agree nor disagree and agree as the response options (Dörnyei & Taguchi, 2010). The inclusion of a neutral option (neither agree nor disagree) allows for respondents who are genuinely neutral (VanderStoep & Johnston, 2009) without forcing the response to one side (McLafferty, 2010). The neutral option also avoids artificially creating a directional opinion (De Vaus, 2002). Buddenbaum and Novak (2001) stressed that the decision as to whether disagree or agree should be coded as 1 is arbitrary but with the researcher having made that decision, other options would be given progressively higher numbers so that the final numbering would reflect both direction and intensity. Thus, in line with this assertion, the disagree option was coded

as 1, the neither agree nor disagree response as 2 and the agree opinion coded as 3 for the attitude items of the questionnaire.

Seventeen items (46-62) assessed the attitude variable of the respondents. Following the validity and reliability estimation of the pilot study, two items had to be deleted and four others re-worded before the main study administration (see Chapter 6). The total score for the attitude of each respondent was generated from the assigned scores of 1, 2 and 3 and also taking into account the reverse scoring for unfavourably worded items. According to Johnson and Christensen (2010), reverse scoring prevents the formation of response sets. They defined a response set as "the tendency for a research participant to respond to a series of items in a specific direction, regardless of the differences in item content" (p. 179). A response set is generally overcome by reversing the wording (and scoring) in some of the items, whereby participants are encouraged to read each item on the questionnaire more carefully (Johnson & Christensen, 2010). Accordingly, in the attitude scale of the questionnaire, item numbers 47, 51, 53, 54, 58, 59, and 61 were reversed scored. Individual attitude scores, therefore, ranged from 17 (most unfavourable attitude - 17 x 1) to 51 (most favourable response - 17 x 3) (Agarwal, 2006), with higher scores representing a more favourable attitude (Domino & Domino, 2006). However, as discussed in Chapter 9, the categorisation of the overall (and not individual) attitude dimension of the present study as favourable or unfavourable was based on the mean of the total possible score.

The attitude items were followed by the possible sources of information pertaining to STIs and other BBVs and outlined under Section D of the questionnaire (Q 63). In addition to the seven agents of socialization (family members, peers, school, workplace, mass media campaigns, religion, and State), training and workshops and relevant organizations were also included as the other possible sources

of information regarding the diseases. The question pertaining to the sources of information was also of the closed-ended response type. However, it was a multiple choice or multi-chotomous question with more than one possible answer (Brace, 2008). The respondents, therefore, were given the option to choose the best three possible choices from the outlined sources of information.

Finally, the respondents' perspectives towards STI-related issues, the role of an effective education in containing the spread of STIs, and the place of teacher education in addressing sexual health, were elicited in the form of open-ended questions framed under Section E of the questionnaire. In an open-ended question, the possible responses are not stated (Kumar, 2011) thus enabling the respondents "to write a free account in their own terms, to explain and qualify their responses and avoid the limitations of pre-set categories of response" (Cohen et al., 2007, p. 321). Open-ended questions are useful if the possible answers are unknown (Bailey, 1994) or in cases where many possible categories of a response would result in a closed-ended question as having numerous options (Cohen et al., 2007). Open-ended questions also allow reaching out to a greater number of respondents at the same time added to the non-necessity of transcription as in interviews (McLeod, 2003). Further, according to the author, compared to a personal interview, respondents may find it easier to disclose confidential or sensitive material through an anonymous questionnaire. Thus, 11 questions in total (Q 64 - Q 74) in the form of text boxes in the questionnaire, explored the respondents' perspectives on the issues as outlined above.

Hoy (2010) argued that without converting their concepts into variables, researchers cannot proceed with empirical research. This section dealt with identifying, operationalizing, and outlining the measurement approaches of the key

variables that were investigated in the study. The next section, therefore, explains the design that was employed to the effect of eliciting information of the converted variables.

5.3 Design

Coolican (1994, p. 18) stated that "the design is the overall structure and strategy of the research". Vogt, Gardner, and Haeffele (2012, p. 3) referred to design as the "master category" and as the basic methods of collecting evidence: surveys, interviews, experiments, observations (participant and naturalistic), archival research (data and textual archives), and combinations of these methods. The categorization of design as solely based on the methods of collecting evidence and not on other criteria of classifying research methods (correlational, experimental/non-experimental, qualitative/quantitative) is thereby justified by the authors. While the authors argued that correlations are analysis tools and hence not design types, they also posited that non-experimental research is a huge category, often lacking specificity, and therefore vague and ineffective to be termed a design (Vogt et al., 2012). Likewise, quantitative and qualitative categories pertain to matters of coding measurement and not design (Vogt et al., 2012).

Based on the above argument, the research design employed for the current study was of a survey type. According to Denscombe (2010, p.11), surveys allow something to be "viewed comprehensively and in detail" with the general purpose to "obtain data for mapping". The author further asserted that surveys cater to research which either measure some aspect of a social phenomenon or trend or gather facts in order to test a theory. Both for the pilot and the main study, the survey was self-administered and internet-based (discussed in the upcoming section).

Another aspect of survey administration takes the form of the time frame designed to collect data. Thus, for the present study, it was of the one-shot type. One-shot designs, the most commonly employed form of survey administration, requires the researcher administering the survey only once to the sample after piloting it (Lodico, Spaulding, & Voegtle, 2010). Piloting, yet another crucial concept of survey research, therefore is discussed next. A pilot study is "a small-scale investigation designed either to test the feasibility of methods and procedures for later use on a large scale, or to search for possible effects and associations that may be worth following up in a subsequent larger study" (Everitt, 2006, p. 176). Ruxton and Colegrave (2006) contended that apart from being invaluable to developing interesting and focused questions, the pilot study also allows to be well acquainted with the working system with the most important goals perhaps being the validation of the study question and standardization of the techniques involved. The validation aspects resulting from the pilot study are detailed in Chapter 6. Sample size calculations may not be required for some pilot studies as long as the samples are representative of the target study population and large enough to provide useful information about the aspects that are being assessed for feasibility (Thabane et al., 2010).

"Once designs have been decided upon, researchers then need to turn their attention to finding cases to study" (Vogt et al., 2012, p. 5). According to the authors, cases generically describe any unit of analysis or object/subject of study. The next section, therefore, outline the procedures undertaken to select the subjects, the questionnaire administration details, and the response numeric.

5.4 Samples

According to Morrison (1993), it is not only the methodology and instrumentation that determine the quality of a piece of research, but also the suitability of the sampling strategy. Cohen et al. (2007) posited that the concept of sampling stems from the issue of defining the population on which the research is focused. They, however, argued that factors such as expense, time, and accessibility limit researchers from gaining information from the whole population, which in turn necessitates obtaining data from a smaller group or subset that is representative of the total population. Therefore, a sample in a study is "this smaller group or subset" (Cohen et al., 2007, p. 100).

Samples in a study may be drawn based on probability or non-probability methods (Cohen & Holliday, 1979, 1982, 1996; Schofield, 1996). The probability sample draws randomly from the wider population in an effort to seek representativeness; the non-probability sample, however, seeks only to represent a particular group or a section and hence avoids representing the wider population (Cohen et al., 2007). The authors stated that in purposive sampling, a form of non-probability sampling, the samples are chosen for a specific purpose or as satisfying the specific needs of the research. This ideology is also expressed by Kumar (2011) who argued that purposive sampling is aimed at extracting information from individuals who have it and as achieving the objectives of the research.

Based on these arguments, pre-service teachers in SA constituted the purposive sample for the study. The Teachers Registration Board of South Australia recognizes four higher educational institutions as running the necessary undergraduate and postgraduate teacher education programs in SA (Teachers Registration Board of South Australia, 2010). Hence, the samples for the present study comprised of pre-

service teachers enrolled in the teacher education courses at these higher educational institutions. Vogt et al. (2012) argued that the researcher having decided on the how (methods of gathering the data) and who (samples) of the study, ethical issues emerge as the next important step. The ethics clearance as obtained for the current study, therefore, is outlined forthwith followed by the method employed towards the data gathering.

Berg (1954, p. 108) enunciated three important elements of ethical research with human beings: "consent", "confidence", and "standard or acceptable procedure". The host institutions' Office of Research Ethics, Compliance and Integrity outline five documents as meeting the above and towards a full review of the research (The University of Adelaide, 2012). These include:

- cover sheet as summarising the protocol and including the investigator's signatures
- list of headings detailing the research
- participant information sheet containing details assisting potential participants' decision towards participation
- consent form eliciting written consent of participants, and
- Contacts and Independent Complaints Procedure Sheet as providing appropriate contact details for seeking additional information on the project, when raising a concern and when making a complaint

While the cover sheet and the list of headings are essentially the details of the research and hence not outlined here, the other three documents are attached in the Appendix in the respective order as stated above. Appendix B entitled the Research Project Information Sheet outlines the research details while clarifying the methods involved thereof as assisting the potential participants' decision towards participation. Some of the details outlined differed as applicable to the pilot/main study and depicted in bold. These pertained to Section C (a change in the number of items of the

attitude scale of the main study after the deletion of two items) and Section E (only administered in the main study regarding the opinions, perspectives, and views of the respondents to the issues posed) of the questionnaire and hence reflected on the total number of items as well (see Chapter 6). Alongside these, the tentative timing to complete the questionnaire was put forth only in the main study after an approximate estimate as observed from the pilot (Subsection 5.5.1 below). The provision of an incentive as a token of appreciation towards participation was also declared in the main study only. Kumar (2011) noted in this regard that participation in a study is not solely based on the incentives offered, but on its importance too. Therefore, in the author's opinion, giving a small gift as a token of appreciation after having obtained the information is not unethical.

The Standard Consent Form as the other ethics document (Appendix C) did not undergo much change from the pilot to main study transition except for the associated incentive declaration (depicted in bold). The Contacts for Information on Project and Independent Complaints Procedure (Appendix D) as the final ethics clearance document, however, had no changes at the main stage of the study to that framed for the pilot. The project was initially approved for a year (Appendix E). This was subsequently renewed with the addition of the clause related to the incentive declaration during the main stage of the study (Appendix F).

Both the pilot and the main study, however, had the same two modes of questionnaire administration. As Cohen et al. (2007) described, questionnaires can be administered employing a wide range of options: self-administration (with or without the presence of the researcher), by post, through face-to-face interviews, over the telephone or using the Internet. In the present study, both at the pilot and the main stage, self-administration (in the researchers' presence) and the Internet constituted

the procedures involved in questionnaire administration. The presence of the researcher in self-administered questionnaires has its advantages in the form of responding to queries, good response rates, successful and correct completions, and rapid and simultaneous data gathering (Cohen et al., 2007). Regarding the internet-based survey administration, the authors contended that a combination of email (to contact participants to advise them to go to a particular web site) and website (at which the survey questionnaire is located in HTML form) is a common approach. The email template remained the same for the pilot/main study (as applicable and outlined in bold) and annexed in Appendix G. However, the website used for the pilot study was the free survey tool and builder KwikSurveys (survey ID - NBIMLK_853f50a3), whereas the one employed for the main data collection was hosted at Obsurvey (survey ID - 81486DCC-6DF8-43C8-8C41-1A2B1AC2EDC1). A snapshot of the webpage of the main study at Obsurvey is documented in Appendix H. The KwikSurvey domain for the pilot study at the ID stated above, however, expired and could not be retrieved.

The issue of a study's sample size as often plaguing researchers is stressed by Cohen et al. (2007). However, they argued that sample size generally depends on the purpose of the study and the nature of the population under investigation. Nevertheless, larger samples are considered to be beneficial on account of its greater reliability and the study's as using sophisticated statistics (Cohen et al., 2007), towards providing an accurate measure of estimates (Kumar, 2011), and reducing the sampling bias (Coolican, 1994). The sample size distribution for the present study, both at the pilot and the main stage alongside the modes involved for the questionnaire administration, is schematically shown in Figure 5.2.

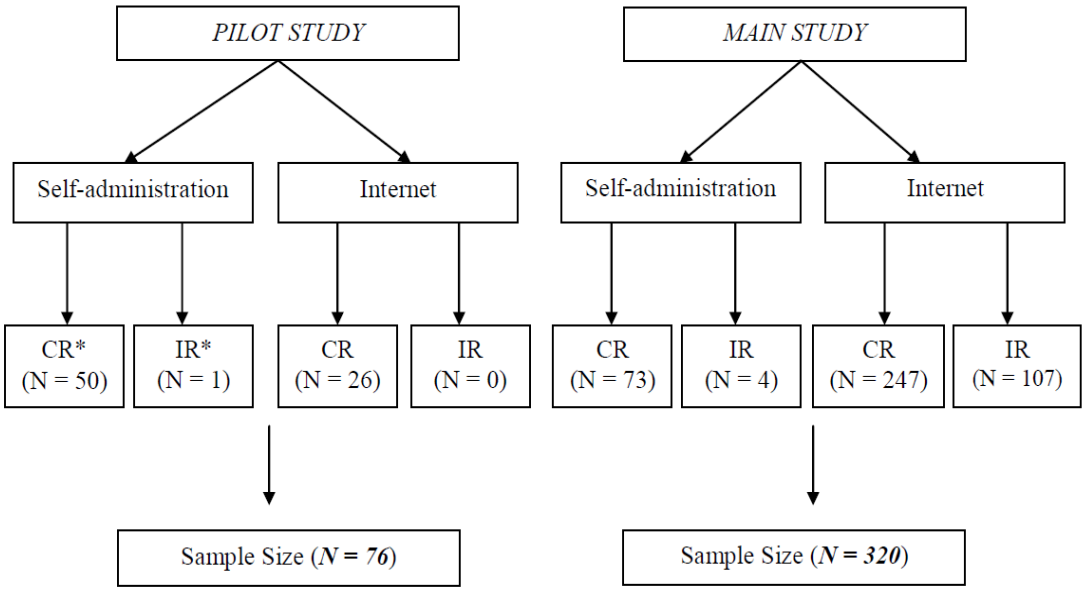

Figure 5.2. Sample size distribution vis'-a-vis' questionnaire administration modes
*CR - Complete Responses
*IR - Incomplete Responses

Coolican (1994) contended that the design chosen and the method of measuring variables have a direct impact on the statistical or other analysis involved, which is only possible at the end of the data collection process. While this section highlighted the procedures involved in the data collection from the samples concerned, the final section describes the underlying principles of data analysis as employed in the study.

5.5 Analysis

According to Denscombe (2010), the main aims of analysis are to describe, explain or interpret the data using a variety of techniques. The techniques, however, as the author argued, tend to gravitate around the notions of quantitative and qualitative approaches. Kumar (2011) asserted study designs in qualitative research as more appropriate towards exploring the variation and diversity of aspects of social life than quantitative research, which is more suited to finding the extent of this variation and

diversity. Denscombe (2010) contended that while "quantitative data take the form of numbers" (p. 242), "qualitative data take the form of words [spoken or written] and visual images [observed or creatively produced]" (p. 273).

A response to closed-ended questions in questionnaires is identified by Denscombe (2010) as one of the sources of quantitative data. Open-ended questions, on the other hand, and using the same research method (questionnaires) are designated as a type of qualitative data by the author. Rubin and Babbie (2010) and Johnson and Christensen (2010) also stated that open-ended questions provide primarily qualitative data. Johnson and Christensen (2010, p. 169) further highlighted that "although open-ended questions are typically analysed qualitatively, the answers sometimes are analysed quantitatively by counting the number of times a response was provided".

Irrespective of whether the study is quantitative or qualitative, the data is subjected to a series of procedures that constitute the core of data processing (Kumar, 2011). These are detailed in the upcoming subsection before outlining the analytical procedures employed for the study.

5.5.1 Entry and Coding

Kumar (2011) stated that the first step in data processing involve cleaning the data. He termed the process of cleaning as editing and as targeted towards removing inconsistencies and incompleteness of data collection. In the present study, inconsistent and incomplete responses both at the pilot and main stage of analysis (designated as IR and discussed in Section 5.4, Figure 5.2 above), were edited manually before the data was entered into a statistical software program. The SPSS (Statistical Package for Social Sciences) for Windows is a versatile computer package that performs a wide variety of statistical procedures (Gerber & Finn, 2005).

Accordingly, the data for the pilot study was entered in SPSS Version 18.0 (SPSS Inc., 2009), whereas SPSS Version 20.0 (IBM Corp., 2011) was utilised for entering the data emerging from the main study. At both stages of the study, raw data was entered directly into SPSS.

Raw data, most often occur naturally in the form of numbers; in cases when it is not so, it is essential to transform those into a number format suitable for quantitative analysis (Denscombe, 2010). According to the author, this process is termed as coding, which allows the attribution of a number to a piece of data, or group of data, with the aim of allowing the data to be analysed in quantitative terms. The coding employed for the study (pilot/main) for entering data into SPSS is reported in Table 5.4.

Table 5.4. The underlying coding and its attributes for SPSS data entry

SPSS Attributes *Variable Name*	*Label*	*Values (Codes)*	*Missing Values*	*Special Function Used*	*Purpose*
ID	Respondent's ID	None	None	None	As applicable
Time*	Time in Minutes to complete Questionnaire	None	None	None	Estimating the time for Questionnaire completion
Gender	Gender	0 = "Male"; 1 = "Female"	99	None	Demographic Variable
Age	Age Range in Years	1 = "Less than and equal to 20 years"; 2 = "21-30 years"; 3 = "31-40 years"; 4 = "Greater than 40 years"	99	None	Demographic Variable
HEL	Highest Educational Level (completed)	1 = "Senior Secondary"; 2 = "Undergraduate"; 3 = "Postgraduate"	99	None	Demographic Variable
SubStr	Subject Stream	1 = "Arts"; 2 = "Science"; 3 = "Commerce"; 4 = "Professional (Law, Engineering, Medicine)"; 5 = "Other"	99	None	Demographic Variable
SubStrOt	Subject Stream (Other)	None	99	None	Demographic Variable
HPE	Health and Physical Education Teacher/Undertaking the HPE Curriculum	0 = "No"; 1 = "Yes"	99	None	Demographic Variable
Q1TFDK to Q45TFDK	'True' 'False' 'Don't Know' Responses	1 = "True"; 2 = "False"; 3 = "Don't Know"	99	None	Entering Raw Data
Q46DNA to Q62DNA**	'Disagree' 'Neither agree nor disagree' 'Agree' Responses	1 = "Disagree"; 2 = "Neither agree nor disagree"; 3 = "Agree"	99	None	Entering Raw Data
Q63 FaMem; Q63 Peers; Q63 Sch; Q63 Work; Q63 MMC; Q63 TandW; Q63 Orgzn; Q63 Relgn Q63 State***	In the respective order: Family Members, Peers, School, Workplace, Mass Media Campaigns, Training & Workshops, Relevant Organizations, Religion, and State as the 'Best 3 Sources'	0 = "No"; 1 = "Yes"	99	None	Tabulating the 'Best 3 Sources of Information'
Q1CI to Q45CI	Correct/Incorrect Responses	0 = "Incorrect"; 1 = "Correct" (as applicable)	99	"Recode Into Different Variables"	Converting 'Raw Data' to 'Scoring Format'
Q46R to Q62R**	Reverse Coded Responses	1 = "3"; 2 = "2"; 3 = "1" (as applicable)	99	"Recode Into Different Variables"	Converting 'Raw Data' to 'Scoring Format'
Q1CI_1 to Q45CI_1	SMEAN	None	None	"Replace Missing Values"	Replacing 'Missing Values' by 'Series Mean' to get total score****
Q46R_1 to Q62R_1**	SMEAN	None	None	"Replace Missing Values"	Replacing 'Missing Values' by 'Series Mean' to get total score****
KNOWLEDGE	Knowledge Score	None	None	"Compute Variable"	Computing 'Knowledge' Score
ATTITUDE	Attitude Score	None	None	"Compute Variable"	Computing 'Attitude' Score

* Applicable only for the pilot stage of study

**At the main stage of study after the deletion of two attitude items (see Chapter 6). Hence, question numbers changed from Q46-Q64 (pilot) to Q46-Q62 (main)

*** At the main stage of study. Question number changed from Q65 (pilot) to Q63 (main) for reasons as above

**** Downey and King (1998) and Polit and Beck (2008) suggested that the mean item value across subjects can be used to substitute missing values (small proportion) for items in multiple-item scales

The entered and coded SPSS data was utilised in yet another Computer Software Program QUEST Version 2.1 developed by Adams and Khoo (1996). The Quest program allows comprehensive test and questionnaire analysis based on Rasch measurement theory in addition to offering a range of traditional analysis procedures (Adams & Khoo, 1993). This was pertinent towards establishing the validity and reliability measures of the knowledge and attitude scales of the questionnaire (see Chapter 6). The knowledge and attitude raw data, therefore, was exported in the form of text files (ASCII format) since item response modelling software programs require the data to be in this format, where each variable is entered at fixed columns in the file (Wu & Adams, 2007). Wu and Adams (2007) also stated that a code should be designated for missing responses in the data and they suggested '9' for this purpose. However, the letter 'N' was used as a notation for indicating missing responses (M. Thompson, personal communication, June 19, 2012) in the text file, substituting the SPSS missing value of 99. The text files prepared, the item response modelling software was run separately for the knowledge and the attitude items. The run specifically requires a separate input file, also in the form of an ASCII (text) file, specifying all the information in the data needed for the analysis (Bond & Fox, 2007; Sick, 2009). This separate input file commands each for the knowledge and the attitude run (pilot/main) alongside the purpose of the command is highlighted in Table 5.5.

Table 5.5. **The Quest control file commands and its functions**

Command	*Purpose**
Knowledge	
Joy's Knowledge Scale	Names the analysis
data_file Joysdata2.txt	Tells the program which data set to analyze
codes 123	Tells the program all possible responses
key 12121212121112112221121212111212111121221211	Tells the program the correct answers for all items
format name 1-2 items 3-47	Tells the program which columns comprise the data set
show settings>>joy.out	Tells the program to provide output for case estimates and item estimate map
estimate ! iter=100;scale=all	Tells the program to score and estimate the data, with a cue to terminate after 100 iterations
show ! scale=all >> joyshow	Directs the general output to the designated file
show items ! scale=all >> joyit	Directs the item statistics output to the designated file
show case ! scale=all >> joycase	Directs the person statistics output to the designated file
itanal ! scale=all >> joyanal	Produces a range of traditional and Rasch item statistics to the designated file
quit	Tells program to quit
Attitude	
Joy's Attitude Scale	Names the analysis
data_file Joysdata2.txt	Tells the program which data set to analyze
codes 0123**	Tells the program all possible responses
recode (123) (012)	Changes 1 to 0, 2 to 1, and 3 to 2 for all items so that each minimum response is a 0
recode (012) (210)!2***	Changes 0 to 2, 1 to 1, and 2 to 0 for items 2, 6, 8, 9, 13, 14, and 16 (the negatively worded items), so that higher scores always represent more attitude
recode (012) (210)!6***	
recode (012) (210)!8***	
recode (012) (210)!9***	
recode (012) (210)!13***	
recode (012) (210)!14***	
recode (012) (210)!16***	
format name 1-2 items 3-19****	Tells the program which columns comprise the data set
estimate ! iter=100;scale=all	Tells the program to score and estimate the data, with a cue to terminate after 100 iterations
show ! scale=all >> joyattshow.txt	Directs the general output to the designated file
show items ! scale=all >> joyattit.txt	Directs the item statistics output to the designated file
show case ! scale=all >> joyattcase.txt	Directs the person statistics output to the designated file
itanal ! scale=all >> joyattanal.txt	Produces a range of traditional and Rasch item statistics to the designated file
quit	Tells program to quit

*The purposes are drawn from Bond & Fox (2007) and Gorsuch & Cox (2000)

** Bond & Fox (2007) recommended that for Likert responses it is advisable to use a coding system that is a logical extension of that used for dichotomous data, and thus starting with zero

***The item numbers for the main study after the deletion of two items at the pilot stage (see Chapter 6). The item numbers are reflected in the order of input in the text file and hence different from the actual item number reflected in the questionnaire.

**** The item numbers for the main study ('3-21' for the pilot) for similar reasons as above

According to Kumar (2011), coding essentially aids in the analysis of the information contained in the data. However, the author also posited that the types of statistical procedures that can be applied to a set of information depend upon the measurement scale on which a variable was measured in the research instrument. Therefore, the final subsection introduces the major scales of the data before outlining the statistical procedures employed.

5.5.2 Analytic Procedures

Cohen et al. (2007) identified the key concepts in numerical analysis as pertaining to the scales of the data, on whether a variable is dependent or independent, and on the parametric and non-parametric nature of the data, which in turn determines the descriptive and inferential statistics employed. The importance of the measurement scale used in a research instrument for measuring a variable towards analysing a set of information is stressed by Kumar (2011). Kumar (2011) also highlighted that from the viewpoint of causal relationship, four sets of variables may operate: change or independent variables (responsible for bringing about a change in a phenomenon, situation or circumstance), outcome/effect or dependent variables (the effects, impacts or consequences of a change variable), extraneous variables (the unmeasured variables affecting the cause-and-effect relationship), and connecting/linking or intervening variables (linking the independent and dependent variables). Based on this classification and the earlier categorisation of measurement scales (Table 5.1), Figure 5.3 shows the major scales of the data that directed the quantitative analysis.

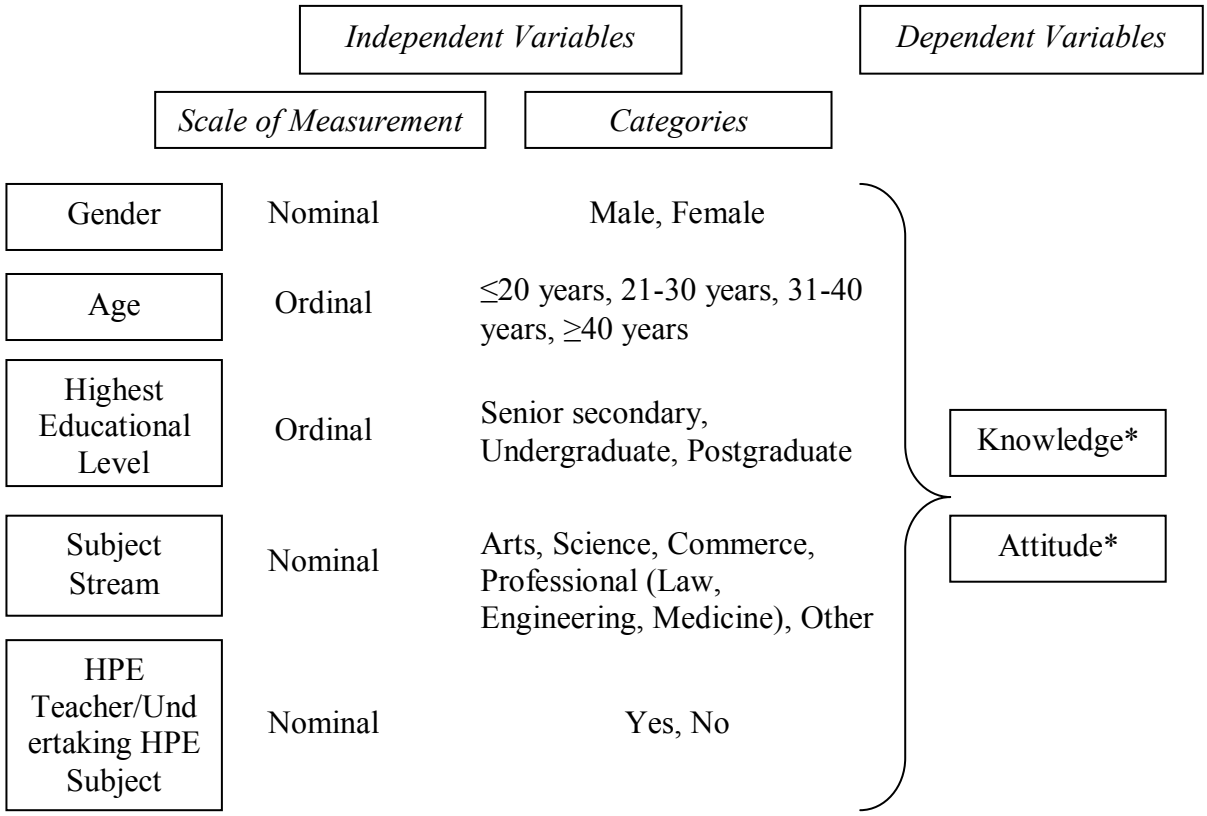

Figure 5.3. **Scales of the data**
***Both expressed as a linear/interval scale after Rasch scaling (see Chapter 6)

Figure 5.3 reveals the scales of measurement and the underlying categories for the respective demographic variables of the study as representing the independent variables. It is important to note that for both the age and the highest educational level attributes, the variables were categorised as representing the ordinal level of measurement on the premise that the underlying categories for each represented a degree of order (M. Thompson, personal communication, June 19, 2012). As outlined earlier in this chapter and also reiterated in Chapter 6, the dependent variables namely knowledge and attitude were both expressed as a linear/interval scale after Rasch scaling.

The quantitative analysis was performed using the knowledge and attitude logit scores (entered separately in SPSS and labelled as 'Rasch Knowledge Estimate' and 'Rasch Attitude Estimate') obtained after Rasch scaling procedures (see Chapter

6). Generally, Rasch estimates allow parametric statistical analysis of data (Bond & Fox, 2007; Granger, 2007; Keenan, Redmond, Horton, Conaghan, & Tennant, 2007; Prieto, Delgado, Perea, & Ladera, 2010). Cohen et al. (2007) explained that parametric data is based on the knowledge of the characteristics of the population in order for inferences to be able to made securely, and therefore often assume a normal, Gaussian curve of distribution. Non-parametric data, on the other hand, make no such assumptions as the characteristics of the population are unknown. The authors further asserted that it is the parametric/non-parametric nature of the data that determines the descriptive and inferential statistics employed. While descriptive statistics describe and present data in terms of summary frequencies, inferential statistics, by contrast, make inferences and predictions based on the data gathered (Cohen et al., 2007).

Descriptive statistics and other modes of graphical representation of data essential for data summarization (Coolican, 1994), was used to analyse the demographic profiles of the respondents in addition to identifying the major sources of information attribute. Descriptive statistics also portrayed the knowledge and attitude scores of the respondents. The application of inferential statistics, on the other hand, depended largely on the data being parametric/non-parametric (in spite of the argument cited in the previous paragraph that Rasch estimates allow a parametric statistical analysis of data). Thus, the Shapiro-Wilk test (for sample sizes ≤ 2000) was tailored to assess the goodness of fit to the normal distribution (SAS Institute Inc., 2009) to determine whether the knowledge and attitude data deviated significantly from the normal distributions. This assessment, in turn, determined the appropriate inferential statistics (McCrum-Gardner, 2007, Tables 2 and 3, pp. 39-40) as guiding the analytic procedures for the closed-ended responses of the questionnaire and outlined in Table 5.6.

Table 5.6. **Selecting the appropriate tests for comparisons between two groups and more than two groups and association between two interval or ordinal variables**

Scale of measurement	*Independent samples*
Comparisons between two groups	
Interval scale (parametric assumptions satisfied)	Independent samples t-test
Ordinal scale or interval scale (parametric assumptions not satisfied)	Mann-Whitney U-test
Comparisons between more than two groups	
Interval scale (parametric assumptions satisfied)	One-way ANOVA
Ordinal scale or interval scale (parametric assumptions not satisfied)	Kruskal-Wallis one-way ANOVA
Association between two interval or ordinal variables	
Interval scale (parametric assumptions satisfied)	Pearson's product-moment correlation coefficient
Ordinal scale or interval scale (parametric assumptions not satisfied)	Spearman's rank correlation coefficient

Source: McCrum-Gardner (2007, Tables 2 and 3, pp. 39-40)

Analysis of open-ended questions, however, is more difficult (Kumar, 2011), and the data often needs to be explored in the form of themes (O'Leary, 2004; Grbich, 2007). According to Braun and Clarke (2006, p. 79), "thematic analysis is a method for identifying, analysing and reporting patterns (themes) within data". The themes, either theoretically driven or inductively deduced, are coded in the dataset and the meanings, context and implications of these themes are examined and described (Joffe & Yardley, 2004). Creswell (2008) argued that since similar codes aggregate together to form themes or the major ideas in the database, they constitute the core element in qualitative data analysis. The themes "also permits the researcher to combine analysis of the frequency of codes with analysis of their meaning in context" (Joffe & Yardley, 2004, p. 57).

Each of the 11 open-ended questions, therefore, was hand-analysed (Creswell, 2008) and coded. Analysis by hand was preferred over a computer assisted analysis mainly for three reasons similar to that outlined by Denscombe (2010): time towards data entry, learning a software package and its potential, and the researcher still requiring to decide the codes and looking for connections within the data. Thus, the coding of the data allowed for drawing up similarities of text segments. Thereafter, the codes were examined for overlap and redundancy, and ultimately collapsed into broad themes. The procedure was repeated with the response patterns under each of the obtained themes to draw up the subthemes. As an efficient data reduction technique for large qualitative data sets, Namey, Guest, Thairu, and Johnson (2008) suggested determining frequencies on the basis of the number of individual participants who mention a particular theme/subtheme as opposed to the total number of times a theme appears in the text. Further, converting these frequencies to percentage (per cent frequency) is also suggested as an effective means of qualitative data summarization (Chavda, 2008; Hesse-Biber, 2010; Sparks-Jackson, & Silverman, 2010). Therefore, with the themes and subthemes identified, the data (individual responses as falling under the themes/subthemes) was entered into Microsoft ® Excel Spreadsheet to analyse the frequency of codes and per cent frequencies for subsequent analysis.

Subsequent analysis followed the principles of grounded theory, a research method developed by Glaser and Strauss (1967). According to Strauss and Corbin (1994), grounded theory is a general methodology for developing theory that is grounded in data systematically gathered and analysed whereby theory develops and evolves during the research process due to the interplay between data collection and analysis phases. Moreover, the generation of the theory consists of a set of plausible

relationships proposed among concepts and sets of concepts. Accordingly, the key concepts underpinning the findings were identified. The key concepts reflected similar qualities to the factors that were identified in the data. However, the concepts or factors were grouped together based on similar constructs and from the collective of concepts, a propositional theme was built. Each theme was dealt in turn with a view to providing a deeper interpretation of the data from which greater insights in the field of study was elicited.

Cottrell and McKenzie (2011) and Polonsky and Waller (2011) argued the importance of underlining the limitations associated with research. According to them, research limitations are not inherent deficiencies but avenues for interpretation of results and further work. The limitation, in the context of the present study, pertained to the fact that the research participants were limited to SA only. Therefore, this is taken into account while interpreting the results, discussion, and implications of the study.

5.6 Summary

This chapter described the methodology underpinning the research. Under the variables attribute, the key variables of the study and research operationalization were outlined. The design and the samples attributes, in turn, focused on the primary mode of data collection while outlining the sampling procedures, the ethical considerations thereof, and the sample size of the study. Finally, the procedures employed towards data entry and data analysis techniques were described under the analysis category.

The next chapter establishes the respective scales' validity and reliability. Not only are the basics of measurement and psychometric testing as adopted in the study highlighted, but the detailed analysis of the Item Response Theory as establishing the validity and reliability measures are also provided in this chapter.

> "[Rasch measurement theory can] play an important role in the process of construct validation, in that a set of test or questionnaire items constitute the instrument designer's empirical definition of the construct." (Sick, 2008, p. 3)

Chapter 6:

Measurement and Psychometric Testing

6.1 Introduction

This chapter draws on the fundamentals of measurement and psychometric testing. Green and Frantom (2002) stated that an instrument can be developed using the Classical Test Theory (CTT) and/or the Item Response Theory (IRT). However, they posited that the Rasch model (a particular version of a one-parameter IRT model - see Section 6.4) provides an opportunity to attend to the anticipated item positions along a continuum of item endorsement difficulty. Therefore, this chapter justifies the argument for the application of the IRT (in particular, the Rasch model) over the CTT towards establishing the validity and reliability estimates of the constructed scales, while outlining the salient features of each. It also describes the theoretical background of the Rasch model as pertinent and applicable to the data types as used in the respective scale construction.

6.2 The Fundamentals of Measurement and Psychometric Testing

Wu and Adams (2007) asserted that measurement in the physical world is available in plenty, with well-established measuring instruments and scales providing useful information about the world around one. According to the authors, measurements in the psycho-social world are also abundant but with less universality compared to their physical counterpart. That the attributes of interest are generally not directly visible to

one as compared to objects of the physical world, measurement in the psycho-social world are often difficult (Wu & Adams, 2007).

Therefore, according to Wu and Adams (2007), measurements in the psycho-social world can only be done through observable indicators of the attributes. However, the authors noted that the psycho-social attributes need clarification before measurements can take place. The psycho-social attributes that are of interest to be measured are referred to as "latent traits" or "constructs" and the science of measuring the latent traits is referred to as "psychometrics" (p. 4). In general, psychometrics deals with the measurement of all latent traits, and not just those in the psycho-social context (Wu & Adams, 2007).

Various formal definitions of psycho-social measurement can be found in the literature. Lord and Novick (1968) defined measurement as a procedure for the assignment of numbers to specified properties of experimental units in such a way as to characterise and preserve specified relationships in the behavioural domain. Allen and Yen (1979) referred to measurement as assigning numbers to individuals in a systematic way as a means of representing properties of the individuals. Nunnally (1978) suggested that measurement constitutes the set of rules for assigning numbers to objects in such a way as to represent quantities of attributes. Wright and Stone (1979) viewed a measure as a location on a line and measurement as the process of constructing lines and locating individuals on the lines.

The measurement of social phenomena, as Bohrnstedt (2010) put it, can follow two theories, the CTT and/or IRT. While the CTT takes an individual's score on an underlying latent variable of interest to be the sum of responses to a set of items hypothesized to measure the latent variable, the IRT, given the overall distribution of responses to a set of items and an individual's responses to them, considers the best

estimate of the individual's underlying true score (Bohrnstedt, 2010). A comparative overview of the CTT versus the IRT is highlighted in the next section.

6.3 Classical Test Theory versus Item Response Theory

Wilson, Allen, and Li (2006) outlined the ideology behind the IRT. According to them, the IRT involves individuals responding to items on tests or surveys based on their ability or attitude and the difficulty or endorsability of the item. They went on to explain this in the context of a testing situation whereby, an individual's high ability and the ease of an item renders a high probability of the individual selecting the right answer. Likewise, an individual's strong attitude and the endorsability factor of an item result in a high probability of the individual endorsing the item strongly (Wilson et al., 2006). Wilson et al. (2006) also stressed that an IRT analysis of responses to a test or survey can provide estimates of each individual's and each item's location on the construct of interest, along with standard errors for each estimate rather than an aggregated error for the entire test or survey as in the CTT. The authors therefore, posited the IRT as better suited to assessing the reliability and validity of a criterion referenced test on account of the fact that the properties of the test can be assessed at any selected critical cut off.

Several other authors (Cooke & Michie, 1997; Hays, Morales, & Reise, 2000; Reeve, 2002; Santor & Ramsay, 1998) also highlighted the advantages of using the IRT over CTT methods. Reeve (2002) asserted that CTT statistics such as item difficulty (proportion of correct responses), item discrimination (corrected item-total correlation), and reliability are sample dependent, whereas IRT item parameters are not dependent on the sample used to generate the parameters, and are assumed to be invariant (within a linear transformation) across divergent groups within a research population and across populations. The fact that IRT models measure scale precision

across the underlying latent variable being measured by the instrument over the CTT's single estimation of reliability and corresponding standard error of measurement have been found as advantageous by Cooke and Michie (1997) and Hays et al. (2000). Another disadvantage of CTT methods was pointed out by Santor & Ramsay (1998). According to them, an individual's score is dependent on the set of questions used for analysis as per the CCT, whereas an IRT-estimated individual's trait level is independent of the questions being used. Further, as the expected individual's scale score is computed from their responses to each item (that is characterized by a set of properties), the IRT estimated score is sensitive to differences among individual response patterns and hence a better estimate of the individual's true level on the trait continuum than CTT's summed scale score (Santor & Ramsay, 1998). Cooke and Michie (1997) noted that in CTT, the summed scale score is dependent on the difficulty of the items used in the selected scale, and therefore, not an accurate measure of an individual's trait level. The CTT procedure assumes that equal ratings on each item of the scale represent equal levels of the underlying trait (Cooke & Michie, 1997). IRT, on the other hand, estimates individual latent trait level scores based on all the information in an individual's response pattern. Therefore, it takes into consideration correct and incorrect responses and utilizes the difficulty and discrimination parameters of the items when estimating trait levels (Weiss, 1995).

An increased application of the IRT and a shift towards authentic assessment were cited as two of the most important developments in educational measurement by Popham (1993). Jackson, Draugalis, Slack, Zachry, and D'Agostino (2002) claimed that though the Rasch model historically has been referred to as a member of the IRT family, the rapid growth in Rasch use has rendered it as a field of measurement in its

own right. The next section, therefore, highlights the basic concepts underlying the Rasch application.

6.4 Applying the Rasch Model

A particular version of a one-parameter IRT model is known as the Rasch model, after the Danish psychometrician who developed it (Rasch, 1960). Rasch models are a set of measurement models coming under the general heading of IRT (Stocking, 1999). The Rasch Measurement Model takes into account the ability of the respondent answering a questionnaire, test or instrument and the difficulty of each test item or items (Rasch, 1960).

Green and Frantom (2002) described the basic concepts of the Rasch measurement model. The Rasch model is a mathematical formula that specifies the form of the relationship between individuals and the items that operationalize one trait. The probability of an individual obtaining a higher score in a testing situation increases as the individual has more of the trait and vice versa, whereby items become more difficult to endorse. The Rasch model assumes that item responses are governed by an individual's position on the underlying trait and item difficulty, and as implied by the theory's terminology, item responses are modelled rather than sum total responses. According to the authors, the model does not allow for deliberate or unconscious deception, guessing, or any other variable that might impinge on the responses provided, and it is only the trait that is modelled and not the minor peripheral influences (Green & Frantom, 2002). The authors also explained that though the Rasch model is a one-parameter model, meaning that it models the one parameter difference between an individual's position and item difficulty, but, in reality, it actually provides two parameter estimates – an individual's position and

item difficulty, also referred to as person logit and item logit respectively, where a logit is a translation of the raw score (Green & Frantom, 2002).

Logit, the unit of measurement used in Rasch analysis for calibrating items and measuring individuals, is based on the natural logarithmic odds of the probability of a response (Jackson et al., 2002). The item difficulty estimate calibrated in logits is described on a continuum from less difficult to more difficult and as Jackson et al. (2002) explained - in the Rasch model, an individual's ability is defined as the log odds of answering correctly, items of average difficulty on the same scale with the average item logit centered to zero to establish this scaling. For example, an individual with an ability measure of + 1.0 logits would have a 50 per cent probability of correctly responding to an item of +1.0 logit difficulty (Jackson et al., 2002). Individual ability measured in logits and item difficulty calibrations reported in logits when diagrammatically represented on the same measurement scale constitute what is termed as an item distribution map (see Section 6.5). The scale measuring the construct is laid out vertically with the most able individuals and most difficult items at the top. The left-hand column locates the individual ability as measured in logits and the right-hand column locates the item difficulty calibrations also reported in logits (Jackson et al., 2002). According to Jackson et al. (2002), this map enables the researcher to observe visually the function of items and ability measures of individuals as a whole in addition to inspecting the spread of items along the scale. A separation distance of 0.15 logits or more between items demonstrates that items are distinct from each other (Wolfe & Kong, 1999). The greater the separation, the more distinct is the measurement strata; however, the separation between items should not be so large that gaps in measurement occur (Jackson et al., 2002). Wilson et al. (2006, p. i7) asserted that for assessing knowledge, as in an educational context, the terms

"respondent ability" and "item difficulty" make sense, whereas if a psychosocial construct is measured then "respondent attitude" and "item endorsability" may be the more appropriate terms to use.

Using the Rasch model offers several benefits, the main of which perhaps is its parsimony and the ensuing computational advantages for example, software with extensive interpretative output, and straightforward assessment of item fit (Edelen & Reeve, 2007). A sample size of at least 100 and a minimum of at least 20 items are suggested for obtaining stable indices when using Rasch analysis (Green & Frantom, 2002). Analyses can still be conducted, however, with far fewer people and items. Smith, Lawless, Curda, and Curda (1999) detailed results of an analysis with 48 people and 14 items. Linacre (1994) too suggested a sample size of 50 for the simplest Rasch model. Others were supportive of a little as 200 or even fewer observations for Rasch analysis (Orlando & Marshall, 2002; Thissen, Steinberg, & Gerrard, 1986). Green & Frantom (2002) pointed out that the Rasch model can be applied to a variety of data types ranging from categorical to rating scale or frequency count data.

Before outlining the underlying theories of the Rasch model for dichotomous and attitude type data, an assertion by Wright and Mok (2000) is worth mentioning which sums up the tremendous potential of the Rasch model:

> The Rasch model is a way to make sense of the world… In order to construct inferences from observation, the measurement model must: (a) produce linear measures, (b) overcome missing data, (c) give estimates of precision, (d) have devices for detecting misfit, and (e) the parameters of the object being measured and of the measurement instrument must be separable. Only the family of Rasch models solve these measurement problems (p. 84, p.87).

6.4.1 Rasch Model for Dichotomous Data

Some of the most commonly used IRT models are the Rasch model for binary responses (Fisher & Molenaar, 1995; Rasch, 1960), and the Rating Scale Model (RSM) or the Partial Credit Model (PCM) for multiple (greater than two) response

options (Andrich, 1978a, 1978b; Masters, 1982). The dichotomous Rasch model takes into account only differences in item difficulty to provide a measure of individual ability (Hawkins, 1987). The dichotomous Rasch model, therefore, formed the underlying theory for the knowledge items in the study.

Michell (2003) described the mathematical basis for the Rasch model for dichotomous data. According to Rasch's model, the relationship between the probability of a individual, *i*, performing correctly on a unidimensional, dichotomous test item, *j*, $P(\chi^2_{ij} = 1)$; *i*'s level of the relevant ability, a_i,; and *j*'s level of difficulty, d_j, is:

$$P(\chi 2_{ij} = 1) = \frac{e^{(a_i - d_j)}}{1 + e^{(a_i + d_j)}} \quad (1)$$

where, 'e' is the base of the natural logarithm function. If (1) is true, then:

$$P(\chi 2_{ij} = 1) = f(a_i - d_j) \quad (2)$$

where, 'f' is an increasing monotonic function.

Proposition (2) implies that order relations between these probabilities across individuals and items must satisfy the hierarchy of conjoint measurement cancellation conditions (Michell, 2003). The author argued that if the Rasch's theory is true, then for any individual, *i*, and item, *j*, of the relevant kind, the probability of *i* getting *j* correct increases with the difference between *i*'s ability and *j*'s difficulty.

In some cases, item responses may reflect a degree of correctness in the answer to a question, rather than simply correct or incorrect (Wu & Adams, 2007). To model these item responses, the PCM (Masters, 1982) or the RSM (Andrich, 1978a, 1978b) can be applied where item scores have more than two ordered categories (polytomous items) (Wu & Adams, 2007). The next subsection outlines the Rasch model for attitude data type as pertinent to the present study.

6.4.2 Rasch Model for Attitude Data

The PCM is a simple adaptation of Rasch's model for dichotomies and the RSM, in turn, is derived from the PCM (Reeve, 2002). The PCM has been applied to a wide range of item types which includes Likert type questionnaire items, essay ratings, items requiring multiple steps, and items where some answers are more correct than others (Wu & Adams, 2007). However, the RSM differs from the PCM in that the distance between difficulty steps (or levels) from category to category within each item is the same across all items (Reeve, 2002), and thus the RSM approach formed the underlying theory for the attitude items in the study.

The RSM describes the probability that a specific individual, *n*, will be rated on a particular rating scale item, *i*, with a specific rating scale category, *x* (Andrich, 1978b). Wolfe and Chiu (1999) described the equation for this probability (Equation 1) as containing three parameters: the individual's ability, β_n, the item's difficulty, δ_i, and the category threshold (that is the threshold between two adjacent scale levels), τ_x. The authors reiterated Reeve's (2002) assertion that in this model, the distance between each category threshold is assumed to be constant across all items. Calibration of data with this model, therefore, results in a separate parameter estimate and a standard error for that estimate for each person, item, and category threshold in the measurement context (Wolfe & Chiu, 1999).

$$P(X_{ni} = x) = \frac{\exp \sum_{j=0}^{x} [\beta_n - (\delta_i + \tau_j)]}{\sum_{x=0}^{m} \exp \sum_{j=0}^{x} [\beta_n - (\delta_i + \tau_j)]}, \quad x = 0, 1, ..., m \qquad (1)$$

where, '$P(X_{ni} = x)$' is the probability that an individual *n* is assigned to rating scale category *x* on item *i*, which has *m + 1* rating scale categories, and

$$\sum_{j=0}^{0} [\beta_n - (\delta_i + \tau_j)] = 0$$

Expected values for the RSM can be calculated for any combination of individual ability and item difficulty (Equation 2) (Wolfe & Chiu, 1999).

$$E_{ni} = \sum_{x=0}^{m} XP\ (X_{ni} = x), \quad \text{x = 0, 1, ..., m} \qquad (2)$$

where, 'E_{ni}' is the expected value for a combination of individual *n* and item *i* which has $m + 1$ rating scale categories, and '$P(X_{ni} = x)$' is obtained from Equation 1.

Departures in the data from these expected values indicate potential misfit and are captured by a fit statistic associated with each parameter estimate (Wolfe & Chiu, 1999). In fact, the Rasch model can evaluate individual item misfits which act as a quality control mechanism for expected item function (Jackson et al., 2002). The next section describes what constitutes the measures of a good fit to the Rasch model.

6.5 Determining the 'goodness-of- fit' to the Rasch Model

Gothwal, Wright, Lamoureux, and Pesudovs (2009) stated that the Rasch model is a probabilistic model encompassing a certain amount of assumed error; the use of the model, therefore, is driven by its goodness-of-fit of model to the data. Rasch analysis computer programs generate goodness-of-fit statistics for items as well as individuals, indicating how well the data fit the Rasch model (Árnadóttir & Fisher, 2008). When the items, in particular, demonstrate statistical goodness-of-fit to the Rasch model, the scale or the measure can be said to be unidimensional (Al-Sabbah, Mey, & Lan, 2010; Aoyama, 2007; Árnadóttir & Fisher, 2008; Baghaei & Amrahi, 2011; Bond & Fox, 2007; Burton & Mazerolle, 2011; Siegel & Ranney, 2003; Zoanetti, Griffin, Beaves, & Wallace, 2009). The meaning and the scope of unidimensionality as applicable to the Rasch model is detailed in the validity and reliability discussion that follows next and hence not presented here.

In addition to providing information about the unidimensional nature of the construct being measured, fit provides an index of the degree to which responses

conform to a logical pattern as well as an indication of the measure's validity for a specific individual (Green & Frantom, 2002). Similarly, fit permits assessment of the validity of the overall measure by providing a means to identify poorly functioning and/or biased items (Green & Frantom, 2002). The authors also asserted that item fit is an index of how well items function as a reflection of the trait. Items with an acceptable fit index, that is items that fit better, are more useful in measuring a trait than items that fit poorly (Green & Frantom, 2002). Jackson et al. (2002) supported Green and Frantom's (2002) assertion by suggesting that the fit measurements provide empirical evidence to detect (1) when an item is not part of the same dimension being measured; (2) the item is not understood; and (3) when it is likely that the response is a guess or an individual possesses special knowledge.

Baghaei and Amrahi (2011) stated that over forty fit indices have been developed by psychometricians to check the accord between data and the model; however, only two of them are implemented in Rasch software written in North America and Australia, the infit and outfit statistics. Infit is a weighted statistic that is sensitive to unexpected behaviour that affects responses to items near the individual's ability level and hence indicative of the degree to which the observations for a particular item meets the model expectations. On the other hand, outfit, an unweighted statistic, is an outlier-sensitive fit statistic that indicates whether unexpected responses or outliers are found based on the individual's ability (Jackson et al., 2002). Both infit and outfit are reported in two forms, unstandardized as mean square (MNSQ) and the standardized MNSQ (Zstd) (Baghaei & Amrahi, 2011; Bond & Fox, 2007; Green & Frantom, 2002; Jackson et al., 2002). Jackson et al. (2002) asserted that while the MNSQ pertains to the amount of randomness in the response pattern when the data fit the model and hence indicative of the magnitude of the

discrepancy between the observed and expected responses, the Zstd approximates the t-statistic and hence indicative of the statistical probability of the discrepancy.

The ideal value is 1 for mean square values and 0 for standardized ones. However, the acceptable range for mean square values is from 0.70 to 1.3 and for standardized ones from -2 to +2 (Baghaei & Amrahi, 2011; Bond & Fox, 2007; Linacre, 2012). The acceptable mean square values for the Likert type scale fall in the range of 0.6-1.4 (Bond & Fox, 2007; Linacre, 2012). Green and Frantom (2002) claimed that there are no definitive rules regarding what is considered acceptable and unacceptable fit and substantiated the claim by tracing the literature highlighting measures of acceptable fit: (1) mean square (infit or outfit) between 0.6 and 1.4 or between 0.8 and 1.2 (Bode & Wright, 1999), (2) mean square less than 1.3 for samples less than 500, 1.2 for 500-1,000, and 1.1 if n>1,000 (Smith, Schumacker, & Bush, 1995), and (3) standardized fit (infit or outfit) between -2 and +2, between -3 and +2, or less than +2 (Smith, 1992). Keeves and Alagumalai (1999) were more stringent and considered a fit as acceptable if the mean lies between 0.77 and 1.3. Bond and Fox (2007, Table 12.6, p. 243), however, highlighted some reasonable item mean square ranges for infit and outfit based on the type of test administered (Table 6.1).

Table 6.1. **Some Reasonable Item Mean Square Ranges for Infit and Outfit**

Type of Test	*Range*
Multiple-choice test (High stakes)	0.8-1.2
Multiple-choice test (Run of the mill)	0.7-1.3
Rating scale (Likert/survey)	0.6-1.4
Clinical observation	0.5-1.7
Judged (where agreement is encouraged)	0.4-1.2

Source: Bond and Fox (2007, Table 12.6, p. 243)

The fact that the fit *t* statistic that is the standardized fit (infit or outfit) is dependent on the sample size was also stressed by Wu and Adams (2007). They

deduced that with an increase in the sample size, the fit *t* values became progressively larger and many items showed misfit. The authors, therefore, argued that fit statistics should serve as an indication for detecting problematic items rather than for setting concrete rules for accepting or rejecting items (Wu & Adams, 2007). Wu and Adams (2007) also contended that the fit statistics should not be used blindly to reject items, particularly those that overfit and solely based on the premises that the rest of the items are not as good as these, since these may lead to removing the best items in the test; rather, an improvement of the items can be the alternative. While over fitting items provide a guide to refining an instrument and are of little concern, those that underfit (also referred to as noise) suggests unusual and/or inappropriate response patterns (Green & Frantom, 2002). Furthermore, residual-based fit statistics depicting items that fit the Rasch model are not sufficient by itself to conclude that the test is perfect. The reliability of the test and item discrimination indices should also be considered in making an overall assessment (Wu & Adams, 2007). The reliability outputs of the Rasch model are discussed alongside the validity and reliability estimation in Section 6.6, while the concept of item discrimination is described as follows.

The mathematical expression of the Rasch model implies that all items discriminate equally between high and low ability individuals, and that there is no error due to guessing successfully (Sick, 2010). According to Sick (2010), a Rasch analysis estimates a single, averaged discrimination parameter that is applied to all items in the instrument. Items with observed discrimination values significantly higher or lower than this uniform value are then scrutinized, on the assumption that below average values indicate a weak relationship to the primary construct, and above average values imply a lack of item independence (Sick, 2010). Wu and Adams

(2007) defined this discrimination index as the correlation between an individual's score on the item and their total score on the questionnaire. A discrimination value of zero indicates that there is no relationship between the item score and the total score, whereas a positive discrimination indicates a positive relationship (Wu & Adams, 2007). Ebel (1972) and Wu and Adams (2007) asserted that the item discrimination measure should be at least 0.2 but preferably closer to or in excess of 0.4.

In addition to the measurement properties described above, Rasch analysis computer programs enable item difficulty and individual ability to be visualized along a linear scale, which is known as a person-item map (Gothwal et al., 2009), a person-item variable map (Maley & Bond, 2007; Sick, 2008) or an item distribution map (Jackson et al., 2002). Gothwal et al. (2009) outlined the utility of the map to determine (1) the extent to which item positions match person positions (targeting) (if positions do not line up, items are likely inappropriate [for example, too easy or too hard] for the persons); (2) whether there are gaps in the measure, which if present indicate the need for more items; and (3) an item hierarchy, which provides information about the most and least difficult items and more and less able persons.

The person-item variable map as Maley and Bond (2007) described, is a logit scale with person and item performance estimates plotted along a single equal-interval continuum. The logit scale is displayed down the middle of the map, with test items and person ability estimates located to the right and left of the scale, respectively. The value of each logit on the scale is equal (Bond & Fox, 2007), enabling inferences to be made in regards to not only who is more able (or ready) than whom, but more specifically, how much more able or ready (Maley & Bond, 2007). The authors explained that a logit value of zero is routinely set as the average and hence items of above average difficulty are plotted as positive, while items of below average

difficulty are plotted as negative. Correspondingly, persons with ability above the average of the test items appear in the positive part of the scale, and persons with ability below that average appear in the negative part of the scale (Maley & Bond, 2007).

Bond and Fox (2007) asserted that each test item's location on the logit scale is determined by its estimated threshold, which is a point on the scale where a person of that estimated ability has a 50 per cent probability of succeeding on that item. For items scored dichotomously, a single item difficulty estimate is plotted at the threshold where the probability of scoring either 0 or 1 is 50 per cent; polytomously scored items, on the other hand, have two difficulty thresholds plotted to separate the three response categories (0, 1, 2) (Bond & Fox, 2007). The plot of a simplified person-item variable map (illustrative only, and not based on real data) was put forward by Sick (2008, Figure 1, p. 5), as shown in Figure 6.1.

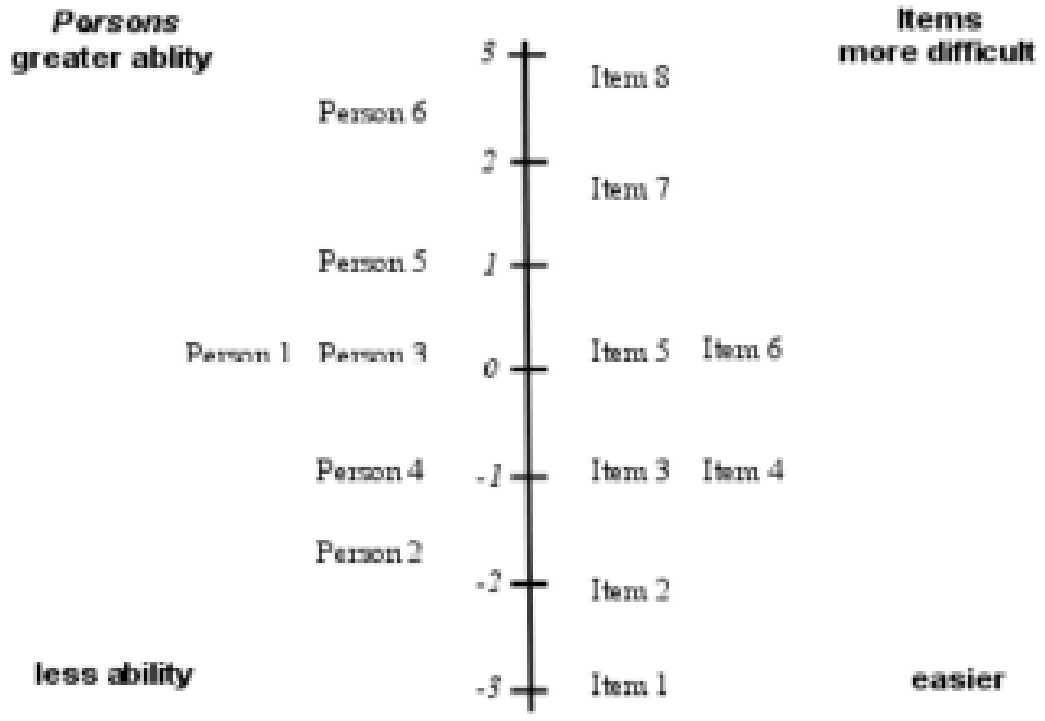

Figure 6.1. **A simplified Rasch variable map** (Adapted from Sick, 2008, Figure 1, p. 5)

Another Rasch plot takes the form of the infit mean square statistics for items as described earlier. The United Nations International Children's Emergency Fund (UNICEF) in its report of the East Asia Learning Achievement Study, referred to this plot as the "pattern of infit statistics for items" and sketched diagrammatically a Rasch output of what constitutes a "good fit" to the model, as shown in Figure 6.2 (UNICEF, 2007, Appendix 1, p. 77).

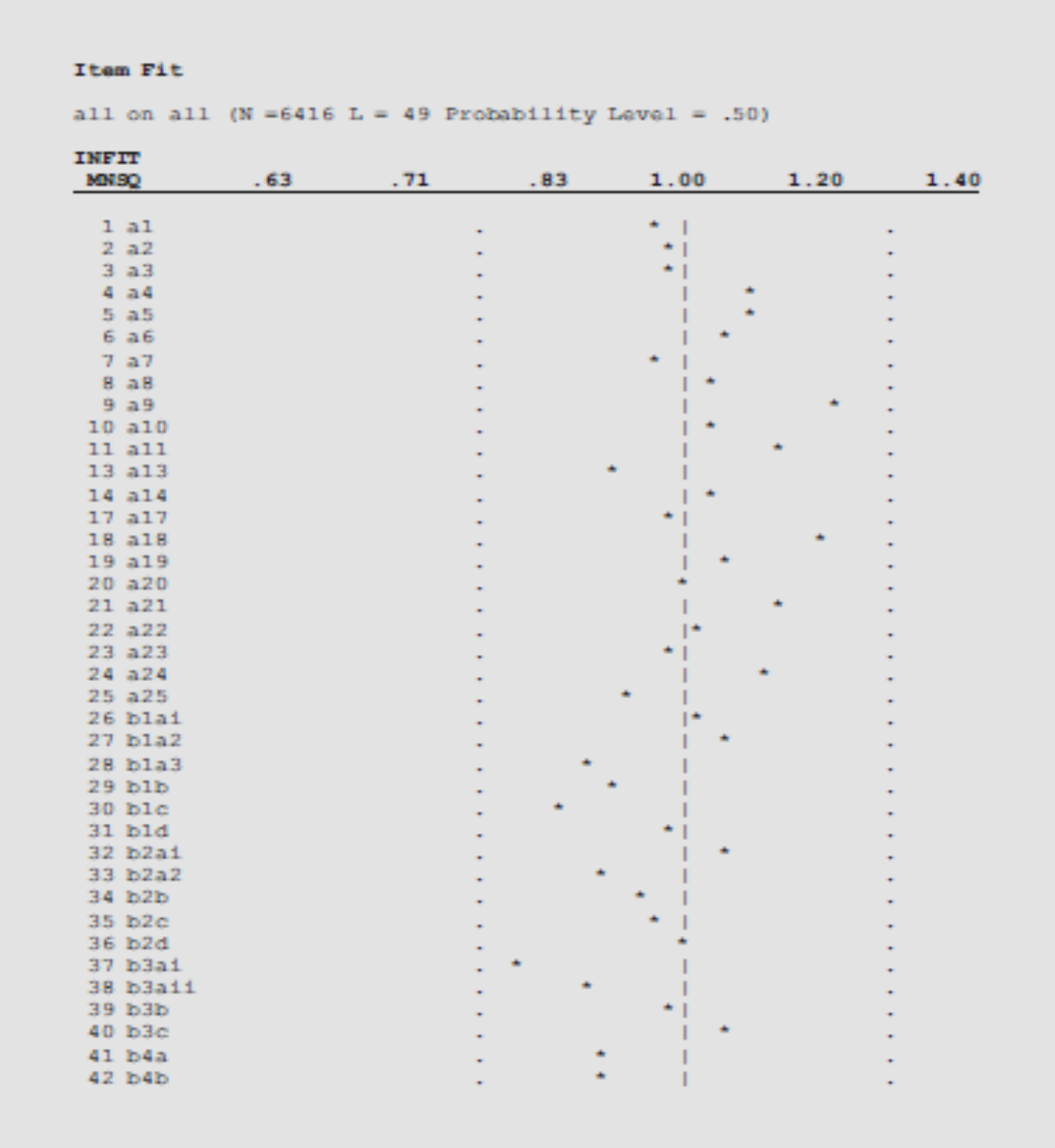

Figure 6.2. **Pattern of infit statistics for items** (Adapted from UNICEF, 2007, Appendix 1, p. 77)

In the plot above, the numbers on the horizontal scale represent the infit mean squares and the asterisks indicate the magnitude of the fit statistic for each item on the same line (Serow, 2007). Bond and Fox (2007) agreed with Serow's (2007) assertion that the fit statistics that lie within the two dotted vertical lines are considered acceptable and the well-fitting nature of the items to the model indicates that the items represent aspects of a latent trait.

Wu and Adams (2007) argued that properties of the Rasch model only hold if the data fit the model. That is, if the data do not fit the Rasch model, by applying a Rasch scaling, the items will not work any better. The authors, therefore, suggested the application of the Rasch model at the pilot stage of a research for selecting items because the item response data from the final form of a test if fails to fit the Rasch model, the scale construction will not be valid even when the Rasch model is applied (Wu & Adams, 2007). In line with this argument, the validity and reliability estimates of the constructed scales using the Rasch model was conducted in both stages, the pilot as well as the main study as outlined below.

6.6 Validity and Reliability

Green and Frantom (2002, p. 3) stated that "a desirable measure is one that is simple and easy to use and is characterized by high quality of the information obtained - usually reported as reliability and validity". Validity has been identified as "the most fundamental consideration in developing and evaluating tests" (American Educational Research Association [AERA], American Psychological Association [APA], & National Council on Measurement in Education [NCME], 1999, p. 9) and as "the foundation for virtually all of our measurement work" (Frisbie, 2005, p. 21). Likewise, according to the same Standards for Educational and Psychological Testing (AERA, APA, & NCME, 1999), reliability has been referred to as "the consistency of

such measurements when the testing procedure is repeated on a population of individuals or groups" (p. 25).

According to Roberts, Priest, and Traynor (2006), reliability is a necessary but insufficient condition for validity. They explained that a questionnaire may be reliable but not valid. This ideology that a measure cannot be valid without being reliable (but not the vice versa) has also been asserted by the Chief Editorial Board of the Journal of Developmental Disabilities in a foreword in a recent issue of their Article (Chief Editorial Board, Journal of Developmental Disabilities, 2007), and by Kaplan and Saccuzzo (2009) in their book Psychological Testing: Principles, Applications, and Issues. Both validity and reliability, therefore, are necessary entities of instrument development (Burton & Mazerolle, 2011).

Validity refers to the extent to which an instrument measures what it purports to measure, and not something else (Kelly, 1927; Netemeyer, Bearden, & Sharma; Razavi, 2001) or the legitimacy of the results of a test as interpreted for a specific purpose (Cook & Beckman, 2006). The methodologies commonly employed for survey validation were outlined by Burton and Mazerolle (2011, Table 1, p. 29) as depicted in Table 6.2.

Table 6.2. **Methods of Survey Validation**

Type	*Description*	*Purpose*
Face	Evaluation of an instrument's appearance by a group of experts and/or potential participants	Establishing an instrument's ease of use, clarity, and readability
Content	Evaluation of an instrument's representativeness of the topic to be studied by a group of experts	Establishing an instrument's credibility, accuracy, relevance, and breadth of knowledge regarding the domain
Criterion	Evaluation of an instrument's correlation to another that is deemed unquestionable or identified as the gold standard	Establishing an instrument's selection over another or establishing the predictability of the measure for a future criterion
Construct	Evaluation of an instrument's ability to relate to other variables or the degree to which it follows a pattern predicted by a theory	Establishing an instrument's ability to evaluate the construct it was developed to measure

Source: Burton and Mazerolle (2011, Table 1, p. 29)

Table 6.2 reveals the different methods used for survey validation. In the context of the present study, three forms of validity estimation were conducted, namely face validity, content validity, and construct validity. Baghaei and Amrahi (2011), however, asserted the unifying of the types of validity into one - the construct validity. They cited Cronbach's (1980) position that "all validation is one" (p. 99) and argued that "by 'one' he meant construct validity" (Baghaei & Amrahi, 2011, p. 1052). Messick (1989) too, in confirming the unitary nature of validity, extended the definition of construct validity and defined it as "an overall evaluative judgment of the degree to which empirical evidence and theoretical rationales support the adequacy and appropriateness of interpretations and actions on the basis of test scores or other modes of assessment" (p. 288). Beckman, Ghosh, Cook, Erwin, and Mandrekar (2004) in their review of 21 studies related to published instruments of assessments of clinical teaching found that the most commonly observed sources of validity evidence were in the category of internal structure. The authors, therefore, related this internal structure to the psychometric characteristics of an instrument and

referred to it as the reliability (Beckman et al., 2004). The different types of reliability, their descriptions, indices, and definitions were also outlined by Beckman et al. (2004, Table 3, p. 974) as depicted in Table 6.3.

Table 6.3. **Types of Reliability: Descriptions, Indices, and Definitions**

Reliability	*Description*	*Indices*	*Definitions*
Internal consistency	Items* on a test** measuring the same trait***, with a high correlation between items. Widely reported, because it can be calculated after administering a single test form once.	Split-half reliability	Divides a test into equal halves, and calculates the correlation between the halves.
		Kuder-Richardson	Similar concept to split-half, but accounts for all items (several different formulas for specific situations).
		Cronbach's α	A generalized form of the Kuder-Richardson formulas.
		Factor analysis	A statistical method to find clusters (factors) of related items.
Temporal stability	Test producing similar results when administered a second time.	Test-retest	Administers the same form to the same person at different times.
Equivalence	Two different tests intended to measure the same trait producing similar results.	Alternate forms	Administers different forms to the same individual at the same or different times.
Agreement (interrater reliability)	One rater's score similar to another's. This may be the most important source of reliability when assessing clinical performance.	Per cent agreement	Per cent of identical responses.
		Phi	Simple correlation.
		Kappa	Per cent agreement corrected for chance.
		Kendall's tau	Agreement on ranked data.
		Intraclass correlation coefficient	Uses analysis of variance (ANOVA) to estimate how well ratings from different raters coincide.
Generalizability theory	Analysing how much of the error in measurement is due to each factor (item, item grouping, subject, rater, day of test, etc.) involved in the measurement process.	Generalizability theory	Complex model that allows estimation of multiple sources of error.

** The word 'test' may apply to any instrument - test, survey, performance rating scale, etc.
* 'Items' are the individual questions on the instrument.
*** The 'trait' is what is being measured, such as knowledge, attitude, or skill in a specific area.

Source: Beckman et al. (2004, Table 3, p. 974)

Table 6.3 outlines the different types of reliability. In the context of the present study, the most common form of reporting reliability that is the internal consistency expressed in terms of Cronbach alpha is reported. That the reliability and validity of an instrument can be ascertained using the Rasch model, have been asserted by numerous researchers (Al-Sabbah, 2010; Ariffin, Omar, Isa, & Sharif, 2010; Aoyama, 2007; Baghaei & Amrahi, 2011; Green & Frantom, 2002; Jackson et al., 2002; Watson & Callingham, 2003; Zoanetti et al., 2009). The Rasch model, however, makes three assumptions (Watson & Callingham, 2003), and the extent to which these assumptions are met is a measure of the validity of the underlying construct (Wright & Masters, 1982). The assumptions, as Watson and Callingham (2003) explained are unidimensionality, variable hierarchy, and local independence. While local independence means that responses to later items in a test do not depend on a correct response to an earlier item, variable hierarchy denotes that the construct is measurable with an additive unit of measure that is repeated along the variable (that is, the scoring or coding assigned to each item describes an increasing quantity of the construct) (Watson & Callingham, 2003). Unidimensionality, on the other hand, signifies different domains or categories (which may be part of the test) as forming a single dimension (Watson & Callingham, 2003). Each of these assumptions as Watson and Callingham (2003) asserted, can be evaluated from the item infit mean square statistics; overfitting items violate the first and the third assumption, whereas items that misfit violate the second assumption. In fact, item fit in the Rasch model as indicative of the unidimensionality (measure of a single underlying construct) and construct validity of an instrument have been asserted by numerous authors (Bond & Fox, 2007; Wright & Stone, 1979), in research involving validation of instruments (Al-Sabbah, 2010; Ariffin et al., 2010; Aoyama, 2007; Baghaei & Amrahi, 2011;

Green & Frantom, 2002; Jackson et al., 2002; Watson & Callingham, 2003; Zoanetti et al., 2009), and the UNICEF (2007) in its report of the East Asia Learning Achievement Study. On the other hand, reliability, a measure of the consistency or repeatability of the instrument (Netemeyer et al., 2003; Nunnally, 1978) is also reported in the Rasch output individually as item reliability and case reliability, and overall as the reliability of the intended measure (Bond & Fox, 2007). These reliability estimates are similar to the Cronbach alpha index of internal consistency (Bond & Fox, 2007), and are based on the logit metric rather than the score metric approach of classical reliabilities (Wilson et al., 2006). An alpha value of 0.70 and above is considered to be the criterion for demonstrating internal consistency of new scales and established scales respectively (Nunnally, 1978; Nunnally & Bernstein, 1994).

Based on the discussion above and the earlier literature on the goodness-of-fit to the Rasch model, the validity and reliability measures of the constructed scales as conducted in both phases of the study - pilot and main, are discussed in the following subsections.

6.6.1 Validity and Reliability Analysis – Pilot Study

6.6.1.1 Face and Content Validity

Once the initial pool of questions were framed constituting the knowledge and the attitude items of the questionnaire, the face and the content validity was secured before progressing to pilot it. The face validity was established by the researcher himself, the supervisors, and peers towards the instrument's ease of use, clarity, and readability. The instrument's credibility, accuracy, relevance, and representativeness (in terms of measuring the concerned traits as addressing the relevant research

questions) were assessed by a panel of three experts in the subject area of interest as a measure of content validity.

The validity of the open-ended questions as measuring what they are intended to measure was evaluated separately by three pre-service teachers before the questionnaire administration. However, it was only the knowledge and the attitude scales (along with the demographic variables and the sources of information) that were piloted for establishing the construct validity and reliability, with the open-ended questions set aside for the main study. The following subsections highlight the construct validity and reliability measures for each of the scales under investigation.

6.6.1.2 Construct Validity and Reliability – Knowledge Scale

The validity estimation of the knowledge scale was evaluated in terms of the overall item and case fit statistics, the individual infit and outfit measures and the discrimination indices of the items. Reliability, on the other hand, is reported individually as an item measure, a case measure, and as the overall reliability of the scale. The individual case estimates, however, are not reported. The overall summary of the item and case estimates are reported in Table 6.4.

Table 6.4. **'Knowledge' Scale (Pilot study): Summary of item and case Estimates**

	Item	*Case*
Mean	.00	− .46
SD	1.32	1.13
SD (adjusted)	1.28	1.06
Reliability of estimate	.95	.88
Internal Consistency	.87	
Zero scores	0	0
Perfect scores	0	0

The mean of item estimates is located at 0 (by default) and the standard deviation (SD) for item estimates is nearly 1. Similarly, the mean case estimate (that is the group average) is closer to 0, with the SD approaching unity for a well-matched

test (Bond & Fox, 2007). Table 6.4 reveals that the mean case estimate was − .46, an indicator that for the individuals involved, the items were slightly difficult to achieve. The SD of 1.32 for item estimates compared to the 1.13 value of the case counterpart indicated a greater spread of item measures or variation in those measures than case measures. Reliability, the ability of the test to define a distinct hierarchy of items (or cases) along the measured variable is interpreted on a 0 to 1 scale, much in the same way as Cronbach's alpha is interpreted (Bond & Fox, 2007). The reliability of both the item and the case ability was high at .95 and .88 respectively, considering the acceptable level of Cronbach's alpha of at least 0.7 as stressed by Nunally (1978). Similarly, the overall internal consistency of the knowledge scale was high at .87. The annotations at the bottom of Table 6.4 with no recorded zero scores and perfect scores (either for the item or case estimates) indicated that all the items were useful for discriminating ability amongst this sample.

The Quest diagrammatic output pertaining to the infit mean square statistics for items and representative of the construct validity as discussed earlier is shown in Figure 6.3.

```
QUEST: The Interactive Test Analysis System
-------------------------------------------------------------------------
Item Fit
12/10/12 10:12
all on all (N = 76 L = 45 Probability Level= .50)
-------------------------------------------------------------------------
INFIT
 MNSQ        .63       .71       .83      1.00      1.20      1.40
1.60
-------------+---------+---------+---------+---------+---------+---------+----
-----+-----
  1 item 1                     .         *      |               .
  2 item 2                     .              * |               .
  3 item 3                     .               *|               .
  4 item 4                     .              * |               .
  5 item 5                     .           *    |               .
  6 item 6                     .                | *             .
  7 item 7                     .      *         |               .
  8 item 8                     .    *           |               .
  9 item 9                     .                |*              .
 10 item 10                    .        *       |               .
 11 item 11                    .                |  *            .
 12 item 12                    .                |  *            .
 13 item 13                    .                |*              .
 14 item 14                    .                |    *          .
 15 item 15                    .                *               .
 16 item 16                    .             *  |               .
 17 item 17                    .           *    |               .
 18 item 18                    .                *|              .
 19 item 19                    .                |    *          .
 20 item 20                    .             *  |               .
 21 item 21                    .                *|              .
 22 item 22                    .             *   |               .
 23 item 23                    . *               |               .
 24 item 24                    .                 |        *      .
 25 item 25                    .       *         |               .
 26 item 26                    .                 |    *          .
 27 item 27                    .                 |           *   .
 28 item 28                    .                 |  *            .
 29 item 29                    .                 |    *          .
 30 item 30                    .                 |       *       .
 31 item 31                    .                 |         *     .
 32 item 32                    .                 |    *          .
 33 item 33                    .                 |  *            .
 34 item 34                    .                 | *             .
 35 item 35                    .             *   |               .
 36 item 36                    .       *         |               .
 37 item 37                    .                 | *             .
 38 item 38                    .             *   |               .
 39 item 39                    .                 |   *           .
 40 item 40                    .             *   |               .
 41 item 41                    .                 |  *            .
 42 item 42                    .                 *               .
 43 item 43                    .        *        |               .
 44 item 44                    .                 |  *            .
 45 item 45                    .         *       |               .
```

Figure 6.3. **'Knowledge' Scale (Pilot study): Infit mean square statistics for items (construct validity)**

As evident from Figure 6.3, none of the items misfit the Rasch model assumptions. That the fit statistics lay within the two dotted vertical lines indicated that the items represented aspects of a latent trait as described earlier. This confirmed the items as measuring the same underlying trait or construct and hence reflective of the construct validity of the knowledge scale. A closer look at the fit statistics for each of the items comprising the knowledge scale further confirmed this assertion (Table 6.5). Table 6.5 also presents the discrimination index for each of the items which were also taken into account for the overall assessment of item functioning.

Table 6.5. **'Knowledge' Scale (Pilot study): Individual item fit statistics and discrimination indices (DI)**

Quest ID	*Item No.*	*Infit MNSQ**	*Outfit MNSQ**	*Infit t**	*Outfit t**	*DI***
item 1	1	.90	**.61**	− .2	− .3	*.33*
item 2	2	.95	.95	− .5	− .1	.44
item 3	3	.99	.94	.0	− .1	.46
item 4	4	.95	.88	− .5	− .4	.45
item 5	5	.91	.91	− .6	− .3	.55
item 6	6	1.04	1.07	.3	.3	*.38*
item 7	7	.85	.75	− 1.1	− .6	.48
item 8	8	.82	.76	− 1.2	− 1.0	.58
item 9	9	1.03	1.13	.2	.5	*.39*
item 10	10	.88	.99	− .4	.2	*.36*
item 11	11	1.05	1.10	.4	.4	*.23*
item 12	12	1.06	1.06	.7	.3	*.37*
item 13	13	1.02	1.04	.2	.3	.41
item 14	14	1.11	1.11	1.2	.6	*.33*
item 15	15	1.00	.97	.1	− .1	.44
item 16	16	.94	.90	− .5	− .2	.42
item 17	17	.92	.82	− .7	− .5	.45
item 18	18	.98	.89	− .2	− .3	.42
item 19	19	1.09	1.00	.8	.1	*.28*
item 20	20	.93	.80	− .6	− .6	.45
item 21	21	.98	.84	− .2	− .5	.41
item 22	22	.92	.87	− .4	− .4	.49
item 23	23	.80	.75	− 1.7	− 1.2	.62
item 24	24	1.16	1.10	1.3	.4	*.21*
item 25	25	.87	.86	− 1.1	− .6	.55
item 26	26	1.11	1.08	.9	.4	*.35*
item 27	27	1.23	**1.96**	**2.3**	**3.7**	*.22*
item 28	28	1.06	**4.64**	.3	**2.8**	**.06**
item 29	29	1.11	**1.76**	.4	1.0	**− .01**
item 30	30	1.13	1.15	1.4	.8	*.31*
item 31	31	1.19	**1.46**	1.1	1.6	*.24*
item 32	32	1.10	1.07	1.0	.4	*.36*
item 33	33	1.05	1.02	.6	.2	*.36*
item 34	34	1.03	1.09	.4	.4	*.35*
item 35	35	.92	**.50**	− .1	− .4	*.32*
item 36	36	.87	.82	− 1.6	− .8	.55
item 37	37	1.05	1.03	.5	.2	*.38*
item 38	38	.93	.91	− .5	− .4	.49
item 39	39	1.07	1.07	.7	.3	*.31*
item 40	40	.94	.86	− .5	− .3	.41
item 41	41	1.06	**1.33**	.3	.7	**.18**
item 42	42	1.00	1.20	.0	.7	*.33*
item 43	43	.87	.72	− .8	− .6	.45
item 44	44	1.05	1.04	.4	.2	.40
item 45	45	.89	.74	− .9	− .7	.47
Mean		1.00	1.08	.02	.13	
SD		.10	.60	.83	.89	

* Deviant values in bold

** Italicised values greater than the acceptable cut-off 0.2 but less than the preferred 0.4

As revealed in Table 6.5, none of the individual infit MNSQ values fell outside the reference value of 0.7-1.3 for mean squares as outlined by Baghaei and Amrahi (2011), Bond and Fox (2007), and Linacre (2012). Items 28, 27, 29, 31, and 41 (in decreasing order of magnitude, respectively), however, recorded outfit MNSQ values above 1.3. This was indicative of the items as not discriminating well. Items 1 and 35, on the contrary, resulted in outfit MNSQ values less than the 0.7 criterion, reflective of redundancy in item information. The standardized values for the mean squares in the form of 'infit t' and 'outfit t' had item 27 (both infit and outfit) and item 28 (outfit) falling outside the acceptable -2 to +2 range. Table 6.5 also highlights the discrimination indices for the individual items with items 29, 28, and 41 (in ascending order of magnitude, respectively), recording values less than the acceptable 0.2 as outlined by Wu and Adams (2007). In fact, item 29 showed a negative value (− .01) and based on Wu and Adams's (2007) suggestion, it was checked for category disordering, which, however, was not found. The other discrimination index values which were greater than the acceptable cut-off 0.2 but less than the preferred 0.4 are italicised under the 'DI' head of Table 6.5. The annotations at the bottom of Table 6.5 in the form of the 'mean' and 'SD' of the fit statistics confirmed little spread from ideal. Ideally, as Bond and Fox (2007) asserted, the mean value of the mean squares should be 1.00 with a small SD; the mean and SD values of the standardized mean squares ('infit t' and 'outfit t'), however, should be 0 and approaching unity, respectively. The mean values of the mean squares were close to 1 (1.00 and 1.08, respectively) with a small SD for each (.10 and .60, respectively). Likewise, the mean values of the standardized mean squares were close to 0 (.02 and .13, respectively) and the SD's close to 1 (.83 and .89, respectively).

Based on the discussion above, the wording of some of the items of the knowledge scale was rephrased (without adding or deleting any item, whatsoever). This was done in spite of the fact that none of the individual infit MNSQ values reported a deviance from the acceptable range. Rather, the re-wording was targeted towards the enhancement of the fit and/or discrimination values as applicable. Table 6.6 outlines the rewording of items based on the fit statistics and/or discrimination indices. It is to be noted that those items which had discrimination indices less than 0.3 formed the criteria for re-wording with respect to this statistic (and not all that recorded a value less than the preferred 0.4).

Table 6.6. 'Knowledge' Scale (Pilot study): Rewording of items based on the fit statistics and/or discrimination indices (DI)

Item No.	*Indicator*	*Original (O)/New (N)*	*Item wording*
1	Outfit MNSQ	O	Combination hormonal contraceptive use is a risk factor for chlamydial infection
		N	Combined Hormonal Contraceptives (CHCs) are associated with an increased risk of chlamydial infection
11	DI	O	Men who have sex with men are at increased risk for syphilis contraction
		N	Men who have sex with men are at increased risk for contracting and transmitting syphilis
19	DI	O	Genital warts lead to cervical cancer
		N	The types of Human Papillomavirus that can cause genital warts are the same as the types that can cause cancers
24	DI	O	Genital herpes can make an individual sterile
		N	Genital herpes can make an individual sterile (incapable of reproduction)
27	Outfit MNSQ, Infit t, Outfit t, DI	O	HIV cannot be spread through saliva (spit)
		N	HIV cannot be transmitted through saliva
28	Outfit MNSQ, Outfit t, DI	O	Treating other Sexually Transmitted Infections lower the risk of HIV transmission
		N	Treating other Sexually Transmissible Infections reduces the ability of a HIV-positive individual to transmit HIV
29	Outfit MNSQ, DI	O	Exclusive breastfeeding reduces mother-to-child HIV transmission
		N	Exclusive breastfeeding reduces mother-to-child HIV transmission compared with mixed feeding
31	Outfit MNSQ, DI	O	Injection drug use is a major risk factor for Hepatitis A infection
		N	Injection drug use is cited as one of the risk factors for Hepatitis A infection
35	Outfit MNSQ	O	The mother-to-child transmission of Hepatitis A is rare
		N	Hepatitis A is rarely transmitted from the mother-to-child
41	Outfit MNSQ, DI	O	Hepatitis C is primarily sexually transmitted
		N	Hepatitis C is primarily transmitted via sexual means

6.6.1.3 Construct Validity and Reliability – Attitude Scale

The attitude scale, however, had two items emerging as misfits to the Rasch model assumptions (detailed in the upcoming paragraphs). Therefore, the Quest had to be re-run after deletion of these two items. The relevant statistical outputs for the initial run as well as those after item deletion are presented alongside for a comparative evaluation. The individual case estimates, however, are not reported. The overall summary of the item and case estimates are reported in Table 6.7.

Table 6.7. **'Attitude' Scale (Pilot study): Summary of item and case Estimates**

	Initial run		*After item(s) (50,54) deletion*	
	Item	*Case*	*Item*	*Case*
Mean	.00	1.15	.00	1.34
SD	.78	.68	.73	.83
SD (adjusted)	.49	.53	.32	.66
Reliability of estimate	.38	.61	.19	.64
Internal Consistency	.70		.79	
Zero scores	0	0	0	0
Perfect scores	0	0	0	5

Table 6.7 reveals that the mean case estimates of the initial and final run were 1.15 and 1.34 respectively, an indicator that for the individuals involved, the items represented ideas that were readily accepted by most of the participants. The SD for the items as well as the cases, both for the initial and the final run were near unity indicative of a well-matched test. The individual reliability estimate, however, was low for both the items (.38) as well as the cases (.61) in the initial run of the scale. The case reliability increased marginally to .64 after deletion of two items; however, the item reliability fell down to .19, which was far below than acceptable. This might be due to the fact that, as Nunnally (1978) asserted that the reliability estimate is dependent on the number of items in a scale. Hence, deleting two items in the scale resulted in lower item reliability. The overall internal consistency of the attitude scale,

however, increased from .70 to .79 as a result of the separate run. This confirmed that the two items that were deleted were not contributing towards measuring the same theoretical construct or trait. The annotations at the bottom of Table 6.7 with no recorded zero scores and perfect scores (for the item estimates) confirmed that all the items were useful for discriminating between individuals on the attitude scale. However, all but five cases (with perfect-score status after item deletion) were integral in defining the discriminating ability amongst this sample.

The Quest diagrammatic output pertaining to the infit mean square statistics for items and representative of the construct validity is shown in Figures 6.4 (i) [initial run] and (ii) [final run], respectively. Since the Quest software identifies items sequentially, therefore, the original item number as per the scale/questionnaire has been depicted in parenthesis for identification purposes.

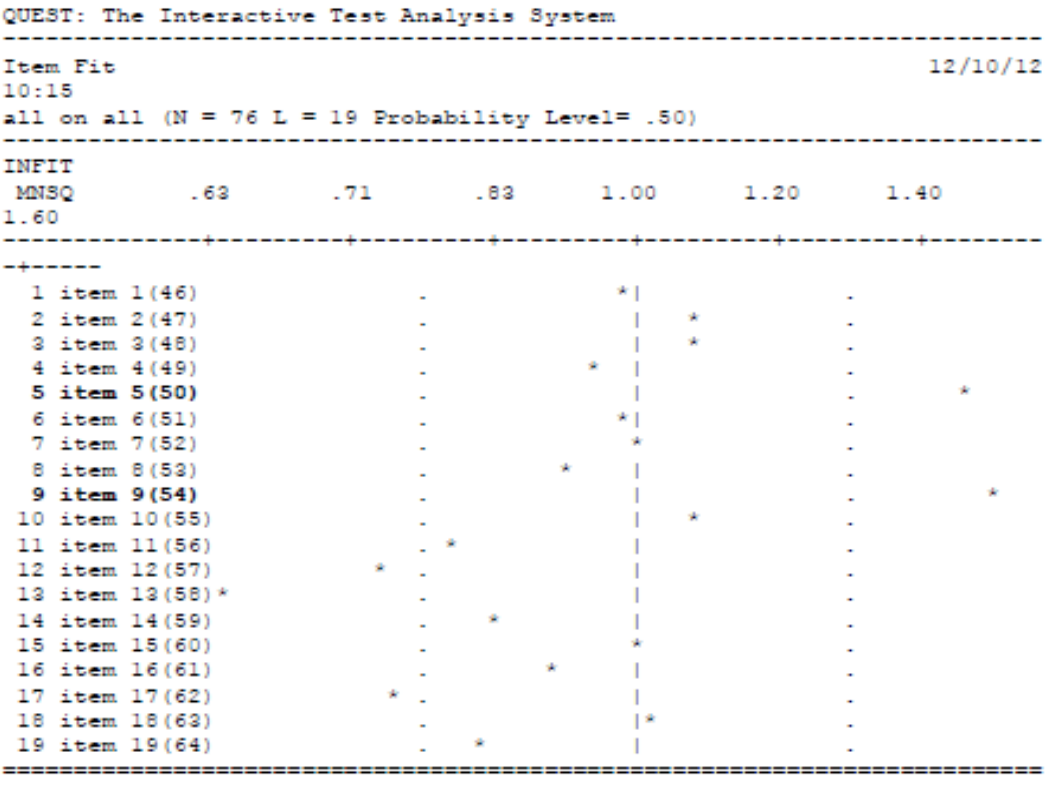

Figure 6.4 (i). **'Attitude' Scale (Pilot study) – Initial Run: Infit mean square statistics for items (construct validity)**
Deviant items in bold

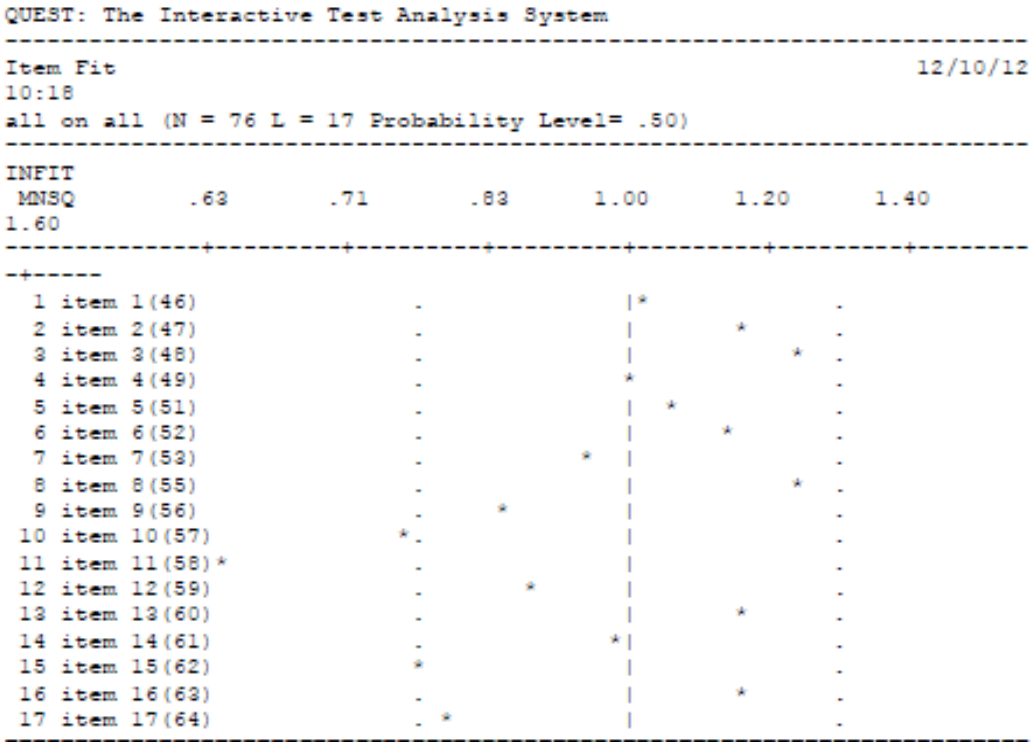

Figure 6.4 (ii). **'Attitude' Scale (Pilot study) – Final Run: Infit mean square statistics for items (construct validity)**

As evident from Figure 6.4 (i) [initial run], items 50 and 54 were located on the right-hand side of the dotted vertical lines, strictly considered as misfit to the Rasch model assumptions. Items 57, 58, and 62, on the other hand, fell to the left-hand side of the reference line. These are considered as over fitting items and are of less or no concern as asserted by Green and Frantom (2002) and Bond and Fox (2007). After deleting the misfit items (50, 54), the fit statistics (apart from those over fitting) lay within the two dotted vertical lines as depicted in Figure 6.4 (ii). This confirmed the items as measuring the same underlying trait or construct and hence reflective of the construct validity of the attitude scale. A closer look at the fit statistics for each of the items comprising the attitude scale further confirmed this assertion (Table 6.8). The fit statistics reference value was kept similar to the knowledge scale (0.7-1.3) for a better and stringent item fit estimation as opposed to the assertion by Bond and Fox (2007) and Linacre (2012), who suggested 0.6-1.4 as the standard for Likert type attitude scales. Table 6.8 also presents the discrimination index for each of the items which were also taken into account for the overall assessment of item functioning. Both the initial and the final run outputs are presented alongside for a comparative evaluation.

Table 6.8. **'Attitude' Scale (Pilot study): Individual item fit statistics and discrimination indices (DI)**

	Initial run						*After item(s) (50,54) deletion*					
Quest ID	*Item No.*	*Infit MNSQ**	*Outfit MNSQ**	*Infit t**	*Outfit t**	*DI***	*Item No.*	*Infit MNSQ**	*Outfit MNSQ**	*Infit t**	*Outfit t**	*DI***
item 1	46	.98	1.01	.0	.2	*.37*	46	1.02	.99	.2	.1	.41
item 2	47	1.07	.77	.3	− .2	*.38*	47	1.17	.73	.6	− .2	.42
item 3	48	1.08	1.07	.7	.4	*.35*	48	1.23	1.23	1.7	1.2	*.38*
item 4	49	.94	.86	− .2	− .4	.46	49	1.01	.96	.1	.0	.47
item 5	50	**1.47**	**1.61**	**3.2**	**2.9**	**− .07**	51	1.05	1.04	.4	.3	.50
item 6	51	.98	.97	− .1	− .1	.45	52	1.14	1.17	.5	.5	.40
item 7	52	1.00	.96	.1	.1	.41	53	.94	.90	− .2	− .2	.48
item 8	53	.91	.93	− .3	− .1	.45	55	1.24	**1.54**	1.4	1.9	*.34*
item 9	54	**1.49**	**1.73**	**3.5**	**3.5**	**− .13**	56	.85	.88	− .6	− .3	.59
item 10	55	1.08	1.18	.5	.8	*.35*	57	.76	.81	− .9	− .3	.64
item 11	56	.80	.70	− .9	− 1.0	.60	58	**.59**	**.32**	− 1.5	− 1.4	.75
item 12	57	.73	**.68**	− 1.0	− .8	.64	59	.88	.93	− .5	− .2	.58
item 13	58	**.61**	**.35**	− 1.4	− 1.5	.74	60	1.15	1.29	1.1	1.4	*.32*
item 14	59	.83	.76	− .8	− .8	.59	61	.98	.86	.0	− .5	.50
item 15	60	1.01	1.07	.1	.4	*.29*	62	.77	**.69**	− .8	− .7	.62
item 16	61	.89	.78	− .6	− .9	.53	63	1.16	1.17	1.1	.9	*.36*
item 17	62	.75	**.62**	− .9	− .9	.61	64	.79	**.68**	− 1.1	− 1.1	.65
item 18	63	1.03	.96	.2	− .1	*.36*						
item 19	64	.83	.73	− .8	− .9	.58						
Mean		.97	.93	.09	.02			.98	.95	.09	.08	
SD		.22	.32	1.29	1.26			.19	.28	.91	.87	

* Deviant values in bold

** Italicised values greater than the *acceptable* cut-off 0.2 but less than the *preferred* 0.4

As revealed in Table 6.8 (initial run), items 54, 50, and 58 had individual infit MNSQ values (1.49, 1.47, and .61, respectively, in decreasing order of magnitude) outside the reference value of 0.7-1.3. Items 54 and 50 also had outfit MNSQ values above 1.3 (1.73 and 1.61, respectively, in decreasing order of magnitude) alongside items 57, 62, and 58 (.68, .62, and .35, respectively, in decreasing order of magnitude). The standardized values for the mean squares in the form of 'infit t' and 'outfit t' (with -2 to +2 as the acceptable range) as well as the discrimination indices (with an acceptable cut-off 0.2), however, only had items 50 and 54 that recorded deviant values. In fact, both the items reported negative discrimination indices, which when checked for category disordering, did not reveal any. These anomalies formed the basis for deleting items 50 and 54 as stated at the beginning of this subsection.

The re-run of the attitude scale after deleting items 50 and 54 resulted only in item 58 as still revealing a deviant infit MNSQ (.59) [Table 6.8 {After item(s) (50,54) deletion}]. Items 62 and 58 also continued to exhibit deviant outfit MNSQ values as earlier (.69 and .32, respectively, in decreasing order of magnitude), with items 55 and 64 reporting deviations not noted in the initial run (1.54 and .68, respectively, in decreasing order of magnitude). However, none of the 'infit t' and 'outfit t' values were outside the recommended -2 to +2 range. Likewise, the discrimination indices were well above the acceptable 0.2 mark, with few items (48, 55, 60, and 63) reporting values less than the recommended 0.4. The other annotations at the bottom of Table 6.8 in the form of the 'mean' and 'SD' of the fit statistics confirmed little spread from ideal, with the reference criteria remaining the same as discussed earlier with the knowledge scale.

Therefore, based on the discussion above, the wording of some of the items of the attitude scale was decided to be rephrased (without adding or deleting any item, further). This was done in spite of the fact that only item 58 reported a deviance of the

infit MNSQ value. The re-wording was targeted towards the enhancement of the goodness-of-fit measures. Table 6.9 outlines the rewording of items based on the fit statistics.

Table 6.9. 'Attitude' Scale (Pilot study): Rewording of items based on the fit statistics

Item No.	*Indicator*	*Original (O)/New (N)*	*Item wording*
55	Outfit MNSQ	O	Not contracting a STI is a sign of fidelity in a relationship
		N	Not contracting a STI is a sign of sexual faithfulness in a relationship
58	Infit MNSQ, Outfit MNSQ	O	Sex education should be compulsory in schools
		N	Sex education in schools can play a major role in combating the spread of STIs
62	Outfit MNSQ	O	Teacher training can help teachers in dealing with STI-related issues
		N	Teacher training can help teachers to be more confident in addressing STI-related issues
64	Outfit MNSQ	O	Proper school-based education can help overcome the spread of STIs
		N	Proper school-based education can be effective in limiting STI spread

6.6.2 Validity and Reliability Analysis – Main Study

The validity and the reliability analysis of the constructed scales after the main data collection were carried out in the same manner as that done for the pilot study. The following subsections highlight the construct validity and reliability measures for each of the scales under investigation.

6.6.2.1 Construct Validity and Reliability – Knowledge Scale

The validity estimation of the knowledge scale was evaluated in terms of the overall item and case fit statistics, the individual infit and outfit measures and the discrimination indices of the items. Reliability, on the other hand, is reported individually as an item measure, a case measure, and as the overall reliability of the

scale. The individual case estimates, however, are not reported. The overall summary of the item and case estimates are reported in Table 6.10.

Table 6.10. **'Knowledge' Scale (Main study): Summary of item and case Estimates**

	Item	*Case*
Mean	.00	− .52
SD	1.19	1.07
SD (adjusted)	1.18	1.00
Reliability of estimate	.99	.87
Internal Consistency	.87	
Zero scores	0	1
Perfect scores	0	0

The mean of item estimates is located at 0 (by default) and the standard deviation (SD) for item estimates is nearly 1. Similarly, the mean case estimate (that is the group average) is closer to 0, with the SD approaching unity for a well-matched test (Bond & Fox, 2007). Table 6.10 reveals that the mean case estimate was − .52, an indicator that for the individuals involved, the items were slightly difficult to achieve. The SD of 1.19 for item estimates compared to the 1.07 value of the case counterpart indicated a greater spread of item measures or variation in those measures than case measures. Reliability, the ability of the test to define a distinct hierarchy of items (or cases) along the measured variable is interpreted on a 0 to 1 scale, much in the same way as Cronbach's alpha is interpreted (Bond & Fox, 2007). The reliability of both the item and the case ability was high at .99 and .87 respectively, considering the acceptable level of Cronbach's alpha of at least 0.7 as stressed by Nunally (1978). Similarly, the overall internal consistency of the knowledge scale was high at .87. The annotations at the bottom of Table 6.10 with no recorded perfect scores (either for the item or case estimates) and only one case with a zero score confirmed that all the items were useful for discriminating ability amongst this sample.

The Quest diagrammatic output pertaining to the infit mean square statistics for items and representative of the construct validity as discussed earlier is shown in Figure 6.5.

```
QUEST: The Interactive Test Analysis System
-------------------------------------------------------------------
Item Fit
18/12/12 15:42
all on all (N = 320 L = 45 Probability Level= .50)
-------------------------------------------------------------------
INFIT
 MNSQ        .63       .71       .83      1.00      1.20      1.40
1.60
--------------+---------+---------+---------+---------+---------+-----
----+-----
  1 item 1                    .          *     |               .
  2 item 2                    .             * |               .
  3 item 3                    .               |     *         .
  4 item 4                    .            *  |               .
  5 item 5                    .               *              .
  6 item 6                    .              *|              .
  7 item 7                    .         *     |              .
  8 item 8                    .             * |              .
  9 item 9                    .           *   |              .
 10 item 10                   .          *    |              .
 11 item 11                   .               |       *      .
 12 item 12                   .               |     *        .
 13 item 13                   .               |       *      .
 14 item 14                   .               |     *        .
 15 item 15                   .             * |              .
 16 item 16                   .        *      |              .
 17 item 17                   .            *  |              .
 18 item 18                   .               *              .
 19 item 19                   .               *              .
 20 item 20                   .        *      |              .
 21 item 21                   .               |   *          .
 22 item 22                   .             * |              .
 23 item 23                   .             * |              .
 24 item 24                   .               | *            .
 25 item 25                   .               |     *        .
 26 item 26                   .               |      *       .
 27 item 27                   .               |       *      .
 28 item 28                   .               |*             .
 29 item 29                   .               | *            .
 30 item 30                   .               |     *        .
 31 item 31                   .               |*             .
 32 item 32                   .               |*             .
 33 item 33                   .               |       *      .
 34 item 34                   .               *              .
 35 item 35                   .               *              .
 36 item 36                   .      *        |              .
 37 item 37                   .             * |              .
 38 item 38                   .               |   *          .
 39 item 39                   .       *       |              .
 40 item 40                   .               |   *          .
 41 item 41                   .            *  |              .
 42 item 42                   .            *  |              .
 43 item 43                   .            *  |              .
 44 item 44                   .              *|              .
 45 item 45                   .         *     |              .
```

Figure 6.5. **'Knowledge' Scale (Main study): Infit mean square statistics for items (construct validity)**

As evident from Figure 6.5, none of the items misfit the Rasch model assumptions. That the fit statistics lay within the two dotted vertical lines indicated that the items represented aspects of a latent trait as described earlier. This confirmed the items as measuring the same underlying trait or construct and hence reflective of the construct validity of the knowledge scale. A closer look at the fit statistics for each of the items comprising the knowledge scale further confirmed this assertion (Table 6.11). Table 6.11 also presents the discrimination index for each of the items which were also taken into account for the overall assessment of item functioning.

Table 6.11. **'Knowledge' Scale (Main study): Individual item fit statistics and discrimination indices (DI)**

Quest ID	*Item No.*	*Infit MNSQ**	*Outfit MNSQ**	*Infit t**	*Outfit t**	*DI***
item 1	1	.90	**.67**	− .8	− 1.3	*.39*
item 2	2	.96	1.12	− .9	1.2	.45
item 3	3	1.10	1.22	.9	1.1	*.27*
item 4	4	.95	.93	− 1.0	− .7	.46
item 5	5	1.00	.95	.0	− .3	.41
item 6	6	.98	.90	− .1	− .5	*.38*
item 7	7	.89	.76	− 1.7	− 1.6	.48
item 8	8	.96	.92	− .7	− .8	.46
item 9	9	.93	.79	− .7	− 1.4	.47
item 10	10	.91	.90	− .8	− .3	*.38*
item 11	11	1.13	**1.32**	**2.1**	**2.1**	*.23*
item 12	12	1.09	1.29	2.0	**2.6**	*.33*
item 13	13	1.14	1.11	**2.6**	1.2	*.31*
item 14	14	1.09	1.25	2.0	**2.4**	*.34*
item 15	15	.95	.92	− 1.0	− .8	.47
item 16	16	.88	.80	**− 2.4**	− 1.7	.52
item 17	17	.95	.92	− .7	− .5	.42
item 18	18	1.00	.97	.1	− .2	*.39*
item 19	19	1.00	.87	.0	− .6	*.32*
item 20	20	.88	.77	**− 2.1**	− 1.8	.51
item 21	21	1.06	1.02	1.1	.2	*.35*
item 22	22	.97	1.02	− .3	.2	.40
item 23	23	.96	.93	− .7	− .8	.46
item 24	24	1.04	.97	.6	− .1	*.32*
item 25	25	1.10	1.14	**2.2**	1.5	*.33*
item 26	26	1.12	1.10	**2.7**	1.0	*.30*
item 27	27	1.14	1.15	**3.0**	1.5	*.29*
item 28	28	1.02	1.10	.2	.4	*.20*
item 29	29	1.04	**1.45**	.4	1.5	**.18**
item 30	30	1.10	1.15	**2.2**	1.4	*.31*
item 31	31	1.03	1.26	.5	**2.1**	*.36*
item 32	32	1.02	.99	.4	− .1	.40
item 33	33	1.14	1.16	**3.0**	1.6	*.29*
item 34	34	1.00	1.02	.0	.2	*.36*
item 35	35	1.01	1.15	.1	.6	*.27*
item 36	36	.85	.79	**− 3.4**	**− 2.1**	.56
item 37	37	.95	.95	− 1.0	− .5	.47
item 38	38	1.05	1.05	1.2	.6	*.38*
item 39	39	.86	.77	**− 2.4**	− 1.6	.51
item 40	40	1.05	.92	.6	− .3	*.30*
item 41	41	.95	.86	− .5	− .6	*.35*
item 42	42	.94	.92	− 1.1	− .6	.45
item 43	43	.94	.85	− .7	− .8	*.39*
item 44	44	.98	.99	− .3	.0	.44
item 45	45	.89	.84	− 1.9	− 1.1	.49
Mean		1.00	1.00	.05	.05	
SD		.08	.17	1.53	1.20	

* Deviant values in bold

** Italicised values greater than the *acceptable* cut-off 0.2 but less than the *preferred* 0.4

As revealed in Table 6.11, none of the individual infit MNSQ values fell outside the reference value of 0.7-1.3 for mean squares as outlined by Baghaei and Amrahi (2011), Bond and Fox (2007), and Linacre (2012). Items 29 and11 (in decreasing order of magnitude, respectively), however, recorded outfit MNSQ values above 1.3. This was indicative of the items as not discriminating well. Item 1, on the contrary, resulted in an outfit MNSQ value of .67 (less than the 0.7 criterion), reflective of redundancy in item information. The standardized values for the mean squares in the form of 'infit t' and 'outfit t' had item 11 (both infit and outfit) and items 13, 16, 20, 25, 26, 27, 30, 33, 36, and 39 (infit) and items 12, 14, 31, and 36 (outfit) falling outside the acceptable -2 to +2 range. Table 6.11 also highlights the discrimination indices for the individual items with only item 29 recording an output less than the acceptable 0.2 as outlined by Wu and Adams (2007). The other discrimination index values which were greater than the acceptable cut-off 0.2 but less than the preferred 0.4 are italicised under the 'DI' head of Table 6.11. The annotations at the bottom of Table 6.11 in the form of the 'mean' and 'SD' of the fit statistics confirmed little spread from ideal. Ideally, as Bond and Fox (2007) asserted, the mean value of the mean squares should be 1.00 with a small SD; the mean and SD values of the standardized mean squares ('infit t' and 'outfit t'), however, should be 0 and approaching unity, respectively. The mean values of the mean squares were exactly 1.00 with a small SD for each (.08 and .17, respectively). Likewise, the mean values of the standardized mean squares were close to 0 (.05 each) and the SD's close to 1 (1.53 and 1.20, respectively).

In conclusion, Table 6.12 compares the old (pilot) and new (main) values of the fit statistics and/or discrimination indices that were used to reword some items of the knowledge scale.

Table 6.12. Comparison of old and new values of reworded items of the 'Knowledge' Scale based on the fit statistics and/or discrimination indices (DI)

Item No.	*Indicator*	*Indicator (Old value, New value)*	*Comments*
1	Outfit MNSQ	Outfit MNSQ (.61, .67)	The Outfit MNSQ value increased marginally, nearing the lower bound figure of the acceptable range*
11	DI	DI (.23, .23)	The DI remained the same and still above the acceptable cut-off
19	DI	DI (.28, .32)	The DI increased marginally and still above the acceptable cut-off
24	DI	DI (.21, .32)	The DI increased significantly and still above the acceptable cut-off
27	Outfit MNSQ, Infit t, Outfit t, DI	Outfit MNSQ (1.96, 1.15) Infit t (2.3, 3.0) Outfit t (3.7, 1.5) DI (.22, .29)	The Outfit MNSQ and the Outfit t values fell within the acceptable ranges. However, the Infit t value fell outside the range with the DI increasing marginally and still above the acceptable cut-off
28	Outfit MNSQ, Outfit t, DI	Outfit MNSQ (4.64, 1.10) Outfit t (2.8, .4) DI (.06, .20)	The Outfit MNSQ and the Outfit t values fell within the acceptable ranges. The DI also increased significantly recording the lower bound acceptable cut-off
29	Outfit MNSQ, DI	Outfit MNSQ (1.76, 1.45) DI (−.01, .18)	The Outfit MNSQ value decreased significantly, nearing the upper bound figure of the acceptable range. The DI also increased significantly; however, it was just below the acceptable cut-off
31	Outfit MNSQ, DI	Outfit MNSQ (1.46, 1.26) DI (.24, .36)	The Outfit MNSQ value fell within the acceptable range. The DI increased significantly and still above the acceptable cut-off
35	Outfit MNSQ	Outfit MNSQ (.50, 1.15)	The Outfit MNSQ value fell within the acceptable range
41	Outfit MNSQ, DI	Outfit MNSQ (1.33, .86) DI (.18, .35)	The Outfit MNSQ value fell within the acceptable range. The DI also increased significantly and still above the acceptable cut-off

*Acceptable ranges
Outfit MNSQ: 0.7-1.3
DI: acceptable cut-off 0.2 but preferred 0.4
Infit t and Outfit t: -2 to +2

6.6.2.2 Construct Validity and Reliability – Attitude Scale

Similar to the knowledge scale, the validity estimation of the attitude scale was evaluated in terms of the overall item and case fit statistics, the individual infit and outfit measures and the discrimination indices of the items. As earlier, reliability is reported individually as an item measure, a case measure, and as the overall reliability of the scale. The overall summary of the item and case estimates are reported in Table 6.13. The individual case estimates, however, are not reported.

Table 6.13. **'Attitude' Scale (Main study): Summary of item and case Estimates**

	Item	*Case*
Mean	.00	1.42
SD	.62	.70
SD (adjusted)	.54	.49
Reliability of estimate	.73	.49
Internal Consistency	.60	
Zero scores	0	0
Perfect scores	0	3

Table 6.13 reveals that the mean case estimate was 1.42, an indicator that for the individuals involved, the items represented ideas that were readily accepted by most of the participants. The SD for the cases as well as the items was near unity indicative of a well-matched test. The individual reliability estimate, however, was low for both the items (.73) as well as the cases (.49) and so was the overall internal consistency of the items (.60). Nevertheless, an internal consistency value greater than 0.50 is regarded as acceptable by several authors (Cronbach, 1951; Helmstater, 1964; Van Lange, De Bruin, Otten, & Joireman, 1997). The annotations at the bottom of Table 6.13 with no recorded zero scores and perfect scores (for the item estimates) confirmed that all the items were useful for discriminating between individuals on the attitude scale. However, all but three cases (with perfect-score status) were integral in defining the discriminating ability amongst this sample.

The Quest diagrammatic output pertaining to the infit mean square statistics for items and representative of the construct validity is shown in Figure 6.6. Since the Quest software identifies items sequentially, therefore, the original item number as per the scale/questionnaire has been depicted in parenthesis for identification purposes.

```
QUEST: The Interactive Test Analysis System
-----------------------------------------------------------------
Item Fit
18/12/12 16: 3
all on all (N = 320 L = 17 Probability Level= .50)
-----------------------------------------------------------------
INFIT
 MNSQ        .63       .71       .83      1.00      1.20      1.40
1.60
--------------+---------+---------+---------+---------+---------+--
-------+-----
  1 item 1 (46)              .              *|               .
  2 item 2 (47)              .               |   *           .
  3 item 3 (48)              .               |              *.
  4 item 4 (49)              .               *               .
  5 item 5 (50)              .               |   *           .
  6 item 6 (51)              .            *  |               .
  7 item 7 (52)              .            *  |               .
  8 item 8 (53)              .        *      |               .
  9 item 9 (54)              .               |*              .
 10 item 10(55)              .               *               .
 11 item 11(56)              .          *    |               .
 12 item 12(57)              .              *|               .
 13 item 13(58)              .               |*              .
 14 item 14(59)              .             *  |               .
 15 item 15(60)              .    *          |               .
 16 item 16(61)              .               |       *       .
 17 item 17(62)              .        *      |               .
=================================================================
```

Figure 6.6. **'Attitude' Scale (Main study): Infit mean square statistics for items (construct validity)**

As evident from Figure 6.6, none of the items misfit the Rasch model assumptions. That the fit statistics lay within the two dotted vertical lines indicated that the items represented aspects of a latent trait. This confirmed the items as measuring the same underlying trait or construct and hence reflective of the construct validity of the attitude scale. A closer look at the fit statistics for each of the items comprising the attitude scale further confirmed this assertion (Table 6.14). The fit statistics reference

value was kept similar to the knowledge scale (0.7-1.3) for a better and stringent item fit estimation as opposed to the assertion by Bond and Fox (2007) and Linacre (2012), who suggested 0.6-1.4 as the standard for Likert type attitude scales. Table 6.14 also presents the discrimination index for each of the items which were also taken into account for the overall assessment of item functioning.

Table 6.14. **'Attitude' Scale (Main study): Individual item fit statistics and discrimination indices (DI)**

Quest ID	*Item No.*	*Infit MNSQ**	*Outfit MNSQ**	*Infit t**	*Outfit t**	*DI***
item 1	46	.98	1.23	− .1	1.0	*.31*
item 2	47	1.06	1.08	.4	.3	*.24*
item 3	48	1.27	**1.42**	**3.7**	**3.6**	**.18**
item 4	49	.99	1.03	− .1	.3	*.38*
item 5	50	1.06	1.08	.9	.9	*.34*
item 6	51	.94	.89	− .4	− .5	.41
item 7	52	.95	.87	− .4	− .7	.43
item 8	53	.88	.80	− 1.4	− 1.6	.53
item 9	54	1.02	1.03	.2	.3	*.34*
item 10	55	1.01	.96	.1	− .2	.40
item 11	56	.89	.75	− .7	− 1.2	.44
item 12	57	.99	.94	− .1	− .4	*.34*
item 13	58	1.03	1.10	.5	1.2	*.34*
item 14	59	.92	.91	− .9	− .7	.48
item 15	60	.82	**.54**	− 1.1	**− 2.2**	.52
item 16	61	1.14	1.21	**2.1**	**2.2**	*.27*
item 17	62	.87	.77	− 1.0	− 1.4	.49
Mean		.99	.98	.11	.05	
SD		.11	.21	1.24	1.44	

* Deviant values in bold
** Italicised values greater than the *acceptable* cut-off 0.2 but less than the *preferred* 0.4

As revealed in Table 6.14, none of the individual infit MNSQ values fell outside the reference value of 0.7-1.3 for mean squares. Items 48 and 60, however, recorded outfit MNSQ values respectively above and below the reference criterion. This was indicative of item 48 as not discriminating well and item 60 containing redundant information. The standardized values for the mean squares in the form of 'infit t' and 'outfit t' had items 48 and 61 (both infit and outfit) and item 60 (outfit) falling outside

the acceptable -2 to +2 range. Table 6.14 also highlights the discrimination indices for the individual items with only item 48 recording an output less than the acceptable 0.2 mark. The other discrimination index values which were greater than the acceptable cut-off 0.2 but less than the preferred 0.4 are italicised under the 'DI' head of Table 6.14. The annotations at the bottom of Table 6.14 in the form of the 'mean' and 'SD' of the fit statistics confirmed little spread from ideal. Ideally, as Bond and Fox (2007) asserted, the mean value of the mean squares should be 1.00 with a small SD; the mean and SD values of the standardized mean squares ('infit t' and 'outfit t'), however, should be 0 and approaching unity, respectively. The mean values of the mean squares were .99 and .98 with a small SD for each (.11 and .21, respectively). Likewise, the mean values of the standardized mean squares were close to 0 (.11 and .05) and the SD's close to 1 (1.24 and 1.44, respectively).

In conclusion, Table 6.15 compares the old (pilot) and new (main) values of the fit statistics that were used to reword some items of the attitude scale.

Table 6.15. Comparison of old and new values of reworded items of the 'Attitude' Scale based on the fit statistics

Old Item No. (*Item No. in Main study*)	*Indicator*	*Indicator* (*Old value, New value*)	*Comments*
55 (53)	Outfit MNSQ	Outfit MNSQ (1.54, .80)	The Outfit MNSQ fell within the acceptable range*
58 (56)	Infit MNSQ,Outfit MNSQ	Infit MNSQ (.59, .89) Outfit MNSQ (.32, .75)	Both the Infit MNSQ and the Outfit MNSQ values fell within the acceptable ranges
62 (60)	Outfit MNSQ	Outfit MNSQ (.69, .54)	The Outfit MNSQ value decreased significantly, shifting further from the lower bound figure of the acceptable range
64 (62)	Outfit MNSQ	Outfit MNSQ (.68, .77)	The Outfit MNSQ fell within the acceptable range

*Acceptable ranges
Infit and Outfit MNSQ: 0.7-1.3

6.7 Summary

It is important to note Hambleton's (2000) assertion that the IRT is not:

> the solution to all of our instrument and measurement problems. It is a mathematical model only, and when it can be demonstrated that (1) the model fits the data of interest, (2) model parameters are properly estimated, and (3) the model is used correctly, the model has many useful features (p. 63).

This chapter outlined the approaches taken to establish the psychometric properties of the constructed scales of the questionnaire. The first part of the chapter justified the grounding and rationale of the application of IRT Theory over the Classical

Test one as employed in the study. The latter part, therefore, highlighted the validity and reliability measures of the knowledge and attitude scales based on the Rasch model, a particular version of a one-parameter IRT model.

The knowledge scale did not have any items as misfitting to the Rasch model at the pilot stage of analysis. However, ten items were reworded based on the fit statistics and/or discrimination indices before proceeding to the main survey administration in an effort to enhance the fit and/or discrimination values as applicable. The main study results revealed that each of the ten reworded items significantly improved with respect to the concerned statistics which formed the basis for its rewording. Overall, the knowledge scale reported high internal consistency and evidence of construct validity following the Rasch measures.

The validity and reliability estimation of the attitude scale as per the Rasch measures, however, had two items misfitting and three others overfitting the model at the pilot stage of analysis. The misfitting items, therefore, were deleted from the scale which resulted in better goodness-of-fit and discrimination index measures. Moreover, four items were reworded based on the fit statistics before proceeding to the main survey administration in an effort to enhance the fit values. The main study results revealed that each of the four reworded items significantly improved with respect to the concerned fit statistics which formed the basis for its rewording. Overall, the attitude scale reported acceptable internal consistency and evidence of construct validity following the Rasch measures.

The psychometric properties of each of the scales under investigation have been reported in this chapter. The next chapter presents the quantitative findings of the study. It canvasses the results of the first six research questions that guided the study.

> "Yes, the previous survey clearly depicts my lack of understanding, which could lead to misinformation for young students." (This Study, Survey Respondent, ID: 284)

Chapter 7:

Results I: 'Closed-ended' Quantitative Analysis

7.1 Introduction

This chapter presents the findings of the closed-ended questions of the survey, particularly focusing on the first six research questions of the study. The first five research questions sought to explore the knowledge and attitudes of pre-service teachers in SA towards STIs and other BBVs, ascertaining the relationship between these, if any, and investigating the difference of the knowledge and attitude attributes across the demographics of the study. The sixth research question, on the other hand, sought to identify the major sources of information for pre-service teachers in SA regarding STIs and other BBVs. The structure of this chapter, therefore, is based on these research questions as the main sections.

As outlined in Chapter 5, the response to the closed-ended questions of the questionnaire was high. A total of 320 respondents (N = 320) turned in complete closed-ended responses. The major statistical analysis of these responses, apart from where descriptive statistics were used, was based on the Rasch estimates (both for knowledge and attitude) rather than the scores themselves, for reasons stated in Chapter 5. The demographic attributes as analysed from the responses obtained are outlined in the following section.

7.2 Demographic Attributes

Gender, age, highest educational level, subject stream, and whether or not the respondent was undertaking the HPE curriculum constituted the demographic attributes of the study. Figure 7.1 shows, in the decreasing order of magnitude, the gender

characteristics of the South Australian pre-service teachers that constituted the sample for the study.

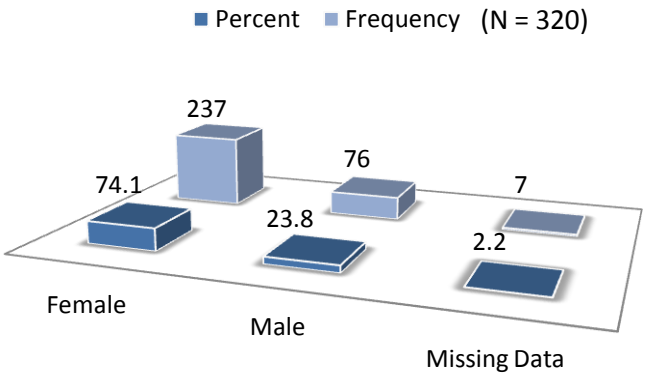

Figure 7.1. The gender characteristics of the South Australian pre-service teachers that constituted the sample for the study

As evident from Figure 7.1, the majority (74.1 per cent) of the respondents were females as compared to males (23.8 per cent), with 2.2 per cent of the individuals failing to turn in a response. Figure 7.2, on the other hand, shows in the decreasing order of magnitude, the frequency and percentage of the age range of the South Australian pre-service teachers that constituted the sample for the study.

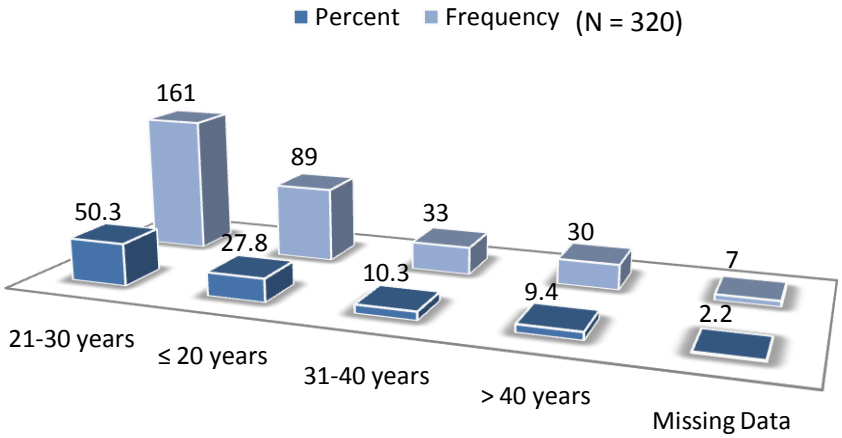

Figure 7.2. The age range of the South Australian pre-service teachers that constituted the sample for the study

As evident from Figure 7.2, the majority (50.3 per cent) of the respondents fell in the 21-30 years category followed by the ≤ 20 years range (27.8 per cent). Those identifying themselves in the age range of 31-40 years constituted 10.3 per cent of the sample with 9.4 per cent reporting to be greater than 40 years. As earlier, 2.2 per cent of the individuals failed to turn in a response. The response pattern for the highest educational level of the South Australian pre-service teachers that constituted the sample for the study is shown in Figure 7.3 in the decreasing order of magnitude.

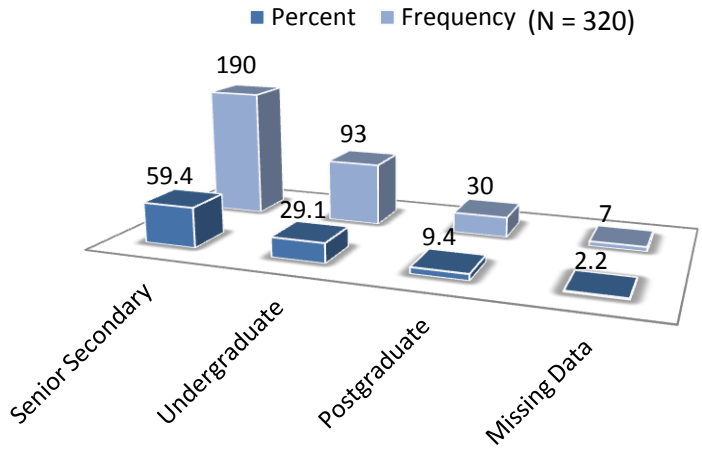

Figure 7.3. The highest educational level of the South Australian pre-service teachers that constituted the sample for the study

As evident from Figure 7.3, the majority (59.4 per cent) of the respondents had a senior secondary qualification as the highest educational level at the time of responding to the survey. Yet others had an undergraduate (29.1 per cent) or a postgraduate (9.4 per cent) qualification as the highest degree attained at the time of responding to the survey. As earlier, 2.2 per cent of the respondents failed to turn in a response. The responses regarding the subject stream of the South Australian pre-service teachers that constituted the sample for the study are shown in Figure 7.4 in the decreasing order of magnitude.

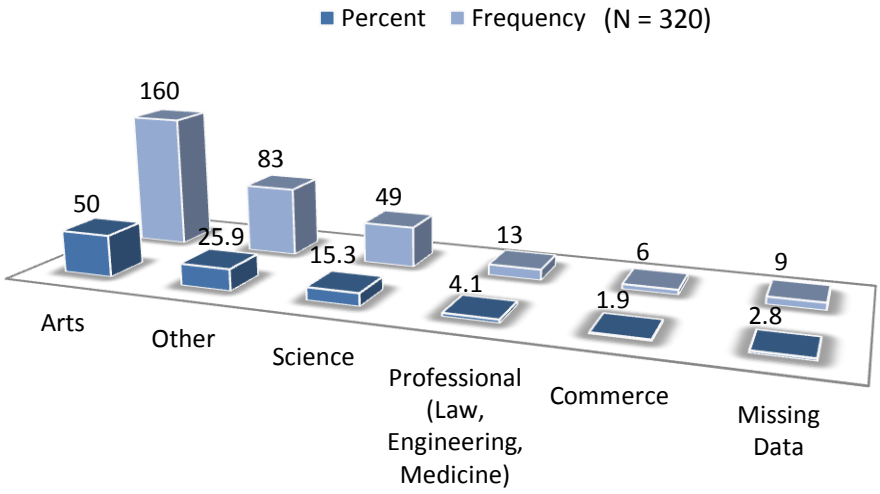

Figure 7.4. The subject stream of the South Australian pre-service teachers that constituted the sample for the study

As evident from Figure 7.4, 50 per cent of the respondents had arts as the major subject stream pertaining to the highest educational degree attained. The stream 'other' comprised of individuals (25.9 per cent) who failed to identify themselves under the subject streams outlined. This was attributed mainly to a senior secondary qualification with no major subject choice as reflected in the string variable ('SubStrOt') of the entered SPSS data (see Chapter 5, Table 5.4, p. 122). Nevertheless, yet others reflected on either science (15.3 per cent), a professional stream (Law, Engineering, Medicine, 4.1 per cent) or commerce (1.9 per cent) as the subject stream pursued towards the attainment of the highest educational degree. Nine individuals, however, did not disclose a response constituting 2.8 per cent of the total sample. The sample characteristics in terms of those undertaking the HPE curriculum as a part of the teacher education degree is shown in Figure 7.5 in the decreasing order of magnitude.

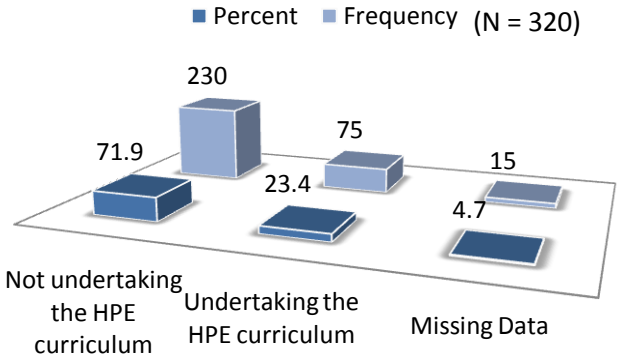

Figure 7.5. The 'undertaking the HPE curriculum' attribute of the South Australian pre-service teachers that constituted the sample for the study

As evident from Figure 7.5, the majority (71.9 per cent) of the respondents were not undertaking the HPE curriculum as a part of the teacher education degree. Those undertaking the HPE curriculum as a part of the pre-service preparation constituted 23.4 per cent of the sample, with 15 respondents (4.7 per cent) failing to turn in an answer to the question.

The findings of each of the research questions under investigation are outlined in the upcoming sections. However, prior to that, the Shapiro-Wilk test as determining whether the knowledge and attitude data (in terms of the Rasch estimates) deviated significantly from the normal distributions and hence an indicator of the statistics employed, is described next.

7.3 The Shapiro-Wilk Test for Normality

The Shapiro-Wilk test (for sample sizes ≤ 2000) assesses the goodness of fit to the normal distribution (SAS Institute Inc., 2009). The normality test as obtained for the Rasch knowledge estimates is presented in Table 7.1.

Table 7.1. **The Shapiro-Wilk test of normality for Rasch knowledge estimates**

	Shapiro-Wilk		
	Statistic	*df*	*Sig.*
Rasch Knowledge Estimate	.963	319*	.000

*df = 319 because one respondent had a zero score and hence no Rasch estimate obtained

Table 7.1 reveals a Shapiro-Wilk statistic of .963, with a degree of freedom (df) of 319 and a p-value (Sig.) of .000. It is this p-value, which, if significant (p value less than .05) indicates a deviation from normality (Field, Miles, & Field, 2012). In this case, since the p-value is less than .05 ($p < .05$), it can be inferred that the Rasch knowledge estimates were not normally distributed. Table 7.2, on the other hand, presents the normality test as obtained for the Rasch attitude estimates.

Table 7.2. **The Shapiro-Wilk test of normality for Rasch attitude estimates**

	Shapiro-Wilk		
	Statistic	*df*	*Sig.*
Rasch Attitude Estimate	.982	317*	.001

*df = 317 because three respondents had a perfect score and hence no Rasch estimate obtained

Table 7.2 reveals a Shapiro-Wilk statistic of .982, with a degree of freedom (df) of 317 and a p-value of .001. In this case too, since the p-value is less than .05 ($p < .05$), it can be inferred that the Rasch attitude estimates were not normally distributed.

That both the Rasch knowledge and attitude estimates did not indicate a normal distribution and hence non-parametric in nature, largely determined the inferential statistics applied (see Chapter 5). While this is outlined in the concerned sections, the

next section outlines the knowledge and attitude scores of the sample of pre-service teachers in SA towards STIs and other BBVs.

7.4 Knowledge and attitudes of pre-service teachers in SA towards STIs and other BBVs

Descriptive statistics outline the knowledge score of the sample of South Australian pre-service teachers regarding STIs and other BBVs. This is presented in Table 7.3.

Table 7.3. The knowledge score of the sample of pre-service teachers in SA towards STIs and other BBVs

	N	*Range*	*Minimum*	*Maximum*	*Mean*		*Std. Deviation*
	Statistic	*Statistic*	*Statistic*	*Statistic*	*Statistic*	*Std. Error*	*Statistic*
Knowledge score	320	37	0	37	18.57	.429	7.678
Valid N (listwise)	320						

Table 7.3 reveals that the mean knowledge score (N = 320) was 18.57 with a standard deviation of 7.678. The minimum knowledge score was zero with a maximum of 37 (out of a possible 45) and thus a range of 37. The attitude score of the sample of South Australian pre-service teachers towards STIs and other BBVs, also in terms of descriptive statistics, is presented in Table 7.4.

Table 7.4. The attitude score of the sample of pre-service teachers in SA towards STIs and other BBVs

	N	*Range*	*Minimum*	*Maximum*	*Mean*		*Std. Deviation*
	Statistic	*Statistic*	*Statistic*	*Statistic*	*Statistic*	*Std. Error*	*Statistic*
Attitude score	320	22	29	51	44.45	.204	3.651
Valid N (listwise)	320						

Table 7.4 reveals that the mean attitude score (N = 320) was 44.45 with a standard deviation of 3.651. The minimum attitude score was 29 with a maximum of 51 (out of a possible 51) and thus a range of 22.

The knowledge and attitude scores outlined in this section, the next section presents the relationship between the knowledge and attitude attributes of the sample of pre-service teachers in SA regarding STIs and other BBVs.

7.5 Relationship between the knowledge and attitude attributes of pre-service teachers in SA regarding STIs and other BBVs

To establish whether there exists any relationship between the knowledge and attitude attributes of the sample of pre-service teachers in SA regarding STIs and other BBVs, the Spearman's rank correlation was employed. The Spearman's rank correlation is the non-parametric equivalent of the Pearson's product-moment correlation and used towards revealing the association between two skewed interval or ordinal variables (McCrum-Gardner, 2007). The association as obtained between the knowledge and attitude attributes of the sample of pre-service teachers in SA regarding STIs and other BBVs is presented in Table 7.5.

Table 7.5. **The Spearman's rank correlation between the knowledge and attitude attributes of the sample of pre-service teachers in SA regarding STIs and other BBVs**

			Rasch Knowledge Estimate	*Rasch Attitude Estimate*
Spearman's rho	*Rasch Knowledge Estimate*	*Correlation Coefficient*	1.000	.196***
		Sig. (2-tailed)	.	.000
		N	319*	316
	Rasch Attitude Estimate	*Correlation Coefficient*	.196***	1.000
		Sig. (2-tailed)	.000	.
		N	316	317**

*N = 319 because one respondent had a zero score and hence no Rasch estimate obtained

**N = 317 because three respondents had a perfect score and hence no Rasch estimate obtained

***. Correlation is significant at the 0.01 level (2-tailed).

Table 7.5 reveals that there was a low to moderate positive relationship between the knowledge and attitude attributes of the sample of pre-service teachers in SA regarding STIs and other BBVs ($r_s = .196$, $p < 0.01$). The strength of the relationship follows the interpretation by Vaus (2002, Box 14.6, p. 259) who posited that correlation coefficient values between 0.10 and 0.29 have a "low to moderate (linear) relationship".

The relationship between the knowledge and attitude attributes of the sample of pre-service teachers in SA regarding STIs and other BBVs outlined in this section, the next section presents the knowledge differences across each of the demographic attributes of the study.

7.6 The knowledge of pre-service teachers in SA regarding STIs and other BBVs across the demographic attributes

To establish whether there exists any significant difference of the knowledge attribute of the sample of pre-service teachers in SA regarding STIs and other BBVs across the demographic characteristics, two different non-parametric tests were employed. The first one, the Mann-Whitney U-test, was used for comparisons where two factors were present namely gender and undertaking the HPE curriculum or not. The second one, the Kruskal-Wallis one-way ANOVA, compared situations when there were more than two factors present namely age, highest educational level and subject stream. These are described in the following subsections.

7.6.1 Gender

The Mann-Whitney U-test analysed whether the knowledge attribute of the sample of pre-service teachers in SA regarding STIs and other BBVs varied across gender (male, female). The test result is presented in Table 7.6.

Table 7.6. The Mann-Whitney test [(i) Ranks (ii) Test Statistics] of the knowledge of the sample of pre-service teachers in SA regarding STIs and other BBVs across gender

(i) Ranks

	Gender	*N*	*Mean Rank*	*Sum of Ranks*
Rasch Knowledge Estimate	*Male*	75	147.50	11062.50
	Female	237	159.35	37765.50
	Total	312		

(ii) Test Statistics[a]

	Rasch Knowledge Estimate
Mann-Whitney U	8212.500
Wilcoxon W	11062.500
Z	-.992
Asymp. Sig. (2-tailed)	.321

a. Grouping Variable: Gender

Table 7.6 reveals that there was no significant difference in the knowledge attribute of the sample of pre-service teachers in SA across gender ($U = 8212.500$, $n_1 = 75$, $n_2 = 237$, $p > 0.05$). The sum of ranks for females ($\sum R_2$) was 37765.50, whereas the sum of ranks for males ($\sum R_1$) was 11062.50. The average rank for the male was 147.50, whereas the female had an average rank of 159.35.

7.6.2 Age

The Kruskal-Wallis one-way ANOVA analysed whether the knowledge attribute of the sample of pre-service teachers in SA regarding STIs and other BBVs varied across age (≤ 20 years, 21-30 years, 31-40 years, > 40 years). The test result is presented in Table 7.7.

Table 7.7. The Kruskal-Wallis test [(i) Ranks (ii) Test Statistics] of the knowledge of the sample of pre-service teachers in SA regarding STIs and other BBVs across age

(i) Ranks

	Age range in years	*N*	*Mean Rank*
Rasch Knowledge Estimate	*Less than and equal to 20 years*	88	156.56
	21-30 years	161	155.57
	31-40 years	33	152.58
	Greater than 40 years	30	165.63
	Total	312	

(ii) Test Statistics[a,b]

	Rasch Knowledge Estimate
Chi-Square	.388
df	3
Asymp. Sig.	.943

a. Kruskal Wallis Test
b. Grouping Variable: Age range in years

Table 7.7 reveals that there was no significant difference in the knowledge attribute of the sample of pre-service teachers in SA across age ($\chi^2 = .388$, $n_1 = 88$, $n_2 = 161$, $n_3 = 33$, $n_4 = 30$, $p > 0.05$). The mean rank for ≤ 20 years was 156.56, for 21-30 years 155.57, for 31-40 years 152.58, and 165.63 for > 40 years.

7.6.3 Highest educational level

The Kruskal-Wallis one-way ANOVA analysed whether the knowledge attribute of the sample of pre-service teachers in SA regarding STIs and other BBVs varied across the

highest educational level (senior secondary, undergraduate, postgraduate). The test result is presented in Table 7.8.

Table 7.8. The Kruskal-Wallis test [(i) Ranks (ii) Test Statistics] of the knowledge of the sample of pre-service teachers in SA regarding STIs and other BBVs across highest educational level

(i) Ranks

	Highest educational level	*N*	*Mean Rank*
Rasch Knowledge Estimate	*Senior Secondary*	189	153.05
	Undergraduate	93	159.66
	Postgraduate	30	168.43
	Total	312	

(ii) Test Statistics[a,b]

	Rasch Knowledge Estimate
Chi-Square	.917
df	2
Asymp. Sig.	.632

a. Kruskal Wallis Test
b. Grouping Variable: Highest educational level

Table 7.8 reveals that there was no significant difference in the knowledge attribute of the sample of pre-service teachers in SA across the highest educational level ($\chi^2 = .917$, $n_1 = 189$, $n_2 = 93$, $n_3 = 30$, $p > 0.05$). The mean rank for senior secondary was 153.05, for undergraduate 159.66, and 168.43 for postgraduate.

7.6.4 Subject stream

The Kruskal-Wallis one-way ANOVA analysed whether the knowledge attribute of the sample of pre-service teachers in SA regarding STIs and other BBVs varied across the

subject stream [arts, science, commerce, professional (Law, Engineering, Medicine), other]. The test result is presented in Table 7.9.

Table 7.9. **The Kruskal-Wallis test [(i) Ranks (ii) Test Statistics] of the knowledge of the sample of pre-service teachers in SA regarding STIs and other BBVs across subject stream**

(i) Ranks

	Subject stream	*N*	*Mean Rank*
Rasch Knowledge Estimate	*Arts*	160	150.18
	Science	49	178.30
	Commerce	6	183.25
	Professional (*Law, Engineering, Medicine*)	12	153.38
	Other	83	150.60
	Total	310	

(ii) Test Statistics[a,b]

	Rasch Knowledge Estimate
Chi-Square	4.571
df	4
Asymp. Sig.	.334

a. Kruskal Wallis Test
b. Grouping Variable: Subject stream

Table 7.9 reveals that there was no significant difference in the knowledge attribute of the sample of pre-service teachers in SA across the subject stream (χ^2 = 4.571, n_1 = 160, n_2 = 49, n_3 = 6, n_4 = 12, n_5 = 83, $p > 0.05$). The mean rank for arts was 150.18, for science 178.30, for commerce 183.25, for professional (Law, Engineering, Medicine) 153.38, and 150.60 for other.

7.6.5 Undertaking the HPE curriculum

The Mann-Whitney U-test analysed whether the knowledge attribute of the sample of pre-service teachers in SA regarding STIs and other BBVs varied across those undertaking the HPE curriculum and those who were not. The test result is presented in Table 7.10.

Table 7.10. **The Mann-Whitney test [(i) Ranks (ii) Test Statistics] of the knowledge of the sample of pre-service teachers in SA regarding STIs and other BBVs across undertaking the HPE curriculum attribute**

(i) Ranks

	HPE Teacher/Undertaking the HPE curriculum	*N*	*Mean Rank*	*Sum of Ranks*
Rasch Knowledge Estimate	*Not undertaking the HPE curriculum*	230	152.10	34983.50
	Undertaking the HPE curriculum	74	153.74	11376.50
	Total	304		

(ii) Test Statistics[a]

	Rasch Knowledge Estimate
Mann-Whitney U	8418.500
Wilcoxon W	34983.500
Z	-.139
Asymp. Sig. (2-tailed)	.889

a. Grouping Variable: HPE Teacher/Undertaking the HPE curriculum

Table 7.10 reveals that there was no significant difference in the knowledge attribute of the sample of pre-service teachers in SA across those undertaking the HPE curriculum and those who were not ($U = 8418.500$, $n_1 = 230$, $n_2 = 74$, $p > 0.05$). The

sum of ranks for those undertaking the HPE curriculum ($\sum R_2$) was 11376.50, whereas the sum of ranks for those not undertaking the subject ($\sum R_1$) was 34983.50. The average rank for those not undertaking the HPE curriculum was 152.10, whereas undertaking the HPE curriculum had an average rank of 153.74.

7.7 The attitude of pre-service teachers in SA regarding STIs and other BBVs across the demographic attributes

To establish whether there exists any significant difference of the attitude attribute of the sample of pre-service teachers in SA regarding STIs and other BBVs across the demographic characteristics, the same set of non-parametric tests were employed. The first one, the Mann-Whitney U-test, was used for comparisons where two factors were present namely gender and undertaking the HPE curriculum or not. The second one, the Kruskal-Wallis one-way ANOVA, compared situations when there were more than two factors present namely age, highest educational level and subject stream. These are described in the following subsections.

7.7.1 Gender

The Mann-Whitney U-test analysed whether the attitude attribute of the sample of pre-service teachers in SA regarding STIs and other BBVs varied across gender (male, female). The test result is presented in Table 7.11.

Table 7.11. The Mann-Whitney test [(i) Ranks (ii) Test Statistics] of the attitude of the sample of pre-service teachers in SA regarding STIs and other BBVs across gender

(i) Ranks

	Gender	*N*	*Mean Rank*	*Sum of Ranks*
Rasch Attitude Estimate	*Male*	76	151.63	11524.00
	Female	234	156.76	36681.00
	Total	310		

(ii) Test Statistics[a]

	Rasch Attitude Estimate
Mann-Whitney U	8598.000
Wilcoxon W	11524.000
Z	-.435
Asymp. Sig. (2-tailed)	.663

a. Grouping Variable: Gender

Table 7.11 reveals that there was no significant difference in the attitude attribute of the sample of pre-service teachers in SA across gender ($U = 8598.000$, $n_1 = 76$, $n_2 = 234$, $p > 0.05$). The sum of ranks for females ($\sum R_2$) was 36681.00, whereas the sum of ranks for males ($\sum R_1$) was 11524.00. The average rank for the male was 151.63, whereas the female had an average rank of 156.76.

7.7.2 Age

The Kruskal-Wallis one-way ANOVA analysed whether the attitude attribute of the sample of pre-service teachers in SA regarding STIs and other BBVs varied across age (≤ 20 years, 21-30 years, 31-40 years, > 40 years). The test result is presented in Table 7.12.

Table 7.12. The Kruskal-Wallis test [(i) Ranks (ii) Test Statistics] of the attitude of the sample of pre-service teachers in SA regarding STIs and other BBVs across age

(i) Ranks

	Age range in years	*N*	*Mean Rank*
Rasch Attitude Estimate	*Less than and equal to 20 years*	89	142.19
	21-30 years	160	159.07
	31-40 years	32	199.17
	Greater than 40 years	29	128.48
	Total	310	

(ii) Test Statistics[a,b]

	Rasch Attitude Estimate
Chi-Square	12.577
df	3
Asymp. Sig.	.006

a. Kruskal Wallis Test
b. Grouping Variable: Age range in years

Table 7.12 reveals that there was a significant difference in the attitude attribute of the sample of pre-service teachers in SA across age ($\chi^2 = 12.577$, $n_1 = 89$, $n_2 = 160$, $n_3 = 32$, $n_4 = 29$, $p < 0.05$). The mean rank for 31-40 years was 199.17, for 21-30 years 159.07, for ≤ 20 years 142.19, and 128.48 for > 40 years.

7.7.3 Highest educational level

The Kruskal-Wallis one-way ANOVA analysed whether the attitude attribute of the sample of pre-service teachers in SA regarding STIs and other BBVs varied across the

highest educational level (senior secondary, undergraduate, postgraduate). The test result is presented in Table 7.13.

Table 7.13. **The Kruskal-Wallis test [(i) Ranks (ii) Test Statistics] of the attitude of the sample of pre-service teachers in SA regarding STIs and other BBVs across highest educational level**

(i) Ranks

	Highest educational level	*N*	*Mean Rank*
Rasch Attitude Estimate	*Senior Secondary*	190	159.74
	Undergraduate	90	149.02
	Postgraduate	30	148.08
	Total	310	

(ii) Test Statistics[a,b]

	Rasch Attitude Estimate
Chi-Square	1.113
df	2
Asymp. Sig.	.573

a. Kruskal Wallis Test
b. Grouping Variable: Highest educational level

Table 7.13 reveals that there was no significant difference in the attitude attribute of the sample of pre-service teachers in SA across the highest educational level ($\chi^2 = 1.113$, $n_1 = 190$, $n_2 = 90$, $n_3 = 30$, $p > 0.05$). The mean rank for senior secondary was 159.74, for undergraduate 149.02, and 148.08 for postgraduate.

7.7.4 Subject stream

The Kruskal-Wallis one-way ANOVA analysed whether the attitude attribute of the sample of pre-service teachers in SA regarding STIs and other BBVs varied across the

subject stream [arts, science, commerce, professional (Law, Engineering, Medicine), other]. The test result is presented in Table 7.14.

Table 7.14. **The Kruskal-Wallis test [(i) Ranks (ii) Test Statistics] of the attitude of the sample of pre-service teachers in SA regarding STIs and other BBVs across subject stream**

(i) Ranks

	Subject stream	*N*	*Mean Rank*
Rasch Attitude Estimate	*Arts*	159	156.75
	Science	48	169.76
	Commerce	6	117.25
	Professional (*Law, Engineering, Medicine*)	12	133.29
	Other	83	147.12
	Total	308	

(ii) Test Statistics[a,b]

	Rasch Attitude Estimate
Chi-Square	3.851
df	4
Asymp. Sig.	.427

a. Kruskal Wallis Test
b. Grouping Variable: Subject stream

Table 7.14 reveals that there was no significant difference in the attitude attribute of the sample of pre-service teachers in SA across the subject stream (χ^2 = 3.851, n_1 = 159, n_2 = 48, n_3 = 6, n_4 = 12, n_5 = 83, $p > 0.05$). The mean rank for arts was 156.75, for science 169.76, for commerce 117.25, for professional (Law, Engineering, Medicine) 133.29, and 147.12 for other.

7.7.5 Undertaking the HPE curriculum

The Mann-Whitney U-test analysed whether the attitude attribute of the sample of pre-service teachers in SA regarding STIs and other BBVs varied across those undertaking the HPE curriculum and those who were not. The test result is presented in Table 7.15.

Table 7.15. The Mann-Whitney test [(i) Ranks (ii) Test Statistics] of the attitude of the sample of pre-service teachers in SA regarding STIs and other BBVs across undertaking the HPE curriculum attribute

(i) Ranks

	HPE Teacher/Undertaking the HPE curriculum	*N*	*Mean Rank*	*Sum of Ranks*
Rasch Attitude Estimate	*Not undertaking the HPE curriculum*	229	150.90	34556.50
	Undertaking the HPE curriculum	73	153.38	11196.50
	Total	302		

(ii) Test Statistics[a]

	Rasch Attitude Estimate
Mann-Whitney U	8221.500
Wilcoxon W	34556.500
Z	-.212
Asymp. Sig. (2-tailed)	.832

a. Grouping Variable: HPE Teacher/Undertaking the HPE curriculum

Table 7.15 reveals that there was no significant difference in the attitude attribute of the sample of pre-service teachers in SA across those undertaking the HPE curriculum and those who were not ($U = 8221.500$, $n_1 = 229$, $n_2 = 73$, $p > 0.05$). The sum of ranks for those undertaking the HPE curriculum ($\sum R_2$) was 11196.50, whereas

the sum of ranks for those not undertaking the subject ($\sum R_1$) was 34556.50. The average rank for those not undertaking the HPE curriculum was 150.90, whereas undertaking the HPE curriculum had an average rank of 153.38.

7.8 The major sources of information for pre-service teachers in SA regarding STIs and other BBVs

From among a range of possible sources of information pertaining to STIs and other BBVs, the respondents were instructed to note the most important three which they felt were crucial towards enhancing their STI-related knowledge and attitude attributes. The range of possible sources of information listed were family members, peers, school, workplace, mass media campaigns, religion, State, training and workshops, and relevant organizations.

Descriptive statistics outline the major sources of information for the sample of pre-service teachers in SA regarding STIs and other BBVs. Figure 7.6 shows, in the decreasing order of magnitude, the frequency and percentage of the major sources of information of the sample of South Australian pre-service teachers regarding STIs and other BBVs.

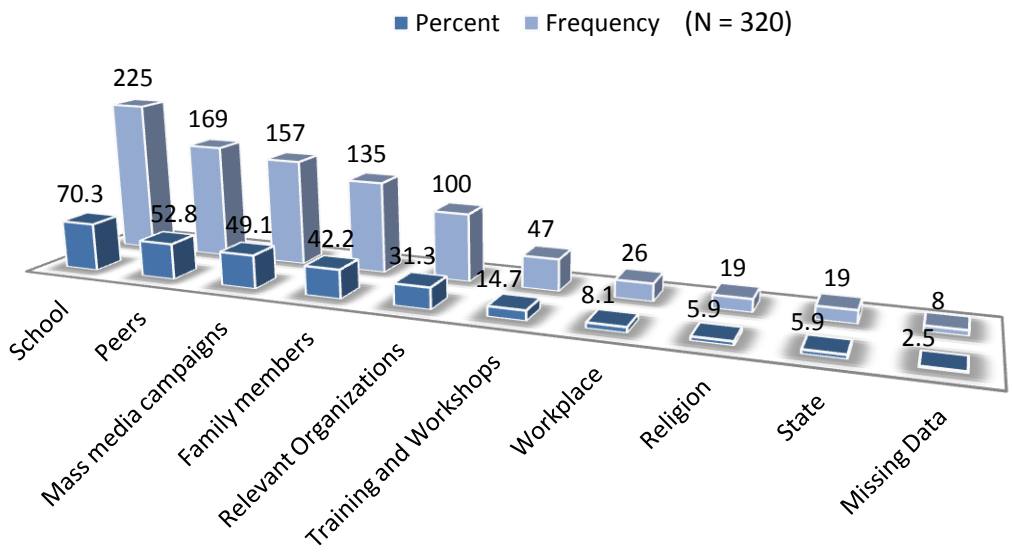

Figure 7.6. The major sources of information for the sample of pre-service teachers in SA regarding STIs and other BBVs

As evident from Figure 7.6, school (70.3 per cent), peers (52.8 per cent), and mass media campaigns (49.1 per cent) emerged as the most frequently noted sources of information for the sample of pre-service teachers in SA regarding STIs and other BBVs. This was followed respectively by family members (42.2 per cent), relevant organizations (31.3 per cent), training and workshops (14.7 per cent), and the workplace (8.1 per cent). The State and religion had an equal per cent count of 5.9 per cent each, with eight individuals (2.5 per cent) failing to turn in a response pertaining to the question regarding the major sources of information.

7.9 Summary

This chapter has presented the findings of the closed-ended questions of the survey particularly in relation to the first six research questions of the study. The first five research questions sought to explore the knowledge and attitudes of pre-service teachers in SA towards STIs and other BBVs, ascertaining the relationship between these, if any, and investigating the difference of the knowledge and attitude attributes across the

demographics of the study. The sixth research question, on the other hand, sought to identify the major sources of information of pre-service teachers in SA regarding STIs and other BBVs.

Before outlining the findings of the research questions as stated above, the first part of the chapter presented the demographic attributes of the South Australian pre-service teachers that constituted the sample for the study. The demographic attributes pertained to gender, age, highest educational level, subject stream, and whether or not the respondent was undertaking the HPE curriculum as part of the teacher education degree. The results revealed that the majority (74.1 per cent) of the respondents were females as compared to males (23.8 per cent). Regarding the age attribute, the majority (50.3 per cent) of the respondents fell in the 21-30 years category followed by the ≤ 20 years (27.8 per cent), 31-40 years (10.3 per cent), and greater than 40 years (9.4 per cent) age ranges, respectively. The highest educational level the majority (59.4 per cent) of the respondents had at the time of responding to the survey was a senior secondary qualification, with an undergraduate or a postgraduate qualification reported by 29.1 and 9.4 per cent of the respondents, respectively. Pertaining to the highest educational level, arts was the major (50 per cent) subject stream pursued, followed by the other (25.9 per cent) category where respondents did not have a major subject choice since it was a senior secondary qualification. Yet others pursued science (15.3 per cent), a professional stream (4.1 per cent), or commerce (1.9 per cent) as the subject stream pertaining to the highest educational level. Those undertaking the HPE curriculum as part of the teacher preparation degree constituted 23.4 per cent of the sample with the majority (71.9 per cent) not undertaking the subject.

Undertaking the appropriate statistical test towards analysis (except where descriptive statistics was used) was outlined next as determined by the Shapiro-Wilk

test of normality. The test revealed that both the Rasch knowledge and attitude estimates (in terms of which the data was analysed) deviated significantly from normal distributions and hence non-parametric in nature. Accordingly, the non-parametric tests employed for the analysis of the knowledge and attitude attributes were the Spearman's rank correlation, the Mann-Whitney U-test, and the Kruskal-Wallis one-way ANOVA, as applicable.

The mean knowledge score of the sample of South Australian pre-service teachers that participated in this study was 18.57 with a standard deviation of 7.678, whereas attitude reported a mean of 44.45 with a standard deviation of 3.651. The Spearman's rank correlation revealed a low to moderate positive relationship between the knowledge and attitude attributes of the sample of pre-service teachers in SA regarding STIs and other BBVs. The Mann-Whitney U-test revealed no significant differences in either the knowledge or attitude attributes and across gender and those undertaking the HPE curriculum and those who were not. Likewise, the Kruskal-Wallis one-way ANOVA revealed no significant differences in either the knowledge or attitude attributes and across the highest educational level and subject stream. However, the Kruskal-Wallis one-way ANOVA revealed a significant difference in the attitude attribute of the sample of pre-service teachers in SA across age, though no such difference was found for the knowledge perspective. School (70.3 per cent), peers (52.8 per cent), and mass media campaigns (49.1 per cent) were reported most frequently by the sample of pre-service teachers in SA as pertaining to the sources of information for this cohort (from those listed) regarding STIs and other BBVs.

The quantitative findings were reported in this chapter. The next chapter presents the qualitative findings of the study. It canvasses the results of the last three research questions that guided the study.

> "At some point a student may ask about diseases or may even have one of these diseases and as a teacher you should have at least a broad understanding. Teachers do if they have children with Autism or down syndrome so why not other issues that may effect your students." (This Study, Survey Respondent, ID: 121)

Chapter 8:

Results II: 'Open-ended' Qualitative Analysis

8.1 Introduction

As a central component of the data collection, the final questions were open-ended questions. This chapter presents the findings of the open-ended questions of the survey, particularly focusing on the last three research questions of the study. The research questions sought to elicit the perspectives of pre-service teachers in SA towards STI-related issues, the role of an effective education in containing the spread of STIs, and the place of teacher education in addressing sexual health as central to curriculum. The research questions were framed to elicit the perspectives of the respondents towards the aforesaid issues and had open-ended sub questions. The individual open-ended questions addressing the broad research questions are listed below. While the first two open-ended questions pertained to eliciting the perspectives of the respondents towards STI-related issues, the next six questions evoked the perspectives of the respondents towards the role of an effective education in containing the spread of STIs. The final three open-ended questions elicited pre-service teachers' perspectives towards the place of teacher education in addressing sexual health. The questions are listed forthwith:

1. The Australian Annual Surveillance Reports and STD Services RAH reveal a high rate of Sexually Transmissible Infection and the like diseases in South Australia. What in your opinion can be the reasons for this upsurge?

2. Adolescents and the young adults are reported to be the ones most vulnerable to contracting these diseases. Why do you believe this is so?

3. What role can education in general play towards combating the spread of these diseases?

4. What are your perspectives regarding the South Australian 'Health and Physical Education' curriculum in general in this context?

5. The South Australian 'Health and Physical Education' curriculum is compulsory till Year 10 as per the SACSA Framework provisions. However, in Years 11 and 12 it is an optional subject under the new SACE criteria. In your opinion, should the aforesaid curriculum be compulsory in Years 11 and 12 under the new SACE as well? Please justify your answer.

6. In your opinion, does the South Australian 'Health and Physical Education' curriculum adequately address the issues related to STIs?

7. What factors, if any, do you hold responsible for the lack of a comprehensive sex education curriculum in South Australia?

8. Do you feel that sex education should be compulsory in South Australian schools?

9. Do you feel that pre-service teachers should be adequately informed regarding these diseases? Why?

10. Do you feel that pre-service teachers are adequately informed regarding these diseases?

11. How can teacher education be better addressed to effectively enhance the knowledge and attitude attributes of pre-service teachers towards these diseases?

The response rate to the open-ended questions of the questionnaire was high. A total of 272 respondents out of a participating 320 (85 per cent) turned in complete open-ended responses. The data was analysed thoroughly and the analysis of this huge array of open-ended responses took the form of drawing up themes and subthemes and respective frequency (f) and per cent counts. The identified themes and subthemes for

each of the open-ended questions along with the frequency count and its per cent is clearly articulated in Appendix I (a-k). For the purposes of this chapter, the data from these open-ended questions will be analysed qualitatively and presented as propositional themes. As described in Chapter 5, this approach follows the principles of grounded theory (Strauss & Corbin, 1994) whereby the key concepts underpinning the findings are identified. The key concepts reflect similar qualities to the factors that were identified in the data, for example, "mis/no information" or "individual attitude behavioural lifestyle". However, concepts or factors were then grouped together based on similar constructs and, from the collective of concepts, a propositional theme was built. This process led to the generation of five propositional themes based on the perspectives of the participants. These are firstly listed below and then each theme is dealt in turn with a view to providing a deeper interpretation of the data from which greater insights in the field of study can be portrayed. The propositional themes are:

1. It is the perspectives of the participants of the study that there is an increase of STIs in South Australian adolescents because information and knowledge relating to sex education is not readily available nor is it comprehensive.
2. It is the perspectives of the participants of the study that there is an increase of STIs in South Australian adolescents because adolescent lifestyle and behaviour is becoming increasingly experimental and characterized as "sexually risky", more so than in traditional societies, and as a result of a number of factors in contemporary society in SA.
3. It is the perspectives of the participants in the study that an increase in access to knowledge is the greatest opportunity that can be offered to South Australians in order to reduce the increase of STIs.

4. It is the perspectives of the participants in the study that the HPE curriculum is an appropriate resource to address STI education for adolescent school students in SA. However, in its present form, the HPE curriculum fails to deliver appropriate sex education.

5. It is the perspectives of the participants in the study that the inclusion of sex education as a compulsory component of all teacher education programs is desirable if STIs in SA are to be reduced.

In the next five sections, each of these propositions is deconstructed and it is shown how each was built from the key concepts and themes embedded in the data elicited from the open-ended questions of the survey pertaining to the last three research questions of the study. In justifying the propositional themes generated as a set of responses to the open-ended questions, some of the reported responses are cited against their ID in brackets. The responses are quoted not only verbatim but also as obtained in the written/typed form.

8.2 Proposition one: Perspectives regarding an increase of STIs in SA

It is the perspectives of the participants of the study that there is an increase of STIs in South Australian adolescents because information and knowledge relating to sex education is not readily available nor is it comprehensive.

South Australian pre-service teachers who participated in the study perceived that it is the lack of information or misinformation that resulted in an increase of STIs in South Australian adolescents. Education pertaining to STIs was perceived as either completely absent or inadequate. The respondents articulated that sex education at schools did not cover topics related to STIs. According to the views of the sample, lack of training of teachers regarding STI-related issues resulted in teachers dealing with sex

and health topics inappropriately in classrooms. The respondents stated that a lack of general knowledge and awareness regarding STIs in terms of its risk factors, spread, prevention, and treatment also contributed to the little or no information. The sample of South Australian pre-service teachers further cited adolescents' lack of experience and naivety as reasons for an increase of STIs among this cohort. The following quotes are evidence of these perspectives:

> *Until grade 10* [,] *I was taught sex education at school, but it was mostly about reproduction, sex organs and using protection; I don't remember anything about STDs.* (ID: 192)
>
> *Lack of proper education in schools and training of teachers to be able to comfortably speak to students in regards to sti's* [STIs] *and sex* [;] *also lack of support in professionals coming to schools to help with the education.* (ID: 117)
>
> *Not enough knowledge of what STI's are out there, and what symptoms to look for, how to prevent infections etc. This lack of knowledge means that they are taking dangerous risks and therefore are the most vulnerable.* (ID: 135)
>
> *They also don't have the wisdom or maturity to realise how very sacred and important a healthy body is. They don't usually have ailments or have had experiences where these types of issues arise, so don't think about them happening.* (ID: 126)

Lack of education by parents on STI-related matters and their embarrassment to discuss these with their children was also identified by the respondents as a significant factor. Some of the respondents were of the view that, with adolescents having no real models arising out of dysfunctional families, either reverted to advice from their peers or sought sexual relationships to fill the void. The respondents believed that this rendered adolescents vulnerable to these diseases. The respondents purported that the dominating peer pressure on the lives of adolescents and young adults pertaining to sexual experimentation coupled with peers serving as reservoirs of information on

sexual health matters (at times incorrect) also rendered individuals susceptible to STIs. The following quotes capture these perspectives:

> *Adolescents are so confused these days because they have no real role models. The family unit is so broken - parents splitting - and often parents in these situations find themselves competing for their child's favour that they will reach a point where the child makes all the decisions leaving very little room for boundaries. In light of this, adolescents then turn to their peers for advice and usually get what they want to hear rather than what they NEED to hear. Going back to the family unit, because the child is insecure, they will always strive to find security in other places, and sadly, some of them will look into sexual relationships to fill such a void.* (ID: 198) (emphasis in original)
>
> *They get a lot of the information from their peer group,* [;] *it is often incorrect*. (ID: 93)
>
> *Peer pressure could also be a large factor i.e. a young girl agreeing to a boy not wanting to use a condom*. (ID: 91)

This section has outlined the perspectives of the sample of South Australian pre-service teachers regarding an increase of STIs in South Australian adolescents. It was evident in the data that there is an increase of STIs in South Australian adolescents because information and knowledge relating to sex education is not readily available nor is it comprehensive. The next section discusses the perspectives of the respondents regarding the vulnerability of young people to contracting STIs.

8.3 Proposition two: Perspectives regarding the vulnerability of young people to contracting STIs

It is the perspectives of the participants of the study that there is an increase of STIs in South Australian adolescents because adolescent lifestyle and behaviour is becoming increasingly experimental and characterized as "sexually risky", more so than in

traditional societies, and as a result of a number of factors in contemporary society in SA.

According to the perspectives of the respondents, the contemporary society in SA reflected a culture of risk taking and a culture that is indifferent to placing importance on these diseases. The respondents were of the view that sexual relationships were considered normal and in vogue in the present day society with devaluing of the self and relationships being the prevalent norm. The respondents also reiterated that discussion about STIs was often considered as a taboo topic in the society leading to embarrassment. This embarrassment resulted in individuals not going in for STI checks and hence leading to the spread of the diseases. Added to these, the respondents stated that the lack of effective mass media campaigns on STIs coupled with explicit sexual media content was also responsible towards rendering individuals prone to sexual relationships and promoting promiscuity. These perspectives are evident in the following quotes:

> *As sexualisation increases and traditional moral codes are dismissed as irrelevant and restrictive, promiscuity and sexual experimentation will increase, and STI will naturally follow.* (ID: 225)
>
> *It may have been considered a so-to-speak 'taboo' in our society to be exposed and educated to these STIs.* (ID: 228)
>
> *There hasn't been a significant mass media campaign since the AIDS education +* [plus] *awareness of the 1980's.* (ID: 11)
>
> *High rates of STI in SA may be due to a rise in pornography content on the internet &* [and] *media that makes promiscuity, unfaithfulness and scantily-clad women seem the norm.* (ID: 22)

The sample of South Australian pre-service teachers also perceived that it is often the temperament and lifestyle pattern of individuals that renders them vulnerable

to STIs and hence high STI rates. This pertained to individuals adopting unsafe sexual practices and displaying lax attitudes towards protection arising out of impulsive decisions. The attitudes and behaviours of individuals, as believed by some of the respondents, were also manifest in individuals having multiple partners and hence engaging in sexual promiscuity. Moreover, the respondents also expressed the view that students were having sex at a young age and often experimenting sexually leading to STI vulnerability and an increase of STIs. The respondents also perceived that young people often upheld a view and an attitude that they would not suffer from STIs. It was believed that this aura of invincibility and immortality generated lax attitudes towards protection which in turn, resulted in the spread of STIs. The spread of STIs was also attributed to increased drug and alcohol use by young people which impacted the behaviour of individuals and engagement in unsafe sex. These perspectives are captured in the following quotes:

> *I know from my experiences many people still do not follow safe sex precautions and often get caught out in the heat of the moment.* (ID: 272)
>
> *People are far more promiscuous and see sex as more of a sport or social standing, needing more partners to be 'popular'.* (ID: 154)
>
> *People are younger and younger when they begin becoming sexually active,* [;] *due to this young age the children may not understand the risk of STI's.* (ID: 287)
>
> *Young people have an invincibility attitude to many things in life. Sometimes this is a positive attitude to take risks to challenge themselves, however* [,] *the attitude 'it won't happen to me' can be damaging in the area of STI's.* (ID: 211)
>
> *Partying and drinking and drug taking have become a norm in society when trying to figure out ones identity, or perhaps just in raising self esteem. I think binge drinking plays a huge role in unprotected sex which could lead to contracting an STI.* (ID: 298)

Other factors perceived by the respondents leading to STI vulnerability and the spread of the diseases were attributed to issues related to contraception and STI-related diagnosis and treatment. The respondents perceived that condoms were mainly considered by individuals as a tool to prevent pregnancy and not STIs. The respondents reiterated that certain stereotypical views were also prevalent among adolescents and young adults that the condom is "uncool" or not necessary. Moreover, some of the respondents expressed the view that young people often have no access to condoms and the cost of contraceptive devices were prohibitive, and as such responsible for individuals not adopting safe sex practices, and hence the spread of the diseases. In addition, according to the respondents, not testing for a STI also resulted in increased disease. The following quotes are evidence of these perspectives:

> *Contraception is mainly discussed in families to prevent teenage pregnancy not to prevent STI's. The best form of contraception is a condom to prevent STI's but condoms are uncool.* (ID: 202)
>
> *Children... may not have access to protection.* (ID: 124)
>
> *Also the cost of condoms and other protective devices are sometimes expensive and so people do not bother.* (ID: 233)
>
> *Not knowing they have a STI and passing it along. Irregular health checks.* (ID: 95)

Further reasons perceived by the respondents for an increase of STIs in South Australia were attributed to demographic characteristics and an over reliance on antibiotics and its resistance. While some respondents perceived that higher population numbers reflected higher STI rates, others were of the opinion that population migration patterns resulted in increased rates of disease. Some respondents were of the view that an over reliance on antibiotics in that it can cure STIs or an antibiotic resistance resulted in the spread of the diseases. In addition to the above, some of the respondents provided miscellaneous reasons for the increase of STIs in South Australian adolescents. The

reasons ranged from the reduced impact of education on children at present to the role of religious organizations promoting abstinence and even closure of STI clinics and surprisingly, weather conditions. Some respondents even expressed their concerns towards the issue rather than citing a reason. The responses pertaining to these perspectives are presented below:

> *Higher population, hence the numbers go up*. (ID: 272)
>
> *A high number of Sudanese and other African refugees settling in South Australia.* (ID: 201)
>
> *Over reliance on the idea that medicine/antibiotics can "fix" the problem.* (ID: 21)
>
> *Resistant mutants developing* → [that leads to] *antibiotic &* [and] *antiviral resistance.* (ID: 73)
>
> *Education to children no longer having the impact it once had.* (ID: 119)
>
> *Religious organisations promoting abstinence – it doesn't work, so stop funding it.* (ID: 107)
>
> *Closure of local clinics such as Shine SA at Woodcroft.* (ID: 219)
>
> *Colder weather meaning more people having sexual activity.* (ID: 292)
>
> *This is bad*. (ID: 20)
>
> *Ashame themselves, feel guilt*. (ID: 23)

This section has outlined the perspectives of the sample of South Australian pre-service teachers regarding the vulnerability of young people to contracting STIs. It was evident in the data that there is an increase of STIs in South Australian adolescents because adolescent lifestyle and behaviour is becoming increasingly experimental and characterized as "sexually risky", more so than in traditional societies, and as a result of a number of factors in contemporary society in SA. The next section discusses the

perspectives of the respondents regarding the role of an effective education to contain STIs.

8.4 Proposition three: Perspectives regarding the role of an effective education in containing the spread of STIs

It is the perspectives of the participants in the study that an increase in access to knowledge is the greatest opportunity that can be offered to South Australians in order to reduce the increase of STIs in SA.

South Australian pre-service teachers who participated in the study perceived that the dissemination of knowledge is necessary if education is to play a role in combating STI spread. It was their view that knowledge through better education was required in key areas mainly pertaining to varied aspects of the diseases ranging from its prevention, consequences, risks, spread, transmission, detection, treatment, and help and support options. Education was also portrayed as playing an important role in confronting myths and misconceptions related to STIs. An effective education on STIs was also perceived as helping individuals to change risky sexual behaviours and guiding them to comply with safe sex measures. Some respondents even articulated that education provides individuals with an option for making smarter choices related to sexual behaviours. The following quotes are evidence of these perspectives:

> *Teaching and education will help people understand more and learn about how to lessen the chances of contracting and spreading diseases.* (ID: 131)
>
> *This also removes any questions that may arise of uncertainty of what some diseases entail and how to handle them.* (ID: 140)
>
> *Making children/adolesants* [adolescents] *more comfortable about the topic, about finding the right person to talk to and the right advice regarding personal issues.* (ID: 305)

It would help shock young people into realising their not invincible and it can happen to anyone. (ID: 301)

Education plays a massive role in combating diseases. If adolescents are fully aware that actions such as unprotected sex could result in infertility and serious symptoms [,] *I really do not believe they would take such risks so easily. Such small measures like putting a condom on are nothing compared to what could result and therefore better education is needed.* (ID: 135)

Awareness creates thought and though [thought] *results in the purchase of condoms or just saying no to sex until old enough.* (ID: 121)

That education plays the largest and the most significant role towards combating STI spread was also articulated by the respondents. According to the views of the sample, education was considered as a necessary prerequisite to reducing the embarrassment associated with STI-related issues and thus improving communication and effectively leading to STI control measures. Education was also considered as instrumental towards establishing healthy interpersonal and intrapersonal relationships. Some effective measures were also suggested by the respondents as a means to increase access to education. These comprised of an education related to STIs being a part of the core curriculum and even more effective when enforced in the later years of high school. The following quotes capture these perspectives:

If you're educated about something there's less of a temptation to learn through experience. If you avoid the topic of sex and its consequences, chances are you'll learn through experience, which means the possibility of encountering the whole continuum of consequences. (ID: 118)

By educating children in a free, open environment where they can safely explore and ask questions about the topic. (ID: 287)

Teaching students to respect and care for themselves, their bodies and their health, and likewise, others. (ID: 318)

Health and PE classes should really include this in the curriculum. However, it shouldn't be overemphasised. (ID: 178)

It could be repeated a bit more later in the senior years of schooling to help enforce the idea. (ID: 278)

In addition to the above, some of the respondents forwarded miscellaneous perspectives relating to the role of an effective education to contain STIs. While one respondent commented that parents might play the largest role in educating young people, another participant stated that STI-related education is effective if taught using the multimedia. Yet another respondent was of the view that STI-related education is effective only if the teachers received adequate training on the subject. Some respondents, however, perceived that education does not necessarily have an impact on the decision making process of an individual on account of other prevalent factors namely the influence of the media and peers. The responses highlighting these perspectives are presented below:

UNSURE, PARENTS MAY PLAY LARGEST ROLE. (ID: 25) (emphasis in original)

Teaching it at schools and through multimedia. (ID: 57)

I learnt most about STIs ect [etc.] *from PDHPE class. I think these teachers should have specialised training to ensure they teach kids about it.* (ID: 146)

Education can do very little as society encourages promiscuity through media and peers. (ID: 154)

The sample of South Australian pre-service teachers also perceived several factors as responsible for the lack of a comprehensive sex education in SA. Inadequate teacher preparation was perceived as resulting in a lack of confidence in teachers to teach the subject, with teachers without a science or HPE background reluctant to teach

it. Some respondents articulated that a lack of funding on the part of schools to effectively train its teachers also contributed to the non-comprehensive nature of sex education. Likewise, according to the views of the sample, a lack of education prevented parents from full discussion of these topics with their children. A number of respondents also expressed the view that parents were often sceptical towards sex education at school for various reasons. Further, the stigma associated with the subject also resulted in the subject being poorly dealt with either by schools, teachers, parents, or students themselves. According to the respondents, students also displayed a disinterest towards sex education arising out of a "glorification of sex in the society". Moreover, the respondents perceived that both schools and teachers were often under the impression that sexual health knowledge was already possessed by the students and hence the subject was either not taught properly or overlooked. The curriculum relating to sex education, for example, HPE was dealt with differently in different schools with the subject not offered on a consistent basis. The respondents also expressed the view that little priority was given to sex education and personal health compared to the other curricular areas which were more vocation oriented. These perspectives are evident in the following quotes:

> *Lack of training and development for educators.* (ID: 311)
>
> *Financial restraint in schools to educate educators.* (ID: 203)
>
> *Im* [I'm] *not sure, but I should imagine some parents would take issue if they believe their children are 'too young', or if they felt sex education should be taught at home, or shouldn't be taught at all for religious reasons (although I disagree with all of these reasons).* (ID: 286)
>
> *Sex is still largely a taboo subject to be discussed in a school setting.* (ID: 148)

The rising notition [notation/notion] *all around us, of sex being glorified and pushed in students faces. The fact they believe partying is awesome, and sex and drugs are just experiments.* (ID: 139)

It is almost assumed knowledge these days, so perhaps it is inadequately taught because it is assumed that most of the knowledge is already possessed? (ID: 261)

A ho go subject. (ID: 36)

Sex education is limited and of short duration... (ID: 99)

The curriculum is geared toward [towards] *having a 'work ready' society, to help make money for the state* [State]. *So* [,] *little emphasis is made on how to look after yourself, your body,* [and] *others*. (ID: 126)

Societal attitude was also perceived by the sample of South Australian pre-service teachers as contributing to SA lacking a comprehensive sex education. Three different attitudinal perspectives were forwarded by the respondents. The first perspective pertained to a general apathy of the society towards the subject. The second perspective reflected on the general opinions, fears, and limitations associated with the subject. Views towards sexual behaviour as a private, personal matter constituted the third perspective of the attitude of the society as responsible for a non-comprehensive sex education in SA, and perhaps elsewhere in Australia. Likewise, the perceived conservative ideologies borne by the government towards sex education added to the lack of importance of personal health as core curriculum also limited the role of an effective education. In addition, the social stigma and conservative attitudes prevalent in the Australian society was also perceived as responsible for non-compulsory sex education in SA. From the perspective of the respondents, the mass media was also responsible towards developing nonchalant attitudes of youths towards casual sex. The fact that the pervasive influence of certain religious factions did not allow comprehensive sex education in government schools, and that sex education was dealt

with differently in religious schools was also forwarded by some respondents. The following quotes are evidence of these perspectives:

> *The naive attitude towards sex education. No one taking responsibility for the job*. (ID: 251)
>
> *Fear, the fear the adults hold of if they teach this information it will encourage children to become sexually active.* (ID: 287)
>
> *Sex is a dirty word. The minute someone brings up the idea of teaching it to children people go ballistic. Until we remove the theory we should simply teach them not to have sex until marriage and actually start to see them as people who will soon be or are currently sexually active, children will not listen*. (ID: 310)
>
> *The Government focus a lot about the affects of cigarette smoking and alcohol abuse, which of course are incredibly important, but sex education needs to be in that same bracket of urgency*. (ID: 233)
>
> *Social stigma as well as the supposed conservatism embedded within Australian society.* (ID: 221)
>
> *The media saturates children with sex today and it is incredibly easy to access on the internet. Youths are developing a nonchalant attitude towards casual sex and a focus in curriculum should also be placed on how it can be relevant to students.* (ID: 252)
>
> *Various Faith and Independent organisations nannying children*. (ID: 107)
>
> *As much as I like the Catholic Education system, their teaching* [teachings] *on this matter are lax at their best*. (ID: 61)

It is evident in the data that the great majority of the sample of South Australian pre-service teachers supported the implementation of compulsory sex education in the State. While some respondents perceived that sex education is a very important aspect of education, others articulated that parents often failed to address issues related to sexual health either due to a lack of information themselves or due to embarrassment

and awkwardness associated with the topic. Some respondents, in extending their support for compulsory sex education, expressed the view that if sex education is to be compulsory then it should be handled responsibly and supported by parents and teachers. A section of the respondents articulated that sex education should be compulsory until year 11 but not year 12. Contrary to this, some supported the introduction of compulsory sex education in SA all through the school years. That parents should also shoulder some responsibilities and have a say in the formulation of the curriculum was also forwarded by some respondents. Likewise, some of the respondents supported compulsory sex education in the State, however, with the opinion that it is better delivered by professionals in the field. Finally, some pre-service teachers purported that sex education should not only be compulsory in SA but uniform throughout the State regardless of the individual religious beliefs of religious schools. The following quotes portray these perspectives:

> *It is a very important topic in the context of a students* [student's] *life.* (ID: 119)
>
> *Not enough parents (my own* [,] *for example* [,]*) are willing to talk to their children about sex, their bodies (puberty), relationships, and STI's. For many children, school is the only place they will learn about these topics, unless they experiment for themselves, unsafely. When parents DO talk to their children, they often would not talk in as great depth as a teacher at school would, due to the 'awkwardness' and 'embarassment'* ['embarrassment']. (ID: 240) (emphasis in original)
>
> *Only if it is handled in a responsible* [,] *non threatening* [non-threatening] *way*. (ID: 196)
>
> *Yes to a certain degree, but up not in year 12.* (ID: 112)
>
> *Since children are having sex younger* [,] *they should have age appropriate* [age-appropriate] *material* [materials] *from a younger age* [;] *but they should continue it*

through all the school years not just in year 6/7 or in biology class in year 10. (ID: 152)

I think parents should be given the opportunity to speak into the curriculum, as different parents come from different religious and moral backgrounds, and have strong beliefs on which attitude [attitudes] *they want their children to be influenced by. The state* [State] *does not always know what is best, and this is one situation where parents need to be given the option to partner with the education system, and for them to have a say on how it is conducted.* (ID: 225)

But by a separate, professional group who comes into the school. (ID: 180)

Even religious schools, as no matter what school a student is in majority will engage in sex at some stage. (ID: 211)

A section of the respondents, however, perceived that sex education is better handled by professionals in the field and hence should not be compulsory in schools in SA. Other respondents were of the view that it should be dealt with responsibly by the family and schools can be an added support to this. Some respondents while reflecting that sex education is important purported that it would be better to implement it as part of the Health curriculum rather than as a separate sex education curriculum. Yet others, in strictly arguing against compulsory sex education were concerned that making it compulsory could promote further sexual activity. These perspectives are evident in the following quotes:

Maybe a special area for a medical professional. (ID: 189)

It is always first the family responsibility, but when this fails, schools can be adjuncts to this. (ID: 203)

Not as its own subject, but as part of a compulsory health subject, yes. (about year 10). (ID: 9)

Another reason is because sex education programs can promote sex which can be a dangerous story for children to hear in regards to being loved in a marriage in a self-giving relationship. (ID: 314)

This section has outlined the perspectives of the sample of South Australian pre-service teachers regarding the role of an effective education to contain STIs. It was evident in the data that an increase in access to knowledge is the greatest opportunity that can be offered to South Australians in order to reduce the increase of STIs in SA. The participants argued that this access to knowledge is not taking place at present due to a number of factors as outlined above. The next section discusses the perspectives of the respondents regarding the HPE curriculum as a key resource that may be useful in reducing the incidence of STIs in SA.

8.5 Proposition four: Perspectives regarding the HPE curriculum in addressing STI education

It is the perspectives of the participants in the study that the HPE curriculum is an appropriate resource to address STI education for adolescent school students in SA. However, in its present form, the HPE curriculum fails to deliver appropriate sex education.

The South Australian HPE curriculum was considered as an appropriate resource by the respondents in the provision of an effective sex education, with a view to limiting the spread of STIs. However, the great majority of the respondents perceived that the HPE curriculum in its present form fails to deliver an appropriate sex education. The respondents reiterated that an education related to STIs was not covered appropriately in the current South Australian curriculum. The reasons cited towards the curriculum's ineffectiveness were attributed to its limited scope, conservative approach, and lack of detail regarding STI-related issues. According to the respondents, the focus

of the curriculum was more on the Physical Education perspective rather than personal health. Moreover, the subject of sex education was not taken seriously both by teachers and students alike and often delivered in a non-engaging manner. The respondents further stated that teachers often felt awkward teaching the subject arising out of an embarrassment discussing sexual health matters with their students. The curriculum was also perceived as outdated. The following quotes are evidence of these perspectives:

> *I don't think it's very good in covering these issues at all, it needs much more development.* (ID: 276)
>
> *Absolutely and completely abysmal. Compared to almost every other state* [State,] *it is unspeakably poor (even WA* [Western Australia] *is more on the ball!).* (ID: 176)
>
> *In school we did 3 hours a week on physical education and 45 minutes in "health". And in the 20 weeks or so of health and PE* [,] *not the whole health topic was even on STI's and other diseases. There is a serious lack of focus on educating our young people on what's out there.* (ID: 94)
>
> *I think most of the time the teachers feel awkward disclosing the information needed and it can sometimes be taken more as a joke than seen as a subject that could save lives.* (ID: 92)
>
> *SACSA in my opion* [opinion] *is out dated. We did cover it in Yr 11 or 12 at my school in Victoria. May have fallen under the Christian studies curriculum*. (ID: 187)
>
> *NO WAY!!! It is absolutely appaling* [appalling] *how they address it. They act like its* [it's] *taboo to talk about and walk on egg shells* [;] *we need to know the truth* [,] *the hard truth and know the options and have free comfortable access to the options without having to feel a sense of taboo.* (ID: 117) (emphasis in original)

The sample of South Australian pre-service teachers also perceived that the HPE curriculum was not offered on a regular and consistent basis in some schools. Moreover, the elective nature of the subject allowed the subject to be not taught

consistently across the school community. As a result, different schools dealt with the subject with great variability. The respondents expressed the view that less classroom time of the year allocated for the subject also reduced its importance. In addition, it was perceived that the subject was introduced too late in schools, specifically in years 9 and 10 when students were already reported to be engaged in sexual relationships. This was considered as a serious drawback by the respondents who perceived that the subject should be introduced in schools much earlier for students to be aware of sexual health issues. The following quotes portray these perspectives:

> *It attempts to, but not enough time is devoted to it.* (ID: 94)
>
> *In my school* [,] *we only did this kind of topic for one semester but it wasn't enough to educate me on a range of STI's.* (ID: 74)
>
> *Every school interprets their obligation to teach sexual health and education in different ways. This is also affected by school culture, particularly if the school is strongly religious or whatnot* [what not]. *To this end, I feel that despite the curriculum existing there really is no standardisation of teaching.* (ID: 118)
>
> *I believe sexual health education should begin slightly earlier than when it was taught to me. Year 10 was unfortunately too late for a few of my peers and so being made aware of the issues regarding sexual health before we were at an age to be thinking about doing it* [,] *would have made a difference to the approach taken.* (ID: 316)

Contrary to the above perspectives, some of the respondents perceived that the HPE curriculum was an appropriate resource in the provision of an effective education to limit the spread of STIs. The respondents were of the view that the curriculum was appropriate in dealing with STI-related issues. Some of the respondents expressed that the curriculum was satisfactory and did as much as possible with respect to STI-related education. The respondents perceived that a lot depended on the individuals themselves as exercising the education thereof. Some of the respondents also shared that most of

the issues pertaining to sexual health were covered by the curriculum, and those that are not, could either be dealt by the parents or the individuals themselves and hence the curriculum was a great back up. These perspectives are evident in the following quotes:

> *The curriculum has a varied amount of work that relates to STI's.* (ID: 308)
>
> *I think they are doing the best job they can. They can only address the issues in the classroom. At the end of the day a teacher hopes that the message hits home in the classroom, as when the student inevitably engage in sexual activity it is not like the teacher will be there to help them prevent the chances of an STI.* (ID: 211)
>
> *I am aware that sex education is taught from at least grade 7 and through high school. Most issues are discussed and I am in total agreement of it. As a parent to a 14yr old* [,] *I thought I had covered most of the areas around males, female, body parts, sex pregnancy etc until she came home and asked extra questions that I had not thought of. It is a great backup*. (ID: 121)

South Australian pre-service teachers who participated in the study elicited mixed perspectives as to whether the HPE curriculum should be compulsory in years 11 and 12. The respondents who perceived that the HPE curriculum should not be compulsory in years 11 and 12 forwarded a range of views in support of their argument. Some of the respondents articulated that making one subject compulsory compromises other subject choice options. Further, not all students consider pursuing HPE for future tertiary education or career path. The respondents also reflected that individuals have unique educational aspirations and mandating curriculum can limit opportunity. The respondents further reiterated that students by this point of time (years 11 and 12) should be armed with enough knowledge on sexual health matters or at least be capable of seeking the information if they require to do so. The following quotes are evidence of these perspectives:

It shouldnt [shouldn't] *be compulsory becasue* [because] *then another subject will be pushed out.* (ID: 292)

SOME STUDENTS DON'T SEE IT AS PART OF THEIR PLAN. (ID: 25) (emphasis in original)

Why should any subject be made compulsory for all students when all students are different with unique interests/likes/dislikes. (ID: 134)

Students will take it as a waste of time. (ID: 32)

Children are responsible enough at ages 17 + [plus] *to make there* [their] *own decision and are capable at seeking the information they need.* (ID: 172)

Contrary to the above perspectives, some respondents perceived that the HPE curriculum should be compulsory in years 11 and 12. Years 11 and 12 were perceived as the most crucial years when students needed to learn about sexual health both in terms of maturity and consent. Further, the respondents purported that mandated HPE education would ensure a more holistic development of adolescent mental, physical/sexual and emotional well being. Some of the respondents articulated that the subject could be made compulsory until year 11 and not year 12 due to the crucial timing and preparation for final examinations. These perspectives are reflected in the following responses:

Yes, from my experience [,] *sexual activity was higher and discussed frequently throughout year 11 and 12 versus previous years in high school. It would make sense to continue educating students especially when activity and discussion among students is highest.* (ID: 216)

Life changing information → [that leads to] *important part of becoming a responsible citizen*. (ID: 37)

Not in year 12, maybe yR [year] *11* [;] *depends on the amount of education +* [plus] *quality of teaching up until this point at school*. (ID: 54)

Year 12 is very important and students need to study subjects they will do well in and get them a good score. (ID: 74)

The respondents also forwarded different perspectives towards rendering the HPE curriculum as more appropriate than any other curriculum in addressing sexual health issues. Some of the respondents perceived that only the Health component should be compulsory in years 11 and 12. The Health component was deemed more essential in these years rather than the Physical Education counterpart. It was also suggested that the subject could be a non-assessed option not adding to the SACE or graduating credits. The subject was also considered as more effective if integrated with other subject areas. It was argued that this would result in far more awareness without necessarily compromising on either personal interests or career options. Some of the respondents even perceived that Health Education could be delivered in the form of information sessions or under the umbrella of pastoral care in years 11 and 12. These perspectives are evident in the following quotes:

I think health should be continued, especially due to the fact that in year 11 and 12 students are in a very liberating part of their life where they start to make many decisions for themselves. If physical education is made compulsory then it would cause some uproar. *I know i* [I] *certainly didnt* [didn't] *want to be running around at that age*. (ID: 238)

I think Health and PE should be compulsory through Year 11 and 12 but maybe as a non assessed [non-assessed] *option for those students who do not wish to study the topic as part of their SACE credits*. (ID: 160)

Perhaps rater [rather] *than just having one topic dedicated to HPE (it is not necessary for many students), it could be worked into other subject areas, such as statistics in mathematics, biology, chemistry, physics, social studies/studies of societies, media studies, ICT, English, etc. Far more awareness could be achieved if one assignment in*

every topic a student undergoes contains HPE/sex-ed [education] *in some form, their knowledge is likely to increase dramatically, and it will still be beneficial to their futures and interests.* (ID: 192)

I think if there is a class dedicated to Personal Health (covering STDs, etc.) [,] *then that could be offered in the form of workshops.* (ID: 309)

It should be instituted as part of the pastoral care program. (ID: 319)

This section has outlined the perspectives of the sample of South Australian pre-service teachers regarding the HPE curriculum as a key resource in addressing STI education. It was evident in the data that the HPE curriculum is an appropriate resource to address STI education for adolescent school students in SA, which, in its present form was perceived as failing to deliver appropriate sex education. The next section discusses the perspectives of the respondents regarding the place of teacher education in addressing sexual health.

8.6 Proposition five: Perspectives regarding the place of teacher education in addressing sexual health

It is the perspectives of the participants in the study that the inclusion of sex education as a compulsory component of all teacher education programs is desirable if STIs in SA are to be reduced.

The great majority of South Australian pre-service teachers who participated in the study in arguing for the importance of STI-related information being included in pre-service teacher preparation programs, based their views on the belief that pre-service teachers in SA should be informed of STIs in order to effectively teach the subject. Some of the respondents even considered that STI-related information is essential for all teachers irrespective of the subject expertise. It was perceived that some students confided and felt comfortable in discussing sexual health matters, irrespective

of subject with certain teachers specifically, and hence important that all teachers should be aware of STI-related issues. The respondents also expressed the view that teachers are often considered as role models by their students. Hence, an accurate and informed knowledge on STIs was considered as essential core knowledge prior to graduation. The following quotes are evidence of these perspectives:

> *It is a difficult subject to prepare for. My own knowledge of these diseases is inadequate and if I were required to teach sexual health there is the possibility that I may teach the wrong thing resulting in a possible issue of safety for students.* (ID: 306)
>
> *Students learn from the behaviours and attitudes of teachers and many students confide in and voice their concerns to their teachers, not just their health teachers. It is just another part o* [of] *being a teacher.* (ID: 220)
>
> *Personally, I want to be a positive role model for my students and be well informed and confident in discussing the issues surrounding sexual health. I want to be able to show that it is ok to talk about it and that being well informed can result in positive decision making.* (ID: 201)
>
> *Sometimes pre-service teachers are looked well upon by students in the schools they are assigned to. They see a new person who has no pre-conceived opinion about them and can sometimes feel comfortable to go to that teacher. If pre-service teachers are adequately educated and informed on the matter* [,] *they are better equipped to assist and offer students relevant advice and information.* (ID: 233)

That STI-related knowledge was pertinent for all individuals was also articulated by some of the respondents. Besides the knowledge dissemination function, STI-related information was also considered important both for the student as well as the self well-being. Some of the respondents in extending their support towards an informed STI-related knowledge perceived that only after doing the quantitative survey

in this study did they realise how little they knew about STIs. These perspectives are reflected in the following quotes:

> *Because it is a topic that all people in general should be equipped to teach even as an adult, a friend or a mentor.* (ID: 316)
>
> *Such a big deal with students* [,] *teachers CAN NOT be ignorant.* (ID: 32) (emphasis in original)
>
> *So they are prepared and they can make informed decisions about their own sexual choices and partners.* (ID: 131)
>
> *Before doing this survey I would have said no. Now I say most definitely yes. I did not realise how little I knew about STI's.* (ID: 259)

Contrary to the above perspectives, some of the respondents perceived that information pertaining to STIs was not that important for everyone to know and that it is not the highest priority for education. For these participants, information pertaining to STIs was only considered necessary for those teaching HPE and not all pre-service teachers. Some of the respondents even articulated that STI-related issues would be better taught by experts in the field and not teachers. It was also reflected that since pre-service teachers are subject to an intense workload with extracurricular activities, it is not viable for them to be taking on the role of sex educators. These perspectives are evident in the following quotes:

> *I don't think it's something we all necessarily need to know*. (ID: 66)
>
> *Depending on there* [their] *major and minor choices. A math teacher doesn't need to be taught about STIs but a PE teacher does*. (ID: 166)
>
> *It should be taught by medical staff who are qualified and have expansive knowledge in the area of STI's.* (ID: 200)
>
> *ARE OUTSIDERS - NOT BASED AT SCHOOL PERMANENTLY; NOT AT SCHOOL LONG ENOUGH*. (ID: 47) (emphasis in original)

They have to do so much already. As well as teaching all that the government ALREADY REQUIRES [,] *they must provide a safe environment for students, put up with parents who don't even give them food for school or make sure they can turn up on time. Teachers time is taken away so much that to complete the core curriculum becomes a challenge!* (ID: 189) (emphasis in original)

There was a consensus across the data amongst the majority of the sample that they were not sufficiently informed and knowledgeable regarding STI-related issues. Only those pre-service teachers who had Health as a discipline expert or had other sources of information than teacher preparation were considered as knowledgeable on STIs. The focus on sex education in the teacher education curriculum was considered insufficient and attributed to a lack of preparation in this field. First or second year pre-service teachers reported that topics on STIs were covered very briefly or not covered at all at that point of time in their teacher preparation degree. As outlined earlier, some of the respondents perceived that only after doing the quantitative survey in this study did they realise how little they knew about STIs. The following quotes capture these perspectives:

Only if you choose to have health as a major or minor. (ID: 104)

I've only gained information through means other than my pre-service teacher training. (ID: 230)

Most likely not, as teaching sexual education is probably something they dread and try to get through it as quickly as possible. (ID: 140)

I am only a first year student and so far its [it's] *only been covered briefly during a health and pe* [PE] *topic. If thats* [that's] *all the education i* [I] *get as a preservice teacher* [,] *then i* [I] *would worry that it is not enough education and i* [I] *would need to get further information.* (ID: 93)

Not at this stage, I'm currently in my second year of my teaching degree and so far we have not had any workshops or discussions about these diseases. (ID: 301)

Clearly not - Did you see my first Section? (ID: 62)

The respondents in the study perceived that the inclusion of sex education as a compulsory component of all teacher education programs is desirable if STIs in SA are to be reduced. The respondents articulated that if the teacher education curriculum highlighted the importance of these topics, then it would encourage pre-service and in-service teachers to do the same and hence enhance graduate knowledge and attitude attributes on STI-related issues. The suggested modes of STI-related education in teacher education programs proposed by the participants varied from integrating the subject into the curriculum, delivering it in the form of information sessions and workshops to making it a compulsory component of initial teacher education programs like mandatory notification. Some of the respondents perceived that a bifurcation of the subject Health and Physical Education is a better way to address teacher education and enhance pre-service teachers' STI-related knowledge and attitudes. The main reason cited in favour of this perspective was that the focus on Physical Education was far greater than the Health counterpart in the HPE courses. These perspectives are reflected in the following quotes:

If the university places value in these topics, then it will encourage pre-service and working teachers to do the same. (ID: 240)

GIVE US SEX EDUCATION as a curriculum topic at uni [University]. (ID: 92) (emphasis in original)

Perhaps workshops with accompanying document kits to prepare teachers for the big questions students may ask, as well as a resource list and creative approaches for creating meaning and relativity to future students on the topic. This could even be just a

one day conference that would inform a huge amount of pre-service teachers that will take this knowledge to their schools. (ID: 316)

Like mandated notification/responding to abuse and neglect is a compulsory training session. [,] *I think sex ed* [education] *and STI training should be too to be a registered teacher. Yes people will moan and complain about it, but when they have to either teach it or is confided in by a student they will have the skills and abilities to deal with it.* (ID: 96)

In reality, health should be a course taught to all primary/middle teachers separately from physical education. The focus is far too great on the PE side in HPE courses. Teachers who are not HPE majors, in a primary setting will likely have to teach these topics with little to no background knowledge. (ID: 252)

8.7 Summary

This chapter has presented the findings of the open-ended questions of the survey particularly in relation to the last three research questions of the study. The research questions sought to elicit the perspectives of pre-service teachers in SA towards STI-related issues, the role of an effective education in containing the spread of STIs, and the place of teacher education in addressing sexual health as central to curriculum.

Regarding STI-related issues, the findings revealed that there is an increase of STIs in South Australian adolescents because information and knowledge relating to sex education is not readily available nor is it comprehensive. Further, the participants stated that because adolescent lifestyle and behaviour is becoming increasingly experimental, more so than in traditional societies, STIs are on the increase in SA, and probably elsewhere in Australia.

Pertaining to the role of an effective education in containing STI spread, the findings revealed that increased access to knowledge is the greatest opportunity that can

be offered to South Australians in order to reduce an increase of STIs. However, the evidence demonstrated that this is not taking place at present due to a number of factors in contemporary society in SA. Moreover, the HPE curriculum was considered as an appropriate resource to address STI education for adolescent school students in SA. However, the respondents stated that in its present form the HPE curriculum fails to deliver an appropriate sex education programme.

Finally, with respect to the issues regarding the place of teacher education in addressing sexual health as central to curriculum, the findings revealed that the inclusion of sex education as a compulsory component of all teacher education programs is desirable if STIs in SA are to be reduced.

While the propositions presented here are not generalisable beyond the context of the study, they do offer new insights into the field of study and will be useful for consideration and debate at the level of policy and practice in education and teacher education. To sum up: It is the perspectives of the participants that teacher education, by including a core component of study on sex education as a compulsory module in all preservice programs, and through the provision of opportunities to enhance the knowledge and capacities of teacher graduates, it is likely that teachers may play a greater role in reducing the prevalence of STIs in SA. Further, participants generally purported that a concurrent review of the design and delivery of the senior curriculum in schooling in SA to include a compulsory sex education module was necessary.

The next chapter discusses both the quantitative and qualitative findings in relation to the literature, wherever possible, and it will be shown how these findings make a significant contribution to this field of study.

> "Schools play the primary role in the dissemination of health-related knowledge and attitudes and the role of education in combating the spread of these menaces is uncontroversial." (Talukdar & Aspland, 2012, p. 25)

Chapter 9:

Discussion

9.1 Introduction

This chapter portrays the confluence of both the quantitative and qualitative findings of the study and the relevant literature. The structure of this chapter, therefore, is shaped around the research questions as reporting the findings and thereafter comparing and/or contrasting with the literature, where applicable. The purpose of this chapter is also to distil how this study makes a significant contribution to knowledge in this field.

The review of related literature in Chapter 3 revealed that only one of the previous studies in the field explored the knowledge and attitude perspectives for a wide range of STIs. Further, the focus of such existing research was on teachers and not pre-service teachers. The remaining studies reviewed were studies conducted with university students, young adults and adults and focused on the knowledge and/or attitude attributes of individual diseases. In these studies too, pre-service teachers were not included. Chapter 3 reported also on research related to HIV/AIDS, and, was able to highlight studies conducted with pre-service teachers. These studies, however, explored the knowledge and/or attitude attributes of only a single disease as compared to the multiple diseases that the present study investigated. Hence, it would be erroneous to compare and/or contrast the quantitative findings of this study with studies that investigated the knowledge and/or attitude attributes of a related cohort, however, for a single disease only. This explains the lack of citation to previous studies while discussing the quantitative findings.

Contrary to the above, some of the qualitative findings evoke perspectives that go beyond the realms of the cohort in the present study. Of particular mention are the questions pertaining to the perspectives of pre-service teachers regarding the probable reasons for high STIs and other BBVs in SA, the vulnerability of adolescents and young adults to contracting STIs and other BBVs, and the role of education in general towards combating STI spread. Accordingly, some of the qualitative findings are assessed against the backdrop of a wider and recent research base and where applicable, against Australian and/or South Australian literature.

The key findings of this study, therefore, are outlined in this chapter in terms of the research questions, and where possible, link to the literature are made overt with a view to highlighting the significance of the findings of this research study.

9.2 Knowledge of pre-service teachers in SA towards STIs and other BBVs

One important quantitative finding of this study pertaining to the knowledge attribute of the participants revealed that the mean knowledge score of pre-service teachers in SA (N = 320) towards STIs and other BBVs was 18.57 with a standard deviation of 7.678. The minimum knowledge score was zero with a maximum of 37 (out of a possible 45) and thus a range of 37.

Previous research investigating knowledge towards STIs or HIV/AIDS grouped the resultant individual knowledge scores as good or poor based on the mean of the total possible score, which in turn depended on the number of questions as addressing the knowledge dimension. For example, Shiferaw et al. (2011) in their study of HIV/AIDS and STI knowledge of preparatory high school students in Gondar town, North West Ethiopia, had a self-administered questionnaire containing 31 items pertaining to the knowledge dimension. Accordingly, the researchers grouped scores of 0 to 15 as poor knowledge and scores of more than 15 as good knowledge. Likewise,

Kaur, Talwar, Sabharwal, and Raut (2011), Maimati, Shamsuddin, Abdurahim, Tohti, and Memet (2010), and Tengia-Kessy and Kamugisha (2006) categorised the knowledge grouping in their research as poor or good depending on the mean of the total possible score.

In line with the above argument, the categorisation of the overall (and not individual) knowledge dimension of the present study was based on the mean of the total possible score. Hence, a mean knowledge score less than 22.5 (45/2) was considered to reflect an overall poor knowledge, whereas that above the value constituted overall good knowledge. Therefore, the mean knowledge score of 18.57 of pre-service teachers in SA (N = 320) towards STIs and other BBVs was categorised as falling under the poor category which reflected that the South Australian pre-service teachers who participated in the study had a poor level of knowledge regarding STIs and other BBVs.

The findings of this study pertaining to the knowledge attribute of the respondents in the present study, therefore, to some extent is contradictory to the study of Westwood and Mullan (2007) who in their knowledge and attitude research of secondary school teachers in central England towards sexual health and sexual health education found an overall good STI-related knowledge. Nevertheless, their study reported that many teachers failed to identify well-known STIs such as hepatitis B, genital warts, non-specific vaginitis, non-specific urethritis and chlamydia. In addition, 63 per cent of the teachers felt that they did not have adequate information about STIs and 43 per cent lacked information on contraception. Further, seventy per cent of the teachers expressed that they were not up to date with the recent information regarding the diseases (Westwood & Mullan, 2007).

A part of the qualitative findings of this study pertaining to South Australian pre-service teachers' perspectives towards teacher education as addressing sexual health support the quantitative findings reflecting poor knowledge. In response to the open-ended question eliciting the perspectives of the respondents as to whether pre-service teachers in SA are knowledgeable regarding STIs, the great majority of the respondents perceived that pre-service teachers in SA are poorly informed about STIs. Some of the respondents articulated that most of the information for pre-service teachers in SA pertaining to STIs was obtained through sources other than formal teacher preparation. Pre-service teacher training on STI-related issues, therefore, was considered as insufficient and inconsistent and it was reflected that it needs to be addressed by teacher educators on a consistent basis. Some respondents attributed their lack of information regarding STIs to the pre-service teaching degree pursued thus far when the present study was undertaken. This was true of respondents in their first or second year of the teacher preparation degree who stated that topics on STIs were covered very briefly or not covered at all. Yet others, in justifying the argument that they were not informed of STIs, reflected that only after doing the quantitative survey in this study did they realise how little they knew about STIs.

Pre-service teachers in this study also identified teacher education in SA as a possible avenue for enhancing pre-service teachers' STI-related knowledge and attitudes. In response to the open-ended question eliciting the perspectives of the respondents as addressing teacher education in SA towards enhancing pre-service teachers' STI-related knowledge and attitudes, the majority of the respondents agreed that a subject pertaining to sexual health issues should be integrated into the pre-service teacher preparation curriculum. Some of the respondents stressed that if the teacher education curriculum highlighted the importance of these topics, then it would

encourage pre-service and in-service teachers to do the same and hence enhance the knowledge and attitude attributes on STI-related issues. Participants also purported that information sessions can also be useful in delivering information on STI-related issues. The suggested modes of such information sessions proposed by the participants varied widely from workshops, tutorials, and seminars to refresher courses, webinars, and lectures. Some participants argued that a compulsory training component for pre-service teachers was a means to increase knowledge regarding STIs and sexual health issues. Further, some of the respondents perceived that a bifurcation of the subject Health and Physical Education is a better way to address teacher education towards enhancing pre-service teachers' STI-related knowledge and attitudes. The reason cited in favour of the latter assertion was the perspective that the focus on Physical Education was far greater than the Health counterpart in the HPE courses.

Therefore, it can be argued that South Australian pre-service teachers' poor knowledge of STIs and other BBVs portrays wider implications for the student community. Smith et al. (2009) asserted that Australian secondary students rely on school programs as one of their most useful sources of information regarding sexual health and relationships. Further, according to Klein and Breck (2010), students in a classroom observe the knowledge, attitudes and behaviours of their teachers specifically on topics of sex education. Tambyah (2008) also asserted that knowledge is an important aspect of teaching and student engagement. However, three nationally representative empirical studies in Australia (two with young people and one with youth and adults) revealed poor STI-related knowledge (Grulich et al., 2003b; Smith et al., 2009; SRP, 2009). This, therefore, is an indication that effective knowledge dissemination (from pre-service teachers entering the profession to students) regarding

STIs and other BBVs is not taking place owing largely to the lack of knowledge of pre-service teachers themselves on these issues.

9.3 Attitudes of pre-service teachers in SA towards STIs and other BBVs

A key quantitative finding of this study pertaining to the attitude attribute of the participants revealed that the mean attitude score of pre-service teachers in SA (N = 320) towards STIs and other BBVs was 44.45 with a standard deviation of 3.651. The minimum attitude score was 29 with a maximum of 51 (out of a possible 51) and thus a range of 22.

Similar to the argument stated earlier and based on the works of Shiferaw et al. (2011), Jahanfar, Sann Lye, and Rampal (2010) and Maimati et al. (2010), the categorisation of the overall (and not individual) attitude dimension of the present study was based on the mean of the total possible score. However, contrary to the attitude categorisation terminologies of these researchers as positive and negative (Maimati et al., 2010; Shiferaw et al., 2011) and good and bad (Jahanfar et al., 2010), the present study views it as favourable and unfavourable. Hence, a mean attitude score less than 25.5 (51/2) was considered to reflect an overall unfavourable attitude, whereas that above the value constituted an overall favourable attitude. Therefore, the mean attitude score of 44.45 of pre-service teachers in SA (N = 320) towards STIs and other BBVs was categorised as falling under the favourable category which reflected that the South Australian pre-service teachers who participated in the study had a favourable attitude regarding STI-related issues.

The findings of this study pertaining to the attitude attribute of the respondents in the present study, therefore, is contradictory to the study of Westwood and Mullan (2007) who in their knowledge and attitude research of secondary school teachers in central England found an overall unfavourable attitude regarding STI-related issues.

The majority of the respondents in the 2007 study preferred to be neutral towards the provision of sex education in school and argued that external providers can present it better. Further, a third of the respondents did not like teaching the subject. Eighty-three per cent, however, felt that the subject would be better dealt with by a combination of teachers, healthcare professionals and other outside agencies (Westwood & Mullan, 2007).

A part of the qualitative findings of this study pertaining to South Australian pre-service teachers' perspectives on two different issues support the quantitative findings reflecting a favourable attitude. In response to the open-ended question eliciting the perspectives of the respondents as to whether sex education should be compulsory in SA, the great majority of the respondents were in favour of compulsory sex education in SA. Some of the respondents articulated that sex education should be compulsory in SA because it constitutes a very important aspect of education. Some others reflected that year 12 should not be a part of a compulsory sex education, and yet others supported the introduction of a compulsory sex education in SA all through the school years, without any restriction, whatsoever.

Moreover, in response to a different open-ended question eliciting the perspectives of the respondents as to whether pre-service teachers in SA should be knowledgeable on STI-related issues, the great majority of the respondents were in favour of this proposition. Some of the respondents articulated that pre-service teachers in SA should be informed of STIs in order to effectively teach the subject. Yet others were of the view that STI-related information is important for all teachers towards the dissemination of an accurate knowledge irrespective of the subject that the teacher teaches. Likewise, a section of the respondents stressed that information pertaining to STIs is important to all, not only in terms of a general knowledge attainment but also

towards effective knowledge dissemination. A favourable attitude was also reflected in some of the respondents justifying the support towards an informed knowledge regarding STIs on the premise that teachers are often considered as role models by their students. Hence, an accurate and informed knowledge on STIs was considered as essential core knowledge for graduate teachers.

Pre-service teachers in this study also identified teacher education in SA as the key to enhancing pre-service teachers' STI-related knowledge and attitudes. The majority of the respondents purported that a subject pertaining to sexual health issues should be integrated into the pre-service teacher preparation curriculum. Other measures included placing more importance on the topic through teacher education, delivering resources on sexual health via information sessions or a compulsory training component, or a bifurcation of the subject Health and Physical Education.

Alnasir (2004) asserted that the health attitudes of school teachers reflect on their students' health practices and behaviour. Tijuana et al. (2004) found that in addition to knowledge, teacher's attitudes, beliefs and values also affect their teaching. According to Masvidal et al. (1995), attitudes and knowledge, in particular those which are related to health could be disseminated from people who bear them to those who lack it, in this case, from teachers to students. However, Grulich et al. (2003b), Smith et al. (2009), and the SRP (2009) in three different nationally representative studies in Australia (two conducted with young people and one with youth and adults) revealed an overall unfavourable attitude towards STI-related issues. This, therefore, is an indication that the favourable attitudes of South Australian pre-service teachers themselves towards STI-related issues is not necessarily transcribing across the wider student community (upon the former entering the profession). It can also be argued that

a standalone favourable attitude of teachers towards STI-related issues is perhaps not sufficient when addressing the health-related attitudes and behaviours of students.

9.4 Relationship between the knowledge and attitude attributes of pre-service teachers in SA regarding STIs and other BBVs

An important quantitative finding of this study pertaining to the relationship of the knowledge and attitude attributes revealed that there was a low to moderate positive relationship between the knowledge and attitude attributes of the sample of pre-service teachers in SA regarding STIs and other BBVs ($r_s = .196$, $p < 0.01$). This suggests that with an increase in the knowledge attribute, there could be a concomitant increase of the attitude component as well.

This finding cannot be compared to previous research on knowledge and/or attitude studies as these dealt with individual STIs rather than the range of diseases that the current study investigated. Moreover, Westwood and Mullan's (2007) research did not explore this particular issue. Nevertheless, the finding is congruent with the assertion by Alnasir (2004) that health knowledge significantly develops the health attitudes of school teachers. Therefore, this finding establishes that with an increase in health-related knowledge, there could be a concomitant increase in the attitude counterpart.

9.5 The knowledge of pre-service teachers in SA regarding STIs and other BBVs across the demographic attributes

To establish whether there exists any significant difference of the knowledge attribute of the sample of pre-service teachers in SA regarding STIs and other BBVs across the demographic characteristics, two different non-parametric tests were employed. The first one, the Mann-Whitney U-test, was used for comparisons where two factors were present namely gender and those undertaking the HPE curriculum and those who were not. The second one, the Kruskal-Wallis one-way ANOVA, compared situations when

there were more than two factors present namely age, highest educational level and subject stream.

The Mann-Whitney U-test revealed that there was no significant difference in the knowledge attribute of the sample of pre-service teachers in SA regarding STIs and other BBVs across gender ($U = 8212.500$, $n_1 = 75$, $n_2 = 237$, $p > 0.05$). The Mann-Whitney U-test was also employed in ascertaining the knowledge differences between those pre-service teachers undertaking the HPE curriculum and those who were not. The results revealed no significant differences in the knowledge attribute of the sample of pre-service teachers in SA across those undertaking the HPE curriculum and those not ($U = 8418.500$, $n_1 = 230$, $n_2 = 74$, $p > 0.05$). Regarding the STI and BBV-related knowledge of the sample of pre-service teachers in SA across age, the Kruskal-Wallis one-way ANOVA revealed that there was no significant difference in the knowledge attribute for the age ranges of pre-service teachers who are aged less than and equal to 20 years, 21-30 years, 31-40 years, and greater than 40 years ($\chi^2 = .388$, $n_1 = 88$, $n_2 = 161$, $n_3 = 33$, $n_4 = 30$, $p > 0.05$). The Kruskal-Wallis one-way ANOVA was also employed in ascertaining the knowledge differences of the sample of pre-service teachers in SA regarding STIs and other BBVs across the highest educational level at the time of responding to the survey. The results revealed no significant differences in the knowledge attribute of the sample of pre-service teachers in SA across senior secondary, undergraduate, and postgraduate qualifications as the highest educational level ($\chi^2 = .917$, $n_1 = 189$, $n_2 = 93$, $n_3 = 30$, $p > 0.05$). Finally, the knowledge differences of the sample of pre-service teachers in SA regarding STIs and other BBVs across the subject stream as pertaining to the highest educational level was also analysed using the Kruskal-Wallis one-way ANOVA. The results revealed no significant differences in the knowledge attribute of the sample of pre-service teachers

in SA across the subject streams outlined namely arts, science, commerce, professional (Law, Engineering, Medicine), and other (for those who failed to identify themselves under the aforementioned) ($\chi^2 = 4.571$, $n_1 = 160$, $n_2 = 49$, $n_3 = 6$, $n_4 = 12$, $n_5 = 83$, $p > 0.05$).

The findings of this study revealed no significant differences of the knowledge attribute of the sample of pre-service teachers in SA regarding STIs and other BBVs across the demographic characteristics namely gender and age. These findings, therefore, match closely with Westwood and Mullan's (2007) research. Westwood and Mullan (2007) also did not find any statistical significant difference of STI-related knowledge of secondary school teachers in central England across gender and age.

Moreover, the findings of this study in revealing no significant differences of the knowledge attribute across the demographic characteristics gain importance in the light of Smith et al.'s (2011) and Mitchell et al.'s (2011) survey results. Smith et al.'s (2011) national survey of Australian secondary teachers of sex education revealed that teachers of sex education are predominantly females and comprise of the younger age groups from 20 to 39 years of age. Further, Smith et al. (2011) and Mitchell et al. (2011) in their survey results of sex education in Australia found that teachers of sex education are drawn predominantly from the disciplines of physical education, home economics and science or from other disciplines such as sociology and English. Of significance, the findings of this study imply that variability in STI-related sex education in SA does not differ widely in terms of being a male or a female teacher, being a HPE teacher and not, the age of teachers, and in terms of the subject areas undertaken by teachers.

9.6 The attitude of pre-service teachers in SA regarding STIs and other BBVs across the demographic attributes

To establish whether there exists any significant difference of the attitude attribute of pre-service teachers in SA regarding STIs and other BBVs across the demographic characteristics, the same set of non-parametric tests were employed as outlined above. While the Mann-Whitney U-test was used for comparisons where two factors were present namely gender and those undertaking the HPE curriculum and those who were not, the Kruskal-Wallis one-way ANOVA compared situations when there were more than two factors present namely age, highest educational level and subject stream.

The Mann-Whitney U-test revealed that there was no significant difference in the attitude attribute of the sample of pre-service teachers in SA regarding STIs and other BBVs across gender ($U = 8598.000$, $n_1 = 76$, $n_2 = 234$, $p > 0.05$). The Mann-Whitney U-test was also employed in ascertaining the attitude differences between those undertaking the HPE curriculum and those not. The results revealed no significant differences in the attitude attribute of the sample of pre-service teachers in SA across those undertaking the HPE curriculum and those not ($U = 8221.500$, $n_1 = 229$, $n_2 = 73$, $p > 0.05$). Regarding the STI and BBV-related attitudes of the sample of pre-service teachers in SA across age, the Kruskal-Wallis one-way ANOVA revealed that there was a significant difference in the attitude attribute across the age ranges of pre-service teachers who are aged less than and equal to 20 years, 21-30 years, 31-40 years, and greater than 40 years ($\chi^2 = 12.577$, $n_1 = 89$, $n_2 = 160$, $n_3 = 32$, $n_4 = 29$, $p < 0.05$). The mean rank for 31-40 years was 199.17, for 21-30 years 159.07, for ≤ 20 years 142.19, and 128.48 for > 40 years. The Kruskal-Wallis one-way ANOVA was also employed in ascertaining the attitude differences of the sample of pre-service teachers in SA regarding STIs and other BBVs across the highest educational level at the time of responding to the survey. The results revealed no significant differences in the attitude

attribute of the sample of pre-service teachers in SA across senior secondary, undergraduate, and postgraduate qualifications as the highest educational level (χ^2 = 1.113, n_1 = 190, n_2 = 90, n_3 = 30, $p > 0.05$). Finally, the attitude differences of the sample of pre-service teachers in SA regarding STIs and other BBVs across the subject stream as pertaining to the highest educational level was also analysed using the Kruskal-Wallis one-way ANOVA. The results revealed no significant differences in the attitude attribute of the sample of pre-service teachers in SA across the subject streams outlined namely arts, science, commerce, professional (Law, Engineering, Medicine), and other (for those who failed to identify themselves under the aforementioned) (χ^2 = 3.851, n_1 = 159, n_2 = 48, n_3 = 6, n_4 = 12, n_5 = 83, $p > 0.05$).

The findings of this study revealed no significant differences of the attitude attribute of the sample of pre-service teachers in SA regarding STIs and other BBVs across gender. This finding, therefore, is consistent with Westwood and Mullan's (2007) findings. Their study also did not find any statistical significant difference of STI-related attitudes of secondary school teachers in central England across gender. However, the present study's finding pertaining to a significant difference of the attitude attribute of the sample of pre-service teachers in SA regarding STIs and other BBVs across age is contradictory to the study of Westwood and Mullan (2007) who did not find any statistical significant difference of STI-related attitudes across age.

As outlined earlier, the findings of this study in revealing no significant differences of the attitude attribute across the demographic characteristics (except for age) gain importance in the light of Smith et al.'s (2011) and Mitchell et al.'s (2011) survey results. Of significance, the findings of this study imply that the STI-related attitudes of pre-service teachers in SA and hence the education thereof does not differ widely in terms of being a male or a female teacher, being a HPE teacher and not, and

in terms of the subject areas undertaken by teachers. However, the findings of this study pertaining to a significant difference in the attitude attribute of pre-service teachers in SA across age, implies that the STI-related attitudes of pre-service teachers in SA and hence the education thereof differs in terms of the age of teachers. This has important implications for teacher educators who currently teach student cohorts that reflect age variability.

9.7 The major sources of information for pre-service teachers in SA regarding STIs and other BBVs

From among a range of possible sources of information pertaining to STIs and other BBVs, the respondents were instructed to note the most important three which they felt were crucial towards enhancing their STI-related knowledge and attitude attributes. The range of possible sources of information listed were family members, peers, school, workplace, mass media campaigns, religion, State, training and workshops, and relevant organizations.

Descriptive statistics in terms of frequency and percentage revealed that the school (70.3 per cent), peers (52.8 per cent), and mass media campaigns (49.1 per cent) were the major sources of information for the sample of pre-service teachers in SA regarding STIs and other BBVs. This finding cannot be compared to previous research in the field as the earlier studies dealt with individual STIs rather than the range of diseases considered in this study. Nevertheless, the resultant major sources of information are important agents of socialization that shape the life of an individual as outlined forthwith.

Pandit (2009) asserted that the school helps mould the ideas and attitudes of an individual as well as helps in framing the socializing phenomenon of young people, specifically regarding particular skills and values in society. Schools are also envisaged to play an important role in the development of identities apart from being agents of

socialization (Holmes et al., 2007). Edgar et al. (1993) noted that with a compulsory education in the Australian perspective, "the socialization responsibilities of educators are enormous" (p. 329).

Peer groups evolve as important socializing agents with decreasing "parent power" manifested particularly during emerging adolescence (Harper, 1997, p. 43). The peer group helps an individual acquire "cooperative morality" in addition to some informal aspects of culture - fads, fashions, crazes and modes of gratification to name some. Most importantly, "forbidden knowledge", like knowledge of sex and sexual relationships are shared within the peer groups (Pandit, 2009, p. 43).

The mass media also plays an important role in socialization, more so in recent times (Pandit, 2009). Holmes et al. (2007) asserted that Australians exhibit high degrees of literacy towards newspapers and magazines. The authors also noted that Australia has the fifth-highest density in the world on a composite index across telephone, television and personal computers. Harper (1997) posited that the role of the media is undoubted in influencing people's attitudes and values. He added that the uniqueness of it as a socializing agent lie in that the message is communicated from the medium to the receiver primarily on a one way basis.

Therefore, that the school, peers, and mass media campaigns are identified as the major sources of information for the sample of pre-service teachers in SA regarding STIs and other BBVs is not surprising. However, the extent to which the STI-related information as imbibed from these sources is appropriate and/or sufficient towards enhancing the knowledge and attitude attributes is doubtful.

Through the open-ended questions the respondents clearly indicate a consensus on three key issues, namely: that the HPE curriculum is unsatisfactory in dealing with STI-related issues in schools; that peers often are reservoirs of incorrect information;

and that the mass media often contain sexual explicit content than contributes to the necessity of effective STI campaigns. The qualitative findings of this study pertaining to South Australian pre-service teachers' perspectives on different issues are evidence of these assertions.

In response to the open-ended questions eliciting the perspectives of the respondents regarding the likelihood of the HPE curriculum in general in providing an effective education to contain STIs and the adequacy of the HPE curriculum as addressing STI-related issues, a section of the respondents perceived the HPE curriculum to be inappropriate, due mainly to a school-specific implementation practices. Participants were of the opinion that the curriculum is delivered differently across schools which resulted in a lack of standardised teaching and hence lowering the curriculum's potential to address STI-related issues. Further, in response to a different open-ended question regarding the factors responsible for the lack of a comprehensive sex education curriculum in SA, a section of the respondents identified schools as the problem. It was suggested that the general views and opinions of schools on the subject or alternatively, the schools' lack of responsibility in teaching the subject resulted in a haphazard approach to sex education in SA. Others noted that the lack of consistency in offering the subject also resulted in the non-comprehensive nature of sex education in SA. It was deemed as significant that sex education was considered taboo in some contexts, which exacerbated the variability in the impact of the sex education curriculum.

Similarly, with respect to the perspectives of the respondents regarding high STI rates in SA among adolescents and young adults, a section of the respondents identified the influence of peer pressure and peer-based information about sexual health matters, which is often incorrect and thus rendered individuals susceptible to STIs.

The fact that the mass media often contain sexually explicit content leading to experimentation was also purported to contribute to high STI rates. In response to the open-ended question eliciting the perspectives of the respondents regarding the reasons for a high STI rate in SA, the mass media was identified as a factor leading to the vulnerability of adolescents and young adults to contracting STIs. The respondents also perceived that the mass media was rarely instrumental in initiating STI campaigns. This together with a lack of a comprehensive sex education curriculum was identified as two key factors underpinning the increase of STIs in SA.

9.8 Perspectives of pre-service teachers in SA towards STI-related issues

The findings of this study revealed that there was a consensus amongst participants that there is an increase of STIs in South Australian adolescents because information and knowledge relating to sex education is not readily available nor is it comprehensive. Further, the observation that adolescent lifestyle and behaviour is becoming increasingly experimental and characterized as "sexually risky", more so than in traditional societies, was deemed significant. The findings of this study are similar to research emanating from the United States of America which is also reported to have high STI rates. The findings of this study, therefore, are useful for consideration and debate at the level of policy and practice in South Australia if effective measures to curb STIs are to be achieved.

Alford and Hauser's (2011) research explored the reasons for high STIs in the United States of America in comparison to the similar systems in European countries namely, France, Germany, and the Netherlands. Their findings were similar to the perspectives elicited by the respondents in the present study. Education related to STIs was found to be more comprehensive and consistent in the European countries outlined

than in the United States of America with the media playing an active role in STI related campaigns unlike in the latter. In France, Germany, and the Netherlands, the society was reported to be more supportive of adolescents and sexual experimentation. Sexual relationships in adolescents were perceived to be normal, sexual behaviour was valued in terms of respectful relationships, and the government was strategically supportive of preventing STIs. Moreover, in the European data, families were recognized as upholding more open communications and were more supportive of sexual health information and services than in the United States of America. Alford and Hauser's (2011) research also revealed that the spread of STIs is contingent on unsafe sexual practices and failure to adopt protective measures with the access and cost of contraceptive devices in the European countries being better and cheaper, when compared to that in the United States of America which had high STI rates. Similar results were reported in Darroch et al.'s (2001) research which explored the reasons for high STIs in the United States of America against the prevalent systems in other developed countries namely, Sweden, France, Canada, and Great Britain. Education related to STIs was found to be more comprehensive and consistent in the countries outlined than in the United States of America with Sweden, France, Canada, and Great Britain providing more governmental and societal support to deal with STI-related issues. The media content in terms of sexually explicit images and references to casual sexual encounters was found to be the same across Sweden, France, Canada, Great Britain, and the United States of America. However, Darroch et al. (2001) noted that the media was less influential in the alternative developed countries than in the United States of America owing to the parental and societal attitudes and the comprehensive nature of sex education. Similar to the findings of the present study, adolescent vulnerability to contracting STIs was found to be contingent on unsafe sexual practices

and failure to adopt protective measures largely driven by adolescent naivety and perceived invincibility. The access and cost of contraceptive devices in the alternative developed countries was found to be better and cheaper, when compared to that in the United States of America (Darroch et al., 2001).

Wildsmith, Schelar, Peterson, and Manlove (2010) also explored the possible reasons for high STIs in the United States of America based on the National Longitudinal Study of Adolescent Health (Add Health) data of 14,322 young adults. The findings revealed that a knowledge deficit is contributory to high STI rates with STI vulnerability contingent on a lack of general knowledge and awareness. Unsafe sexual practices and failure to adopt protective measures added to an invulnerable attitude borne by individuals that they cannot suffer from STIs also resulted in the spread of the diseases. STI vulnerability was also attributed to individuals having multiple partners and sexual experimentation at a young age (Wildsmith et al., 2010). The Henry J. Kaiser Family Foundation (2003) in their research exploring the reasons for high STIs in the United States of America among adolescents and young adults found that a lack of general knowledge and awareness and risky sexual behaviour exhibited by individuals resulted in the spread of these diseases. A lack of experience and gullibility on the part of adolescents and young adults was outlined as a factor enhancing their STI vulnerability. Alcohol and drug use were also cited as factors promoting unsafe sex and hence STI vulnerability. The peer group was reported to be influential in the lives of adolescents and young adults pertaining to sex and relationships (Henry J. Kaiser Family Foundation, 2003). The WHO (2005) in a cross-cultural study in eight countries namely, Belarus, India, Kenya, Mexico, Romania, South Africa, The Russian Federation, and Zambia also established the link of alcohol use and sexual risk behaviour. The findings in this study concur.

Other research findings similar to the perspectives elicited by the respondents in the present study are reported by the Government of Alberta (2011), Kirby (2011), the Stancombe Research & Planning P/L (2008) in Australia, and the National Institute for Health and Clinical Excellence [NICE] (2007) of the United Kingdom. Each of these studies revealed that it is the lack of general knowledge and awareness, the lack of comprehensive sex education, and risky sexual behaviour exhibited by individuals that renders adolescents and young adults susceptible to STIs. In addition, the SRP (2008) found that issues related to contraception access and cost also resulted in individuals failing to adopt safe sex measures and hence susceptible to contracting the diseases. The findings in the report further revealed that condoms were primarily used as a pregnancy prevention mechanism with the majority of the samples considering the condom as "a passion killer", "not real", "not as good", "like taking a shower in a raincoat" (SRP, 2008, p. 5). Likewise, the systematic review of published literature conducted by Samkange-Zeeb, Spallek, and Zeeb (2011) highlighted the awareness and knowledge of STDs among school-going adolescents in Europe. The results revealed that of the 15 studies reviewed, the majority indicated condoms primarily considered as an interim method of contraception than STI prevention. Again, the findings of this study reflect similar sentiments.

This discussion reveals that research highlighting reasons for high STI rates among young people were mainly completed in the United States of America and Europe. Therefore, from an Australian perspective, the findings of this study make a significant contribution to the field. Though the findings are not generalisable beyond the context of the study, they do offer new insights into the field of study and are useful for consideration and debate at the level of policy and practice in education in Australia for the first time. Moreover, the findings shed light on the many areas that adolescents

and young adults find problematic particularly in relation to sexual health. It is important that concerted action is taken to raise awareness and knowledge on STI-related issues for both individuals and the community if STIs are to be reduced in SA. For the first time in Australia, this study provides empirical evidence to support this claim.

9.9 Perspectives of pre-service teachers in SA towards the role of an effective education in containing the spread of STIs

The findings of this study revealed that an increase in access to knowledge is the greatest opportunity that can be offered to South Australians in order to reduce the increase of STIs in SA. According to the perspectives of the respondents, the HPE curriculum is an appropriate resource to address STI education for adolescent school students in SA. However, in its present form, the HPE curriculum fails to deliver appropriate sex education. Similar to the earlier findings, these are useful for consideration and debate at the level of policy and practice in South Australia if general awareness and knowledge regarding STI-related issues are to be achieved through the school curriculum.

The sample of South Australian pre-service teachers perceived education playing the largest and the most significant role in limiting the spread of STIs. The evidence shows that sex education should be compulsory in years 11 and 12 for raising greater awareness and knowledge among students regarding sexual health. These perspectives are similar to research conducted by the Advocates for Youth in the United States of America and SHine SA in Australia. Both organisations reported that education has a major role in fostering awareness as well as inculcating safer sex perspectives. An effective education not only raises awareness related to the aspects of the diseases in terms of its spread, risks, prevention, consequences, treatment, and help

and support options but also bears the potential to change risky sexual behaviour of individuals (Advocates for Youth, 2008; SHine SA, 2012). Likewise, the SHine SA (2010, 2012) newsletters outlined that sexual health education programs can foster relationships and communication.

The respondents in the present study articulated several perceived factors responsible for the lack of a comprehensive sex education in SA. These primarily ranged from a lack of adequate teacher training on the subject coupled with the stigma and embarrassment associated with STIs found in the attitudes borne by the government, parents, and schools regarding STI-related issues. These findings are largely similar to research conducted in Australia and reported by Smith et al. (2011), SHine SA (2000, 2004), Johnson (2006), and Talukdar et al. (2013).

Smith et al. (2011) reported the results of the first national survey of approximately 300 Australian secondary teachers of sex education conducted in 2010. The findings of the survey revealed that16 per cent of the respondents had no training in sex education at all and the training that existed was largely in-service than pre-service (54 per cent). Regarding the reasons for not teaching sex education, only 16 teachers (out of a responding 197) reported that they felt uncomfortable with teaching certain topics. Nevertheless, the majority of the teachers (51 per cent) were of the opinion that though sex education is crucial for understanding sexuality and sexual health, it is less effective in terms of teaching young people values and attitudes and in particular, developing and strengthening skills and promoting and sustaining risk-reducing behaviour (Smith et al., 2011). The respondents in Smith et al.'s (2011) study further revealed that the government's lack of support in the area of sexual health education (much in contrast to drug education and mental health) often manifests as a barrier to teaching the subject. Other barriers to an effective sex education were time constraints,

exclusion from the curriculum, and the importance placed on the subject. In the Smith et al. research, the media was reported to have little or no influence on the content of sex education. Parents were shown to have the least influence on sex education matters and largely supportive towards the implementation of relationships and sexual health education all through the school years (Smith et al., 2011). That parents are largely supportive towards a comprehensive sex education in South Australia is also reflected in a study by the SHine SA (2000). However, another SHine SA (2004) study revealed that the taboo nature of the subject and lack of education of parents often manifested as a barrier to a compulsory sex education.

Similar to the findings of Smith et al. (2011) and the study reported here, Johnson's (2006) study revealed that barriers to the implementation of a comprehensive sex education were community influence and pressure, time constraints, exclusion from the curriculum, and the importance placed on the subject in schools. Moreover, a stigma associated with the subject often rendered it difficult for students to discuss sexual relationships and teachers without a health background were reluctant to teach the subject. Talukdar et al. (2013) in their review of the past and the present of sex education in SA also outlined that the government exercises a powerful role in scrutinising the contents and delivery of the subject. The authors portrayed the dominating influence of religious factions towards the implementation of a comprehensive sex education in the State. In citing Gibson's (2009) work, they also noted that the religious schools often pursue sex education as consistent with their religious teachings. The findings in this study concur.

In addition to highlighting the factors responsible for the lack of a comprehensive sex education in SA, the respondents in the present study also highlighted the significance of the HPE curriculum in providing effective sex education.

According to the perspectives of the respondents, the HPE curriculum is an appropriate resource to address STI education for adolescent school students in SA. Of greater significance, this study has demonstrated that the HPE curriculum in its present form fails to deliver appropriate sex education. The reasons for not considering the HPE curriculum appropriate ranged from its limited scope and lack of detail regarding STI-related issues to the low priority of health education in comparison to physical education. A key finding of this study was the consensus that the subject was not taken seriously both by teachers and students alike and often delivered in a non-engaging manner. Of significance here was the perspective of the respondents that teachers often felt awkward teaching the subject arising out of an embarrassment discussing sexual health matters with their students. It is evident in this study that the HPE curriculum is ineffective in the provision of a program designed to prevent STIs and this is consistent with the claims of Talukdar and Aspland (2012). The authors established that "the curriculum lacks and fails to comprehensively deal with the allied topic of STDs and its concomitant prevention" (p. 30), both under the SACSA and the new SACE curriculum. The authors further asserted that the elective nature of the new SACE does not guarantee sufficient learning as far as STIs and sexual health are concerned, even for those who opt for the subject HPE (Talukdar & Aspland, 2012).

This discussion shows that although South Australian pre-service teachers that participated in this study portrayed education as an effective tool to foster knowledge and awareness on STI-related issues, a number of factors in contemporary society in SA emerged as barriers to an appropriate sex education. Moreover, the HPE curriculum in its current form was perceived by the participants as failing to deliver appropriate sex education. It is important that these findings are taken into consideration when developing future curricular resources addressing sexual health. These findings are

significant in the wake of the National HPE curriculum that is currently being rolled out across the nation. In light of the findings of this research, the national HPE curriculum should be reviewed in relation to the provision of appropriate sex education. The government should also initiate campaigns highlighting the importance of sex education and involve parents, teachers, and students in the process. These would result in more open discussions helping to reducing the embarrassment associated with STIs.

9.10 Perspectives of pre-service teachers in SA towards the place of teacher education in addressing sexual health

The findings of this study revealed that the inclusion of sex education as a compulsory component of all teacher education programs was perceived as desirable if STIs in SA are to be reduced. The great majority of South Australian pre-service teachers that participated in this study confirmed the importance of STI-related information for pre-service teachers. Of significance, the great majority of participants perceived that they were not sufficiently informed and knowledgeable regarding STI-related issues due to poor education.

That pre-service teacher training can instil confidence in teachers to dealing with sensitive issues such as sexual health is reflected in the work of Lynagh, Gilligan, and Handley (2010). Their study evaluated the impact of a specifically designed 13-week Unit of work on pre-service teachers' confidence and perceived competence in teaching about, and dealing with, sensitive issues. The study was carried out with two different cohorts of pre-service teachers enrolled in a Bachelor of Education degree program in an Australian university. The 13-week Unit of work addressed relevant content from the New South Wales K-12 Personal Development, the HPE curriculum and other additional sensitive issues. The findings revealed that pre-service teachers found training effective towards increasing confidence as well as managing sensitive issues (Lynagh et al., 2010). Likewise, a SHine SA (2000) report pertaining to the

opinions of parents, teachers and students regarding relationships and sexual health education revealed that both teachers and parents emphasised the need of effective pre-service training in order to teach the subject better.

Significantly, the present study articulated that if the teacher education curriculum highlighted the importance of these topics, then it would encourage pre-service and in-service teachers to do the same and hence enhance the knowledge and attitude attributes on STI-related issues. The suggested modes of STI-related education in teacher education programs proposed by the participants varied from integrating the subject into the curriculum, delivering it in the form of information sessions and workshops to making it a compulsory teacher training component like mandatory notification. Some of the respondents even perceived that a bifurcation of the subject Health and Physical Education is a better way to address teacher education towards enhancing pre-service teachers' STI-related knowledge and attitudes. The main reason cited in favour of this perspective was that the focus on Physical Education was far greater than the Health counterpart in the HPE courses. These are significant findings in the field of teacher education.

More specifically, the findings of this study pertaining to the perspectives of the respondents regarding the place of teacher education in addressing sexual health as central to curriculum are significant for consideration and debate at the level of policy and practice in teacher education in SA. Teacher education should be re-constituted to incorporate sexual health issues and be delivered by trained professionals in the field. The curriculum addressing sexual health and wellbeing should also incorporate STI-related issues for enhancing the knowledge and attitude attributes of pre-service teachers. This is a key finding of the study and provides empirical evidence to teacher educators engaging in curriculum reform.

9.11 Summary

This chapter discussed both the quantitative and qualitative findings of the study against the backdrop of relevant literature. In closing, it is evident that the findings of this study have significant implications for teacher education in terms of curriculum reform and in building the knowledge base and dispositions of graduates in relation to sex education. This is particularly significant in SA where a need has been identified to urgently address the increasing levels of adolescent STIs. The findings here provide deep insights to policy makers, teachers and parents concerning this important topic from the perspectives of a large cohort of pre-service teachers in SA. While the findings confirm much of the current literature, key substantive theoretical propositions have been generated that bring new insights to the field.

The final chapter recapitulates the key findings of this study and also articulates the implications for policy and practice and for future research.

> "It should be part of our degree to learn about these diseases and more specifically, how to discuss these issues with a student if they would like to speak with us about them." (This Study, Survey Respondent, ID: 91)

Chapter 10:

Conclusion

10.1 Structure of the Thesis

The purpose of this chapter is to recapitulate the structure of the thesis and the findings of the study. In addition, this chapter also outlines the implications of the findings for educational policy and practice and future research initiatives.

The rationale for conducting this research was attributed to the fact that there exists high STI and other BBV rates in SA, specifically among the adolescents and young adults. Young people, in turn, consider school programs as one of their most useful sources of information regarding sexual health and relationships. However, the identified inadequacies of pre-service teacher training in addressing sexual health issues coupled to a lack of research on pre-service teachers' knowledge and attitude perspectives towards STIs and other BBVs emerged as central to the rationale for conducting this research.

Accordingly, the present study explored the knowledge and attitude attributes of pre-service teachers in SA towards STIs and other BBVs. It also explored the perspectives of South Australian pre-service teachers towards three issues in particular: STI-related issues in general, the role of an effective education in containing the spread of STIs, and the place of teacher education in addressing sexual health. The pathway linking the background, design, execution, and outcomes of this exploration drafted in the form of the chapters of the thesis is recapitulated below.

Chapter 1 outlined the context of the present study. The historical perspective of STDs in SA traced the advent and prevalence of diseases in the State until the 1990s. Recent statistics related to the diseases helped to uncover one of the major statements of problems as underpinning the research. The inadequacies of the HPE curriculum and the lack of a comprehensive sex education and pre-service teacher training were also outlined as central to the rationale for conducting this research. Chapter one highlighted these problems and made an argument for the significance of the research. The section on significance also highlighted the importance of pre-service teacher training and the reasons for conducting the research with pre-service teachers as key participants. The chapter also outlined the major aims, objectives, and research questions of the study in addition to highlighting the nature of the research participants, assumptions, limitations and delimitations of the study.

Chapter 2 outlined the theoretical basis of the study. The underlying concepts, theories, measurement approaches, and importance of knowledge and attitudes in the context of the present study were described in this chapter. It also discussed the concept of the agents of socialization that impact the knowledge and attitude attributes of an individual in relation to the current research.

Chapter 3 analysed the relevant research in relation to each of the individual STDs and other BBVs under investigation. It became evident that only research related to HIV/AIDS was in abundance when considering the perspectives of pre-service teachers as well as in-service teachers. A single study each was found for genital warts and STDs in general which also had teachers (in-service) as its subject. The literature on the remaining STDs as well as the BBVs, therefore, focused on research which had knowledge and/or attitude as its measures, but conducted with college and university students, young adults, and adults somewhat resembling the pre-service cohort of the

present study. To this end, the age of the respondents in those studies became a determining criterion for inclusion in the review of related literature. This chapter, therefore, highlighted the gap in the related literature and the rationale for conducting the present study. Moreover, the deep insights that emerged from these studies formed the basis for the development of the items of the attitude scale of the questionnaire as employed in the present study.

Chapter 4 also portrayed literature but related to the basic theoretical aspects underlying each of the diseases under investigation. Different aspects of each of the diseases were highlighted to gain a detailed understanding of these diseases.This chapter, therefore, was pertinent in understanding the basis for the development of the knowledge scale of the questionnaire as employed in the study.

Chapter 5 highlighted the methodology underpinning the research under four headings namely variables, design, samples, and analysis. Under the variables attribute, not only were the key variables identified but also the operationalization of research as essential towards the development of the questionnaire was outlined. The design and the samples attributes, in turn, focused on the primary mode of data collection while outlining the sampling procedures, the ethical considerations thereof, and the sample size of the study. Finally, the procedures employed towards data entry and data analysis techniques as applied in the study were described under the analysis category.

Chapter 6 described the approaches taken to establish the psychometric properties of the constructed scales of the questionnaire. The first part of the chapter justified the grounding and rationale of the application of IRT Theory over the Classical Test Theory as employed in the study. The latter part, therefore, highlighted the validity and reliability measures of the knowledge and attitude scales based on the Rasch model, a particular version of a one-parameter IRT model. Overall, the knowledge scale

reported high internal consistency and evidence of construct validity following the Rasch measures. The attitude scale, on the other hand, also reported acceptable internal consistency and evidence of construct validity following the Rasch measures.

Chapters 7 and 8 discussed the findings of the study. While Chapter 7 outlined the findings of the closed-ended questions of the survey as reflecting the first six research questions of the study, Chapter 8 dealt with the findings of the open-ended questions of the survey particularly focusing on the last three research questions.

Chapter 9 juxtaposed the findings and existing literature. The structure of this chapter, therefore, was based on the research questions as uncovering the findings and thereafter comparing and/or contrasting with the literature, where applicable. The chapter also distilled the current study's significant contribution to knowledge in the field.

The purpose of this chapter, ten, therefore, is to recapitulate the findings of the study and articulate the implications for policy and practice, and for future research.

10.2 The Key Findings

A total of nine research questions guided the present study. The findings of the first six of these were obtained through the closed-ended questions of the survey, with open-ended questions evoking the last three. The key findings of the study against each of these research questions are outlined as follows:

Research question 1 sought to explore the knowledge of pre-service teachers in SA towards STIs and other BBVs. The findings revealed a poor level of knowledge of the sample of South Australian pre-service teachers towards STIs and other BBVs. The mean knowledge score of the sample of pre-service teachers in SA (N = 320) towards STIs and other BBVs was 18.57 with a standard deviation of 7.678. The minimum knowledge score was zero with a maximum of 37 (out of a possible 45) and thus a

range of 37. This finding, therefore, is an indication that effective knowledge dissemination (from South Australian pre-service teachers entering the profession to students) regarding STIs and other BBVs is not taking place owing largely to the lack of knowledge of pre-service teachers themselves on these issues.

Research question 2 sought to explore the attitudes of pre-service teachers in SA towards STIs and other BBVs. The findings revealed a favourable attitude of the sample of South Australian pre-service teachers towards STIs and other BBVs. The mean attitude score of the sample of pre-service teachers in SA (N = 320) towards STIs and other BBVs was 44.45 with a standard deviation of 3.651. The minimum attitude score was 29 with a maximum of 51 (out of a possible 51) and thus a range of 22. This finding, therefore, is an indication that the favourable attitudes of South Australian pre-service teachers themselves towards STI-related issues is not necessarily transcribing across the wider student community (upon the former entering the profession). It can also be argued that a standalone favourable attitude of teachers towards STI-related issues is perhaps not sufficient when addressing the health-related attitudes and behaviours of students.

Research question 3 sought to ascertain the relationship between the knowledge and attitude attributes of pre-service teachers in SA regarding STIs and other BBVs. The findings revealed that there was a low to moderate positive relationship between the knowledge and attitude attributes of the sample of South Australian pre-service teachers (N = 320) regarding STIs and other BBVs ($r_s = .196$, $p < 0.01$). This finding indicates that with an increase in the knowledge attribute, there could be a concomitant increase of the attitude component as well, which is significant because this implies that the health knowledge and perceptions significantly develop the health attitudes of school teachers.

Research question 4 sought to investigate the difference of the knowledge attribute of pre-service teachers in SA regarding STIs and other BBVs across the demographics of the study, namely gender, age, highest educational level, subject stream, and undertaking the HPE curriculum and not. The findings revealed that there were no significant differences in the knowledge attribute of the sample of South Australian pre-service teachers (N = 320) regarding STIs and other BBVs across gender, age (≤ 20 years, 21-30 years, 31-40 years, > 40 years), highest educational level (senior secondary, undergraduate, postgraduate), subject stream (arts, science, commerce, professional - Law, Engineering, Medicine, other), and undertaking the HPE curriculum and not. The findings, therefore, imply that variability in STI-related sex education in SA does not differ widely in terms of being a male or a female teacher, being a HPE teacher and not, the age of teachers, and in terms of the subject areas undertaken by teachers.

Research question 5 sought to investigate the difference of the attitude attribute of pre-service teachers in SA regarding STIs and other BBVs across the demographics of the study, namely gender, age, highest educational level, subject stream, and undertaking the HPE curriculum and not. The findings revealed that there were no significant differences in the attitude attribute of the sample of South Australian pre-service teachers (N = 320) regarding STIs and other BBVs across gender, highest educational level (senior secondary, undergraduate, postgraduate), subject stream (arts, science, commerce, professional - Law, Engineering, Medicine, other), and undertaking the HPE curriculum and not. However, there were significant differences in the attitude attribute of the sample of South Australian pre-service teachers (N = 320) regarding STIs and other BBVs across age (≤ 20 years, 21-30 years, 31-40 years, > 40 years). The findings, therefore, imply that the STI-related attitudes of pre-service teachers in

SA and hence the education thereof does not differ widely in terms of being a male or a female teacher, being a HPE teacher and not, and in terms of the subject areas undertaken by teachers. However, the finding of this study pertaining to a significant difference in the attitude attribute of pre-service teachers in SA across age, implies that the STI-related attitudes of pre-service teachers in SA and hence the education thereof differs in terms of the age of teachers. This has important implications for teacher educators who currently teach student cohorts that reflect age variability.

Research question 6 sought to ascertain the major sources of information for pre-service teachers in SA regarding STIs and other BBVs. School (70.3 per cent), peers (52.8 per cent), and mass media campaigns (49.1 per cent) were reported most frequently by the sample of South Australian pre-service teachers (N = 320) as pertaining to the sources of information for this cohort (from those listed) regarding STIs and other BBVs. The findings established that the major sources of information are important agents of socialization that shape the life of an individual.

Research question 7 sought to explore the perspectives of pre-service teachers in SA towards STI-related issues. The findings (number of valid responses = 272) revealed that the majority of the sample of South Australian pre-service teachers perceived little or no information as the greatest contributor to a high STI rate in the State. An individual's attitude and behavioural lifestyle was perceived as the dominant reason provided by pre-service teachers in SA towards rendering adolescents and young adults as vulnerable to contracting STIs. Therefore, from the collective of concepts, the propositional theme that was generated was that there is an increase of STIs in South Australian adolescents because information and knowledge relating to sex education is not readily available nor is it comprehensive. Further, adolescent lifestyle and behaviour is becoming increasingly experimental and characterized as "sexually risky",

more so than in traditional societies, and as a result of a number of factors in contemporary society in SA, causing an increase in STIs.

Research question 8 sought to explore the perspectives of pre-service teachers in SA towards the role of an effective education in containing the spread of STIs. The findings (number of valid responses = 272) revealed that an informed knowledge on the subject was perceived by the sample of South Australian pre-service teachers as the greatest contribution pertaining to the role of an effective education in containing STI spread. The majority of the sample of South Australian pre-service teachers perceived that the HPE curriculum should not be made compulsory under the new SACE. Nevertheless, pre-service teachers that participated in this study were strongly in favour of compulsory sex education in the State with the majority perceiving the role of teachers as responsible for the lack of a comprehensive sex education in SA. Therefore, from the collective of concepts, the propositional theme that was generated was that an increase in access to knowledge is the greatest opportunity that can be offered to South Australians in order to reduce an increase of STIs in SA. Moreover, the HPE curriculum is an appropriate resource to address STI education for adolescent school students in SA; but, in its present form, the HPE curriculum fails to deliver appropriate sex education.

Research question 9 sought to explore the perspectives of pre-service teachers in SA towards the place of teacher education in addressing sexual health as central to curriculum. The findings (number of valid responses = 272) revealed that the majority of the sample of South Australian pre-service teachers were in favour of an informed knowledge on the subject. The majority of the participants also confirmed that they did not have adequate STI-related information. Accordingly, introducing the subject as a core topic in teacher preparation programs was perceived by the majority of the sample

as enhancing South Australian pre-service teachers' STI-related knowledge and attitude attributes. Therefore, from the collective of concepts, the propositional theme that was generated was that the inclusion of sex education as a compulsory component of all teacher education programs is desirable if STIs in SA are to be reduced.

This section highlighted the key findings of the study. However, a brief outline of the key strengths of the study is imperative to draw upon the implications for future research. This is outlined in the next section before articulating the implications of the present study for educational policy and practice and for future research initiatives.

10.3 Strengths of the Study

The quantitative dimension of this study explored the knowledge and attitude attributes of pre-service teachers in SA (N = 320) towards a range of STIs and other BBVs. The lack of an existing comprehensive questionnaire addressing each of these diseases led to the development of one as argued in Chapter 5. Developing the items of the knowledge scale of the questionnaire, therefore, was based on an extensive review of literature uncovering recent information related to the diseases. The items of the attitude scale of the questionnaire pertaining to STI-related issues were also based on the review of related literature. That the knowledge and the attitude scales reflected what it set out to measure was evident in the psychometric properties of the scales. Both the scales reported evidence of construct validity and acceptable reliability measures.

The qualitative dimension of this study, on the other hand, in terms of open-ended questions, explored the perspectives of the respondents towards three issues in particular: STI-related issues in general, the role of an effective education in containing the spread of STIs, and the place of teacher education in addressing sexual health as central to curriculum. The response rate to the open-ended questions of the questionnaire was high. A total of 272 respondents out of a participating 320 (85 per

cent) turned in complete open-ended responses. As discussed in the previous chapter, the responses of some of the open-ended questions supported the quantitative findings of the study pertaining to the knowledge and attitude attributes. The responses of yet other open-ended questions evoked deep insights into the respective issues from the perspective of South Australian pre-service teachers.

10.4 Implications

Smith et al. (2011) reported the results of the first national survey of approximately 300 Australian secondary teachers of sex education conducted in 2010. The survey focused on the content of sex education, barriers and support, and teachers' views and opinions and school policy requirements regarding sexual health education. The report quoted one of the survey respondents:

> "I have had several students both within my classes and outside of them who have benefited from sexual education. It is something that desperately needs to be covered in classes without the assumption that they will learn from their parents or elsewhere. Too many kids are falling pregnant or contracting various STIs before they even reach year 10. Not enough is being done in this area!!!" (A survey respondent - Smith et al., 2011, p. 7)

In fact, young people in their transition to adulthood "academically", "physically", and "socially" depend to a great extent on schools and teachers and therefore, "proper preparation for this task is essential" (Eisenberg et al., 2010, p. 337). In this regard, UNESCO (2011) noted that pre-service teacher training has a key role in preparing a new wave of teachers to effectively deliver sexual health education. Unfortunately, the majority of sexual health education teachers in Australia/South Australia are either ill-prepared (Mitchell et al., 2011) or not prepared at all (Keller, 2010b).

However, inadequate teacher preparation is only one of the key problems as highlighted through the research being reported here. The study has shown

convincingly that the lack of general knowledge and awareness of preventative sex education, the inadequacies pertaining to the curriculum related to sexual health, and the lack of a comprehensive sex education in SA are key factors contributing to an ineffective adolescent sex and health education in the State and hence a rise in STI rates. Each of these propositions that have been put forward by the respondents in the present study affirms that this is the case. Therefore, the results as revealed in this study both from the quantitative and qualitative analysis that pre-service teachers in SA have a poor level of STI-related knowledge despite a favourable attitude can be interpreted as significant in a more theoretical way. It can be argued that pre-service teachers' knowledge deficit stems from their own lack of education which is based on an inadequate and inconsistent curriculum and an incomprehensive sex education. It is clear that a standalone favourable attitude on the part of pre-service teachers (upon entering the workforce) is perhaps insufficient as an educational intervention design to assist adolescents and young adults to modifying their health-related behaviours. Pre-service teachers themselves are a product of the same system and hence, it can be theorized that they constitute an integral component of a vicious cycle which can be termed as the Cycle of Ignorance in relation to sex education in schools in SA. This is evident as a result of the analysis of the findings in this study. This Cycle of Ignorance continues to contribute to increasing STIs in SA. This is shown schematically in Figure 10.1 as each phase of educational ignorance contributes to the next, although no causal relationship is being argued here.

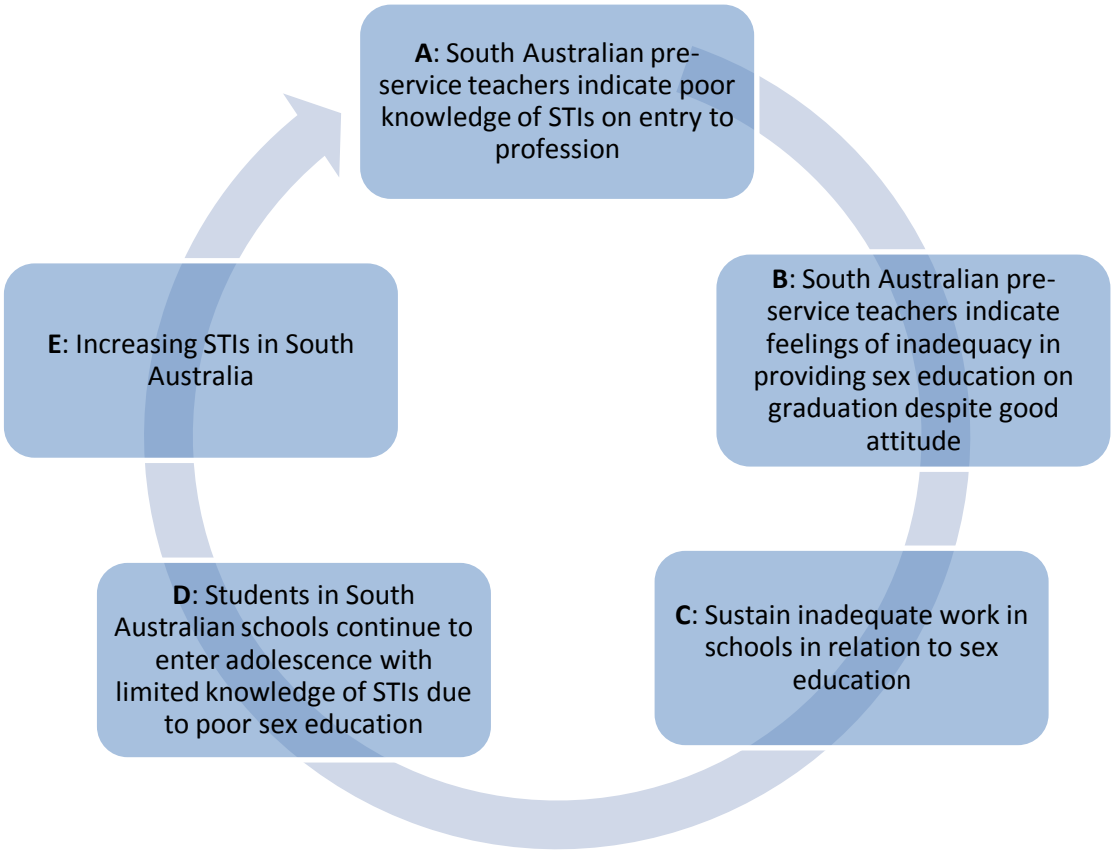

Figure 10.1. The enduring Cycle of Ignorance in relation to sex education in schools in SA: The perspectives of pre-service teachers in SA

As evident in Figure 10.1, it is the perspectives of the pre-service teachers that participated in this study that adolescents and young adults are prone to contracting STIs and other BBVs in SA at increasing rates. It was also made evident that these age groups depend on schools and teachers for their health-related behaviours. The knowledge and/or attitude attributes of pre-service teachers themselves on health-related issues depend to a large extent on their own schooling and/or pre-service teacher education. However, as reported by earlier studies and based on the findings of the present study, inadequate and inconsistent sex education in schools and teacher preparation programs impact on the knowledge and/or attitude attributes of pre-service teachers. This, in turn, impacts on the students they teach. Upon entering the profession, teachers cannot demonstrate adequate knowledge of sex education and as a result, their

students, just as they did, fail to become fully educated in relation to sexual health. The Cycle of Ignorance continues as each generation unfolds, resulting in increasing STIs in adolescents in SA.

Based on the substantive model of the Cycle of Ignorance in relation to sex education in schools in SA as generated from the findings and propositions obtained in the present study, a number of implications can be articulated in relation to policy and practice. One aspect of the implications generates recommendations for policy that calls for educational agencies to fracture the Cycle of Ignorance and is targeted at teacher educators, teachers, and parents through curriculum reform. The second aspect of the implications for practice is targeted at providing support for students regarding life style and preventatives, support for education initiatives, and support for graduates. These are discussed in the following subsection as key strategies designed to fracture the Cycle of Ignorance.

10.4.1 Towards Policy and Practice

The majority of the South Australian pre-service teachers that participated in this study reflected that they were not knowledgeable about STIs and the quantitative findings pertaining to the knowledge attribute also confirms this perception. Nevertheless, the majority of the respondents argued in favour of the need for pre-service teachers to be informed regarding sexual health issues, and primarily in the form of a core topic at the pre-service teacher education provider. Therefore, it is recommended that pre-service teacher training on sexual health should be prioritised in the education sector policies, strategic and action plans of SA and other national/regional level education and multi-sectoral commitments. There should be support for graduates throughout the teacher preparation program. Further, it is important that teacher training resources on sexual health are developed after consultation with teachers, pre-service teachers, students,

parents, and professionals. The resources should essentially cover but not be limited to STI/BBV content and prevention education, teaching methodologies, teacher skills, personal attitudes, and cultural norms that may impact on teaching sexual health issues. It is also important that the implementation of these resources by the pre-service teacher preparation providers is monitored on an annual basis. Moreover, there should be action-based research for developing national/regional assessment tools for the content, delivery, and outcomes of pre-service teacher training addressing sexual health particularly in relation to adolescents.

The majority of the respondents in this study also reflected that the HPE curriculum is neither contributory towards the provision of an effective education to contain STIs nor does it address STI-related issues. Nevertheless, the majority of the participants perceived that the HPE curriculum should not be compulsory under the new SACE curriculum authority in SA (specifically year 12). Therefore, in view of these findings, it is recommended that the national HPE curriculum be reviewed by curriculum developers prior to its full implementation in 2014. It is also important that the national HPE curriculum's effectiveness in addressing STI-related issues be a specific focus of the review.

The data in this study further revealed that the majority of the South Australian pre-service teachers shared a perspective that a lack of information and high risk sexual activity are the dominant reasons for high STI rates in SA and the vulnerability of adolescents and young adults to contracting the diseases, respectively. It was the general consensus of the respondents that an effective education can be instrumental in containing the spread of STIs and other BBVs. Therefore, it is suggested that the role of education be prioritised in the individual and overall STI strategic and action plans of SA and its implementation and outcomes be reviewed on a regular basis. Moreover,

frequent and updated STI campaigns should be also initiated by the government and social media outlets.

South Australian pre-service teachers that participated in this study noted several factors that contribute to the lack of a comprehensive sex education in SA. Therefore, it is suggested that the provision of a comprehensive and consistent sex education in SA be reviewed and involve teachers, pre-service teachers, students, parents, and professionals in the process. It is also important that resources are developed which specifically encourage key stakeholders in schools to adopt a whole school approach to sex education. Moreover, there should be action-based research for developing national/regional assessment tools for the content, delivery, and outcomes of sex education.

The recommendations as suggested for future policy and practice initiatives will, therefore, assist educators (both pre-service and in-service), policy makers, other key stakeholders in the area of sexual health education, and assist schools and communities to raise awareness of the many areas where adolescents and young adults experience challenges related to sexual health. It is likely that without these interventions, the Cycle of Ignorance will be sustained and STIs will continue to rise. The implications for future policy and practice arising out of this research outlined, the next subsection highlights the implications for future research initiatives.

10.4.2 Towards Future Research

As outlined earlier, the key strengths of this research were attributed to exploring the knowledge and attitude attributes based on the developed scales and eliciting the perspectives of South Australian pre-service teachers regarding various issues related to sexual health. The structure and findings of this research pave the path for further study.

The limitation of this study as outlined in the first chapter pertained to the fact that the research participants were limited to SA only. This could be enriched if pre-service teachers across all the States of Australia could be sampled. This larger cohort would also allow for an effective comparison of results across the groups. Therefore, based on this limitation, possible future research project could be designed to explore pre-service teachers' knowledge and attitudes towards STIs and other BBVs on a comparative basis across all the States of Australia. Similarly, research could be conducted exploring pre-service teachers' knowledge and attitudes towards STIs and other BBVs on a comparative basis to that of in-service teachers, both for South Australia as well as the other States of Australia.

The results of the present study revealed a poor level of knowledge but favourable attitudes of pre-service teachers in SA towards STIs and other BBVs. Further research combining knowledge, attitudes, and health-related behaviours could be conducted in an effort to ascertain whether knowledge and attitudes necessarily transcribe to behaviour modification.

Finally, the respective knowledge and attitude scales as constructed for the purpose of the present study could be used for studies with teachers or other similar cohorts to evaluate the functioning of the items for these groups of individuals. This would be crucial to establishing the respective scales' applicability for a wide but related group of individuals.

10.5 Concluding Comments

This study explored the knowledge and attitude attributes of pre-service teachers in SA towards STIs and other BBVs. It also explored South Australian pre-service teachers' perspectives towards STI-related issues, the role of an effective education in containing STIs, and the place of teacher education in addressing sexual health as central to

curriculum. This study, a relatively unexplored area of scholarship, provides deep insights into issues related to the sexual health of young people while paving the path for future research. In conclusion, it is important to call for further research particularly if the Cycle of Ignorance is to be interrupted and the incidence of STIs in adolescence is to be reduced in Australia.

Appendix A

Sexually Transmissible Infections and other Blood-Borne Viruses' Knowledge and Attitude Questionnaire

Sexually Transmissible Infections and other Blood-Borne Viruses' Knowledge and Attitude Questionnaire

Purpose of the Study: *The incidence of Sexually Transmissible Infections (STIs) and other Blood-Borne Viruses (BBVs) is widespread in South Australia, specifically among the adolescent and young adult age groups. The present study is an attempt to explore the 'knowledge' and 'attitude' perspectives relating to these diseases, of one of the noblest professions dealing with these age groups. It aims to address the knowledge gap (if any) and the concomitant attitudes of those envisaged as 'role models for teenagers', in a view to effectively contain the spread of these diseases.*

SECTION A

[***Instructions***: This Section pertains to the ***demographic variables*** of the study. Please put a '***tick***' (√) in the boxes as applicable for gender, age, highest educational level (completed), subject stream and whether or not you are a 'HPE' Teacher (or enrolled for the course thereof). If you are not sure of the subject stream pertaining to the highest educational level (completed), please feel free to choose the option 'other', specifying the major you studied at that level. ***Please answer all of the following attributes***]

Gender: Male ☐ Female ☐

Age: ≤20 years (less than and equal to 20 years) ☐ , 21-30 years ☐ , 31-40 years ☐ ,

>40 years (greater than 40 years) ☐

Highest Educational Level (completed): senior secondary ☐ , undergraduate ☐, postgraduate ☐

Subject Stream: arts ☐ , science ☐ , commerce ☐ , professional (law, engineering, medicine) ☐ ,

other (please specify) ☐ _____

Are you a 'Health and Physical Education (HPE)' Teacher or are you undertaking the 'HPE' Subject as offered under the 'Teacher Training' Course at this College/University? Yes ☐ , No ☐

SECTION B

[***Instructions***: This Section (Items 1-45) pertains to the ***knowledge attributes*** of the study related to Sexually Transmissible Infections and other Blood-Borne Viruses. Please put a '***tick***' (√) in the boxes as applicable for each of the following statements (***true/false***) and feel free to choose the option '***don't know***' (***DK***) if you are not sure of an answer. ***Please answer all the questions***]

Example:

	True	False	DK
HIV can be spread by mosquitoes	☐	☑	☐

Appendix A (contd.)

		True	False	DK
1.	Combined Hormonal Contraceptives (CHCs) are associated with an increased risk of chlamydial infection			
2.	Newborns of chlamydia-infected mothers usually do not acquire the infection			
3.	Correct and consistent condom use can reduce chlamydial infection			
4.	Chlamydia has typical symptoms for easy identification			
5.	Chlamydia can lead to infertility			
6.	Multiple partners is not a risk factor for gonorrhoeal infections			
7.	Newborns of gonorrhoea-infected mothers can develop conjunctivitis			
8.	Condoms fail to offer protection against gonorrhoeal infections			
9.	Oral, anal and vaginal sex can all spread gonorrhoea			
10.	Gonorrhoeal infection is not related to an individual's HIV susceptibility			
11.	Men who have sex with men are at increased risk for contracting and transmitting syphilis			
12.	Direct contact with syphilis-infected individuals can spread the disease			
13.	Condoms might not provide a total protection against syphilis			
14.	Washing or douching after sex helps to prevent syphilis			
15.	Syphilis can result in life-threatening cardiovascular and neurological disease			
16.	The risk of the Human Papillomavirus infection increases with a HIV co-infection			
17.	The Human Papillomavirus cannot spread through direct skin-to-skin contact			
18.	Till date, vaccines do not exist for the Human Papillomavirus infection			
19.	The types of Human Papillomavirus that can cause genital warts are the same as the types that can cause cancers			
20.	Genital Human Papillomavirus infections often do not have signs and symptoms			
21.	Young age at sexual debut is a risk factor for genital herpes contraction			
22.	Oral sex can help prevent genital herpes acquisition			
23.	There is no effective vaccine against genital herpes			
24.	Genital herpes can make an individual sterile (incapable of reproduction)			
25.	An infection of genital herpes can often be without signs and symptoms			
26.	Oral sex is postulated as posing the highest risk for HIV transmission			

Appendix A (contd.)

		True	False	DK
27.	HIV cannot be transmitted through saliva			
28.	Treating other Sexually Transmissible Infections reduces the ability of a HIV-positive individual to transmit HIV			
29.	Exclusive breastfeeding reduces mother-to-child HIV transmission compared with mixed feeding			
30.	Elective abortion can reduce HIV infection progression			
31.	Injection drug use is cited as one of the risk factors for Hepatitis A infection			
32.	Hepatitis A cannot be transmitted via sexual means			
33.	There is an effective vaccine against Hepatitis A			
34.	Hepatitis A can spread during handling or preparing food by an infected individual			
35.	Hepatitis A is rarely transmitted from the mother-to-child			
36.	HIV-infected individuals are at low risk for Hepatitis B infection			
37.	Hepatitis B can be spread sexually			
38.	No vaccine till date is effective against Hepatitis B			
39.	Individuals with Hepatitis B often do not have symptoms			
40.	Acute and chronic forms of Hepatitis B infection can recover spontaneously			
41.	Hepatitis C is primarily transmitted via sexual means			
42.	Hepatitis C cannot be spread through casual contact			
43.	Vaccination is an effective means to prevent Hepatitis C acquisition			
44.	Hepatitis C is not a series of stages of Hepatitis infections (A→B→C)			
45.	Infants delivered to Hepatitis C infected mothers can progress to chronic hepatitis			

SECTION C

[***Instructions***: This Section (Items 46-62) pertains to the ***attitude attributes*** of the study related to Sexually Transmissible Infections and other Blood-Borne Viruses. Please put a '***tick***' (√) in the boxes as applicable ***in your opinion*** (***disagree/neither agree nor disagree/agree***) for each of the following statements. ***Please answer all the questions***. ***Note***: ***'STIs' denote Sexually Transmissible Infections***]

Example:

	Disagree	Neither agree nor disagree	Agree
AIDS will help the society by decreasing the number of drug abusers	☑	☐	☐

Appendix A (contd.)

		Diasgree	Neither agree nor disagree	Agree
46.	Adolescents should be more cautious in promiscuous relationships			
47.	Sexual behaviour has no role in STI contraction			
48.	Regular STI check-ups should be made compulsory to stop its spread			
49.	Preventive measures to reduce STI acquisition are easy to follow			
50.	Inappropriateness of curriculum regarding STIs help its spread			
51.	STIs are not life-threatening			
52.	STI-infected individuals should not be looked down upon			
53.	Not contracting a STI is a sign of sexual faithfulness in a relationship			
54.	A high STI rate should not bother a non-infected individual			
55.	Discussing STIs do not lead to sexual promiscuity			
56.	Sex education in schools can play a major role in combating the spread of STIs			
57.	Social ostracism should not hinder individuals from STI testing			
58.	Professionals rather than teachers should deal with STI topics			
59.	Contracting STIs signify illicit relationships			
60.	Teacher training can help teachers to be more confident in addressing STI-related issues			
61.	Today's teachers fail to influence the behaviours of their students			
62.	Proper school-based education can be effective in limiting STI spread			

SECTION D

[***Instructions***: This Section (Item 63) pertains to the ***sources of information*** related to Sexually Transmissible Infections and other Blood-Borne Viruses. Please ***choose your best three*** (***3***) ***possible sources*** among the options given which you feel have been beneficial in the enrichment of your knowledge regarding these diseases. Please put a '***tick***' (√) in the boxes as applicable]

63. Among the following listed possible sources of information regarding Sexually Transmissible Infections and Blood-Borne Viruses, please ***choose the best three*** which according to you have been instrumental in the enrichment of your knowledge regarding these diseases.

Family members ☐ , Peers ☐ , School ☐ , Workplace ☐ , Mass Media Campaigns ☐ ,

Training & Workshops ☐ , Relevant Organizations ☐ , Religion ☐ , State ☐

SECTION E

[***Instructions***: This Section (Items 64-74) pertains to your ***opinions***, ***perspectives*** and ***views*** related to Sexually Transmissible Infections and the role of an effective education in containing the spread of these. Please answer the following questions ***briefly*** in the text boxes provided herewith]

64. The Australian Annual Surveillance Reports and STD Services RAH reveal a high rate of Sexually Transmissible Infection and the like diseases in South Australia. What in your opinion can be the reasons for this upsurge?

65. Adolescents and the young adults are reported to be the ones most vulnerable to contracting these diseases. Why do you believe this is so?

66. What role can education in general play towards combating the spread of these diseases?

67. What are your perspectives regarding the South Australian 'Health and Physical Education' curriculum in general in this context?

68. The South Australian 'Health and Physical Education' curriculum is compulsory till Year 10 as per the SACSA Framework provisions. However, in Years 11 and 12 it is an optional subject under the new SACE criteria. In your opinion, should the aforesaid curriculum be compulsory in Years 11 and 12 under the new SACE as well? Please justify your answer.

Appendix A (contd.)

69. In your opinion, does the South Australian 'Health and Physical Education' curriculum adequately address the issues related to STIs?

70. What factors, if any, do you hold responsible for the lack of a comprehensive sex education curriculum in South Australia?

71. Do you feel that sex education should be compulsory in South Australian schools?

72. Do you feel that pre-service teachers should be adequately informed regarding these diseases? Why?

73. Do you feel that pre-service teachers are adequately informed regarding these diseases?

74. How can teacher education be better addressed to effectively enhance the knowledge and attitude attributes of pre-service teachers towards these diseases?

Appendix A (contd.)

Dear Teacher,

Thank you *so much for completing this questionnaire. Your precious time and untiring effort is greatly appreciated. If you have any suggestions or questions regarding the study or the results thereof, please feel free to contact the researcher/supervisor(s) as detailed below.*

You can, in fact, state your e-mail/contact number here if you want the researcher to get back to you for some comments/suggestions.

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Appendix B

Research Project Information Sheet

THE UNIVERSITY OF ADELAIDE AUSTRALIA

SCHOOL OF EDUCATION

Level 8, 10 Pulteney Street, University of Adelaide, Adelaide SA 5005; Tel: (+618) 8313 5628, Fax: (+618) 8313 3604

RESEARCH PROJECT INFORMATION SHEET

Dear Teacher,

I am Joy Talukdar, a PhD student in the School of Education at the University of Adelaide. I am presently undertaking research leading to the production of a thesis on the topic entitled *'Knowledge' and 'Attitude' of Pre-service Teachers in South Australia towards Sexually Transmissible Infections (STIs) and other Blood-Borne Viruses (BBVs).*

It is evident from statistical reports that the incidence and prevalence of Sexually Transmitted Diseases and other Blood-Borne Viruses are high in South Australia, specifically among the adolescent and young adult age groups. It is also posited that knowledge and attitude related to health issues disseminate from teachers to students given that teachers are considered 'gatekeepers' or 'role models' by their students. It is this perspective that sets the background for the present study, and accordingly the *aim of this research* is to quantify the knowledge and attitude attributes of pre-service teachers in South Australia regarding STIs and other BBVs, as prevalent in the State. The study further aims to investigate the perspectives that pre-service teachers in South Australia hold towards STI-related issues, the role of an effective education in containing the spread of STIs, and teacher education related to sexual health.

The *study will help* to provide valuable insights into the existing knowledge and prevalent attitudes of pre-service teachers in South Australia towards STIs and other BBVs, and suggest means of improvement, if any. Further, it will address the research gap in the field as evident from the review of related literature. However, *teachers will not gain any direct benefit** **(see below and accompanying consent form)** from participating in this study, though it will articulate the implications for teacher education.

In view of the aforesaid, your valued *consent* for participation for the *pilot/main study* (applicable only *if you are above 18 years of age*) would be of immense aid in the collection of my data. In this context, if you choose to participate in the study, you can be rest assured of *anonymity* and *confidentiality* being maintained in the sense that the questionnaire constructed for the purpose has no provision to fill in the 'name' or 'identity of any sort' (apart from the last page whereby, you are free and strictly not binding, to put in your contact details in case you want the researcher to get back to you for suggestions). The consent form, however, requires a name input as per research norms. Therefore, individual *participants will not be identifiable* in the resulting thesis, report or other publications. Moreover, *participation is entirely at will* with the option of '*withdrawal*' at any intended point of time.

Appendix B (contd.)

The *response mode of each Section of the questionnaire* and the ***tentative time to complete the survey*** is stipulated as follows:

Characteristics → / Questionnaire ↓	Item(s)	Response Mode	Timing
Section A	5 Demographic Variables	'Closed-ended'	
Section B	1-45 (Knowledge)	'Closed-ended' 'True/False/Don't Know' type	
Section C	**46-62 (Attitude)**	'3-Point Likert' 'Disagree...Agree' type	**25-30 mins**
Section D	63 (Sources of Information)	'Closed-ended'	
Section E	**64-74 (Opinions, Perspectives, and Views)**	'Open-ended'	
Total	***74***		

*** a total of 20 respondents from the response pool as completing the survey will be entitled for a prize draw in the form of '*Gift Vouchers*' (Coles/JB Hi-Fi/Woolworths) as a token of appreciation towards participation. This is strictly NOT to be considered as a direct benefit towards participation. The consent form details this and you are free NOT to divulge your personal contact details in case you wish not to enter the draw.**

In view of the aforesaid, I earnestly request you to fill up the questionnaire. Should you require additional information regarding this research, please feel free to contact me by telephone on +61 8 83137196, mobile 0435221506, or email joy.talukdar@adelaide.edu.au

Should I be unavailable, my Principal Supervisor, Professor Tania Aspland, can also be contacted by telephone on +61 8 83135692, or email tania.aspland@adelaide.edu.au

Thank you for considering this request.

Kind Regards,

Joy Talukdar

Appendix C

Standard Consent Form

THE UNIVERSITY OF ADELAIDE
AUSTRALIA

THE UNIVERSITY OF ADELAIDE HUMAN RESEARCH ETHICS COMMITTEE

STANDARD CONSENT FORM
FOR PEOPLE WHO ARE PARTICIPANTS IN A RESEARCH PROJECT
(for pre-service teachers in South Australia)

1. I, ... (please print name)

   consent to take part in the research project entitled:

   'Knowledge' and 'Attitude' of Pre-service Teachers in South Australia towards Sexually Transmissible Infections (STIs) and other Blood-Borne Viruses (BBVs),

   and to that extent *certify that I am above 18 years of age*.

2. I acknowledge that I have read the attached Information Sheet entitled:

   Research Project Information Sheet

3. *I certify that I am/am not a 'Health and Physical Education' Teacher* (this also involves me taking the related teacher education course)

4. I have had the project, so far as it affects me, fully explained to my satisfaction by the research worker. My consent is given freely.

5. Although I understand that the purpose of this research project is to quantify the knowledge and attitude attributes of pre-service teachers in South Australia regarding sexually transmissible infections and other blood-borne viruses, as prevalent in the State, it has also been explained that my involvement may not be of any benefit to me* (**see point 10 below**).

6. I have been given the opportunity to have a member of my family or a friend present while the project was explained to me.

7. I have been informed that, while information gained during the study may be published, I will not be identified and my personal results will not be divulged.

8. I understand that I am free to withdraw from the project at any time and that this will not affect my professional progress, now or in the future.

9. I am aware that I should retain a copy of this Consent Form, when completed, and the attached Information Sheet.

Appendix C (contd.)

....
(signature) *(date)*

***Additional Information Related to 'Prize Draw'** (optional)

10. **I intend/do not intend to be included in the prize draw for the completion of the survey, and therefore wish to place/not place my e-mail and institutional details in the box below**:

Name: e-mail: Institution:

Appendix D

Contacts for Information on Project and Independent Complaints Procedure

THE UNIVERSITY OF ADELAIDE
HUMAN RESEARCH ETHICS COMMITTEE

Level 7, 115 Grenfell Street, The University of Adelaide, SA 5005; Tel: (+618) 8313-5137, Fax (+618) 8313-3700

CONTACTS FOR INFORMATION ON PROJECT AND INDEPENDENT COMPLAINTS PROCEDURE

The Human Research Ethics Committee is obliged to monitor approved research projects. In conjunction with other forms of monitoring it is necessary to provide an independent and confidential reporting mechanism to assure quality assurance of the institutional ethics committee system. This is done by providing research participants with an additional avenue for raising concerns regarding the conduct of any research in which they are involved.

The following study has been reviewed and approved by the University of Adelaide Human Research Ethics Committee:

Project title: 'Knowledge' and 'Attitude' of Pre-service Teachers in South Australia towards Sexually Transmissible Infections (STIs) and other Blood-Borne Viruses (BBVs)

1. If you have questions or problems associated with the practical aspects of your participation in the project, or wish to raise a concern or complaint about the project, then you should consult the project coordinator:

   Name: Joy Talukdar (Researcher)
   Telephone: +61 8 83137196/ 0435221506 (mobile)
   Email: joy.talukdar@adelaide.edu.au

   Name: Professor Tania Aspland (Principal Supervisor)
   Telephone: +61 8 83135692/ 0411815071 (mobile)
   Email: tania.aspland@adelaide.edu.au

2. If you wish to discuss with an independent person matters related to

   - making a complaint, or
   - raising concerns on the conduct of the project, or
   - the University policy on research involving human participants, or
   - your rights as a participant

   contact the Human Research Ethics Committee's Secretary on phone (+618) 8313-6028.

Appendix E

Ethics Approval Certificate

THE UNIVERSITY of ADELAIDE

RESEARCH BRANCH
RESEARCH ETHICS AND COMPLIANCE UNIT

BEVERLEY DOBBS
EXECUTIVE OFFICER
HUMAN RESEARCH ETHICS SUB-COMMITTEES
THE UNIVERSITY OF ADELAIDE
SA 5005
AUSTRALIA

TELEPHONE +61 8 8303 4725
FACSIMILE +61 8 8303 7325
email: beverley.dobbs@adelaide.edu.au
CRICOS Provider Number 00123M

5 September 2011

Professor T Aspland
School of Education

Dear Professor Aspland

APPROVAL No.: H-213-2011
TITLE: Knowledge and attitude of pre-service teachers in South Australia towards Sexually Transmissible Infections (STIs) and other Blood-Borne Viruses (BBVs)

I write to advise you that on behalf of the Human Research Ethics Committee I have approved the above project. Please refer to the enclosed endorsement sheet for further details and conditions that may be applicable to this approval.

The ethics expiry date for this project is: 30 September 2012

Participants taking part in the study are to be given a copy of the Information Sheet and the signed Consent Form to retain.

Please note that any changes to the project which might affect its continued ethical acceptability will invalidate the project's approval. In such cases an amended protocol must be submitted to the Committee for further approval.

It is a condition of approval that you **immediately report** anything which might warrant review of ethical approval including:

- serious or unexpected adverse effects on participants
- proposed changes in the protocol; and
- unforeseen events that might affect continued ethical acceptability of the project.

It is also a condition of approval that you inform the Committee, giving reasons, if the project is discontinued before the expected date of completion.

A reporting form is available from the website at http://www.adelaide.edu.au/ethics/human/guidelines/reporting.This may be used to renew ethical approval or report on project status including completion.

Yours sincerely

PROFESSOR GARRETT CULLITY
Convenor
Human Research Ethics Committee

Appendix E (contd.)

THE UNIVERSITY of ADELAIDE

RESEARCH BRANCH
RESEARCH ETHICS AND COMPLIANCE UNIT

BEVERLEY DOBBS
EXECUTIVE OFFICER
HUMAN RESEARCH ETHICS SUB-COMMITTEES
THE UNIVERSITY OF ADELAIDE
SA 5005
AUSTRALIA

TELEPHONE +61 8 8303 4725
FACSIMILE +61 8 8303 7325
email: beverley.dobbs@adelaide.edu.au
CRICOS Provider Number 00123M

Applicant: Professor T Aspland

School: School of Education

Project Title: **Knowledge and attitude of pre-service teachers in South Australia towards Sexually Transmissible Infections (STIs) and other Blood-Borne Viruses (BBVs)**

THE UNIVERSITY OF ADELAIDE HUMAN RESEARCH ETHICS COMMITTEE

APPROVAL No: **H-213-2011** RM No: 0000012262

APPROVED for the period until: **30 September 2012**

It is noted that this study is to be conducted by Mr Joy Talukdar, PhD Candidate.

Refer also to the accompanying letter setting out requirements applying to approval.

PROFESSOR GARRETT CULLITY
Convenor
Human Research Ethics Committee

Date: 1 SEP 2011

Appendix F

Ethics Renewal Certificate

THE UNIVERSITY of ADELAIDE

RESEARCH BRANCH
OFFICE OF RESEARCH ETHICS, COMPLIANCE AND INTEGRITY

SABINE SCHREIBER
SECRETARY
HUMAN RESEARCH ETHICS COMMITTEE
THE UNIVERSITY OF ADELAIDE
SA 5005
AUSTRALIA

TELEPHONE +61 8 8313 6028
FACSIMILE +61 8 8313 7325
email: sabine.schreiber@adelaide.edu.au
CRICOS Provider Number 00123M

12 September 2012

Professor T Aspland
School of Education

Dear Professor Aspland

PROJECT NO: H-213-2011
Knowledge and attitude of pre-service teachers in South Australia towards Sexually Transmissible Infections (STIs) and other Blood-Borne Viruses (BBVs)

Thank you for the annual renewal report and amendment requested from M J Talukdar dated 3.9.12. I write to advise you that on behalf of the Human Research Ethics Committee I have approved renewal of ethical approval for the project and the request to include a gift voucher prize to student participants as outlined in the email.

The ethical endorsement for the project applies for the period until: 30 September 2015

Participants taking part in the study should be given a copy of the Information Sheet and the signed Consent Form to retain.

Please note that any changes to the project which might affect its continued ethical acceptability will invalidate the project's approval. In such cases an amended protocol must be submitted to the Committee for further approval. It is a condition of approval that you immediately report anything which might warrant review of ethical approval including (a) serious or unexpected adverse effects on participants (b) proposed changes in the protocol; and (c) unforeseen events that might affect continued ethical acceptability of the project. It is also a condition of approval that you inform the Committee, giving reasons, if the project is discontinued before the expected date of completion.

A reporting form is available from the Committee's website. This may be used to renew ethical approval or report on project status including completion.

Yours sincerely

Dr John Semmler
Acting Convenor
Human Research Ethics Committee

Appendix G

E-mail template for participants

Dear Teacher,

Joy Talukdar is currently pursuing his Doctorate at the School of Education, University of Adelaide. His research entails determining the *'knowledge' and 'attitude' perspectives of pre-service teachers in South Australia towards STIs (Sexually Transmissible Infections) and other BBVs (Blood-Borne Viruses)*, which qualifies you for this survey.

Surveys like these abound in education and while they're time consuming to do and can seem pointless, they actually have importance to the profession, since they're usually linked to research that is aimed to improve teaching, learning and societies in general. *No pressure or anything*! This one is, of course, *voluntary* and *anonymous*: that is, while Joy is bound to ask for your consent, you won't be identified in the research, and you don't have to do the survey at all if you choose not to.

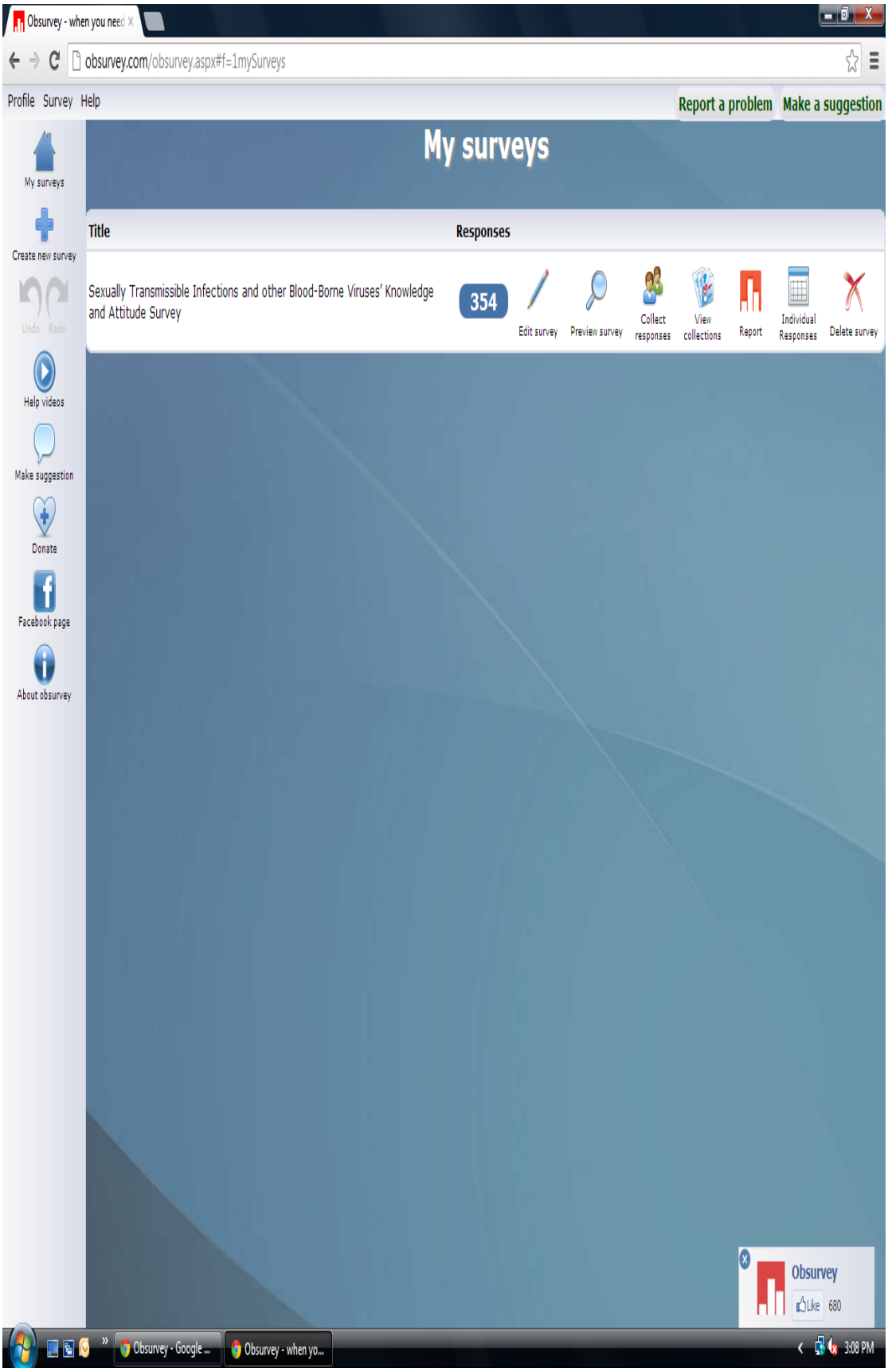
Colleagues, this is what we teachers do as part of our normal professional lives. There's no strict requirement for doing it, except for the outlay in time and being honest in your responses.

Please click or copy/paste in a new browser the link below to start the survey for the **pilot/main study**:

THANK YOU FOR ANONYMOUSLY PARTICIPATING ASAP

Appendix H

Snapshot of the webpage of the main study at 'obsurvey.com'



Appendix I (a)

Frequency and per cent of the identified themes and subthemes of the reasons for an upsurge of STIs in SA (Q64)

Themes	*Frequency (f)*	*Per cent*	*Subthemes*	*Frequency (f)*	*Per cent*
Number of valid responses = 272					
Mis/No Information	116	42.6	Lack of education	80	69.0
			Lack of knowledge	41	35.3
			Naivety/ Ignorance	5	4.3
Individual Attitude/ Behavioural Lifestyle	91	33.5	Risky sexual behaviour	35	38.5
			Sexual promiscuity	32	35.2
			Age of sexual experimentation	27	29.7
			It can't/won't happen to me	10	11.0
			Increased drug/alcohol use	7	7.7
Society	73	26.8	Attitude	48	65.8
			Mass media	29	39.7
			Taboo topic	14	19.2
Contraception	16	5.9	Views/Opinions	10	62.5
			Availability	5	31.3
			Cost	2	12.5
Tests	16	5.9	Frequent/ Accurate	14	87.5
			Irregular	2	12.5
Population	8	2.9	Magnitude	4	50.0
			Migration	4	50.0
Parents	5	1.8	N.A.*		
Other	15	5.5	Miscellaneous	6	40.0
			Antibiotic reliance/ resistance	4	26.7
			Of concern	3	20.0
			Peers	2	13.3
Don't Know	10	3.7	N.A.		
No Response	25	9.2	N.A.		

*N.A. Not Applicable

Appendix I (b)

Frequency and per cent of the identified themes and subthemes of the reasons for the vulnerability of adolescents and young adults to contracting STIs (Q65)

Themes	*Frequency (f)*	*Per cent*	*Subthemes*	*Frequency (f)*	*Per cent*
Number of valid responses = 272					
Individual Attitude/ Behavioural Lifestyle	164	60.3	Age of sexual experimentation	65	39.6
			Risky sexual behaviour	61	37.2
			Sexual promiscuity	47	28.7
			It can't/won't happen to me	43	26.2
			Increased drug/alcohol use	16	9.8
Mis/No Information	135	49.6	Lack of knowledge	72	53.3
			Lack of education	59	43.7
			Naivety/ Ignorance	27	20.0
Society	50	18.4	Attitude	25	50.0
			Taboo topic	23	46.0
			Mass media	10	20.0
Peers	20	7.4	N.A.*		
Contraception	18	6.6	Views/Opinions	11	61.1
			Availability	5	27.8
			Cost	3	16.7
Other	9	3.3	Parents	4	44.4
			Tests	3	33.3
			Miscellaneous	3	33.3
No Response	6	2.2	N.A.		

*N.A. Not Applicable

Appendix I (c)

Frequency and per cent of the identified themes and subthemes of the role of education in general in combating the spread of STIs (Q66)

Themes	*Frequency* (*f*)	*Per cent*	*Subthemes*	*Frequency* (*f*)	*Per cent*
Number of valid responses = 272					
Knowledge/Awareness/ Information	203	74.6	Aspects of disease	220	108.4
			Behaviour modification	43	21.2
			Informed choice	16	7.9
			Realistic education	16	7.9
			Help and support	14	6.9
The Key Role	37	13.6	N.A.*		
Destigmatize	27	9.9	N.A.		
Little/No Impact	14	5.1	N.A.		
Promote Respectful Relationship Education	10	3.7	N.A.		
Other	11	4.0	Integrated into the curriculum	7	63.6
			Miscellaneous	3	27.3
			More enforced in the later years of High School	2	18.2
No Response	9	3.3	N.A.		

*N.A. Not Applicable

Appendix I (d)

Frequency and per cent of the identified themes and subthemes regarding the likelihood of the HPE curriculum in general in providing an effective education to contain STIs (Q67)

Themes	*Frequency* (*f*)	*Per cent*	*Subthemes*	*Frequency* (*f*)	*Per cent*
Number of valid responses = 272					
Inappropriate	125	46.0	More coverage needed	45	36.0
			Too big focus on PE - not enough Health	42	33.6
			Lacking professionalism	26	20.8
			Weak	11	8.8
			Once isn't enough	10	8.0
			Introduced too late	7	5.6
			Too conservative	7	5.6
			School-specific implementation	5	4.0
			Outdated	2	1.6
Appropriate	28	10.3	Sufficient	16	57.1
			Does as much is possible	9	32.1
			Great back up	3	10.7
Other	13	4.8	Educate	6	46.2
			Education doesn't help	3	23.1
			Worked into other subject areas	2	15.4
			Miscellaneous	2	15.4
Don't Know	91	33.5	N.A.*		
No Response	28	10.3	N.A.		

*N.A. Not Applicable

Appendix I (e)

Frequency and per cent of the identified themes and subthemes regarding the proposition of the HPE curriculum as compulsory/non-compulsory under the new SACE (Q68)

Themes	*Frequency* (*f*)	*Per cent*	*Subthemes*	*Frequency* (*f*)	*Per cent*
Number of valid responses = 272					
Non-supportive towards Compulsory HPE	141	51.8	Via information sessions/pastoral care	39	27.7
			Culls subject choice	38	27.0
			Compromises career options	33	23.4
			Not everyone likes HPE	31	22.0
			Informed already	26	18.4
			Delivered earlier	21	14.9
			Compulsion doesn't help	19	13.5
			Only the Health component	10	7.1
Supportive towards Compulsory HPE	114	41.9	The crucial years	53	46.5
			More critical education	32	28.1
			Only the Health component	14	12.3
			Until year 11	8	7.0
			As a non-assessed option	5	4.4
			Worked into other subject areas	5	4.4
Don't Know	4	1.5	N.A.*		
No Response	13	4.8	N.A.		

*N.A. Not Applicable

Appendix I (f)

Frequency and per cent of the identified themes and subthemes regarding the adequacy of the HPE curriculum in addressing STI-related issues (Q69)

Themes	*Frequency* (*f*)	*Per cent*	*Subthemes*	*Frequency* (*f*)	*Per cent*
Number of valid responses = 272					
Inappropriate	134	49.3	More coverage needed	32	23.9
			Weak	20	14.9
			Too big focus on PE - not enough Health	15	11.2
			Lacking professionalism	10	7.5
			Once isn't enough	10	7.5
			Too conservative	8	6.0
			School-specific implementation	5	3.7
			Outdated	2	1.5
Appropriate	30	11.0	Sufficient	12	40.0
			Does as much is possible	7	23.3
			Great back up	4	13.3
Don't Know	96	35.3	N.A.*		
No Response	22	8.1	N.A.		

*N.A. Not Applicable

Appendix I (g)

Frequency and per cent of the identified themes and subthemes regarding the factors responsible for the lack of a comprehensive sex education curriculum in SA (Q70)

Themes	*Frequency* (*f*)	*Per cent*	*Subthemes*	*Frequency* (*f*)	*Per cent*
Number of valid responses = 272					
Teachers	78	28.7	Lack of education	47	60.3
			Stigma	38	48.7
			Attitude	9	11.5
			Age	2	2.6
Society	73	26.8	Attitude	50	68.5
			Taboo topic	23	31.5
			Mass media	4	5.5
Parents	35	12.9	Attitude	27	77.1
			Stigma	5	14.3
			Lack of education	3	8.6
			Age	2	5.7
Government	30	11.0	Attitude	18	60.0
			Political correctness	7	23.3
			Funding	5	16.7
Curriculum	30	11.0	Inconsistent	16	53.3
			Once isn't enough	9	30.0
			Work-ready	9	30.0
Religion	29	10.7	Religious lobby groups	15	51.7
			Religious schools	9	31.0
Schools	29	10.7	Attitude	12	41.4
			Once isn't enough	8	27.6
			Stigma	6	20.7
			Funding	2	6.9
Students	16	5.9	Attitude	8	50.0
			Stigma	8	50.0
Other	7	2.6	Lack of information	4	57.1
			There is no lack	3	42.9
Don't Know	23	8.5	N.A.*		
No Response	35	12.9	N.A.		

*N.A. Not Applicable

Appendix I (h)

Frequency and per cent of the identified themes and subthemes regarding the proposition of a sex education as compulsory/non-compulsory in SA (Q71)

Themes	*Frequency* (*f*)	*Per cent*	*Subthemes*	*Frequency* (*f*)	*Per cent*
Number of valid responses = 272					
Supportive towards Compulsory Sex Education	254	93.4	An important topic	32	12.6
			Parents are not qualified teachers	11	4.3
			Calls for more	8	3.1
			To a certain degree	8	3.1
			All through the school years	7	2.8
			Responsibility of parents too	7	2.8
			Better addressed by professionals	3	1.2
			Regardless of religious beliefs	2	0.8
Non-supportive towards Compulsory Sex Education	16	5.9	Better addressed by professionals	6	37.5
			Responsibility of parents too	5	31.3
			Not as its own subject	4	25.0
			Can promote promiscuity	2	12.5
Other	2	0.7	N.A.*		
Don't Know	2	0.7	N.A.		
No Response	4	1.5	N.A.		

*N.A. Not Applicable

Appendix I (i)

Frequency and per cent of the identified themes and subthemes regarding the proposition of the necessity/non-necessity of STI-related information for pre-service teachers in SA (Q72)

Themes	*Frequency* (*f*)	*Per cent*	*Subthemes*	*Frequency* (*f*)	*Per cent*
Number of valid responses = 272					
Supportive towards Informed Knowledge	235	86.4	To teach the subject	114	48.5
			Pertinent for all	38	16.2
			Informed assistance (regardless of subject)	28	11.9
			Role models	23	9.8
			Student-teacher comfortability	18	7.7
			Student well-being	16	6.8
			Only if teaching	16	6.8
			Self well-being	13	5.5
			"Not until I did this Survey"	9	3.8
Non-supportive towards Informed Knowledge	25	9.2	Not the highest priority	8	32.0
			Only if teaching	8	32.0
			Better addressed by professionals	6	24.0
			Enough work load	4	16.0
			Not based at school permanently	2	8.0
Other	2	0.7	N.A.*		
Don't Know	4	1.5	N.A.		
No Response	11	4.0	N.A.		

*N.A. Not Applicable

Appendix I (j)

Frequency and per cent of the identified themes and subthemes regarding the proposition of pre-service teachers in SA as informed/uninformed of STIs (Q73)

Themes	*Frequency* (*f*)	*Per cent*	*Subthemes*	*Frequency* (*f*)	*Per cent*
Number of valid responses = 272					
Non-supportive towards Adequately Informed	216	79.4	Other exposure than pre-service training	31	14.4
			Needs to be addressed more often	29	13.4
			Not so far	22	10.2
			"Not until I did this Survey"	17	7.9
			Enough work load	2	0.9
Supportive towards Adequately Informed	24	8.8	Sufficient independent knowledge	10	41.7
			Health as a subject	5	20.8
Don't Know	21	7.7	N.A.*		
No Response	17	6.3	N.A.		

*N.A. Not Applicable

Appendix I (k)

Frequency and per cent of the identified themes and subthemes as pertaining to addressing teacher education in SA towards enhancing pre-service teachers' STI-related knowledge and attitudes (Q74)

Themes	*Frequency* (*f*)	*Per cent*	*Subthemes*	*Frequency* (*f*)	*Per cent*
Number of valid responses = 272					
Core Topic at University	82	42.9	N.A.*		
"It's going to happen, deal with it approach"	61	31.9	N.A.		
Information Sessions	57	29.8	N.A.		
Compulsory Teacher Training Component	8	4.2	N.A.		
Better Addressed by Professionals	5	2.6	N.A.		
Separating Health and PE	4	2.1	N.A.		
Other	6	2.2	Depends on the individual need	2	33.3
			Not one solution exists	2	33.3
			Miscellaneous	2	33.3
Don't Know	27	9.9	N.A.		
No Response	47	17.3	N.A.		

*N.A. Not Applicable

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Adams, R. J., & Khoo, S-T. (1993). *Quest: The Interactive Test Analysis System*. Hawthorn, VIC: Australian Council for Educational Research. Abstract retrieved November 12, 2012 from ERIC (Record Details – ED362553) database.

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