School of Education

A Rasch Modelling Approach to Measuring School Need for Psychological Services

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DECLARATION

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

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ABSTRACT

The role and deployment of school psychologists in Western Australia has been reviewed a number of times since the establishment of services to schools. The current practice for the allocation of school psychologists to schools continues to rely on the student population of a school, its socioeconomic index and an appraisal of the school's *difficulty* level. Psychological services are then allocated accordingly, with the decision-making mechanism based on an *ad hoc* conception of school need.

The research reported in this study examined the issue of establishing the aspects or characteristics of schools which constitute a greater or lesser need for services and then attempts to measure this need in an objective, evidence-based manner. The various elements of school need for psychological services in Western Australia are posited to cluster around constructs extrapolated from the domains of service identified by Ysseldyke, Dawson, Lehr, Reschly, Reynolds, and Telzrow (1997), the delivery systems described by Oakland, Faulkner, and Annan (2005) and services delivered in Western Australia (Area Manager Student Services personal communication, 2007; Swan Education District Student Services Plan, 2009-2011; West Coast Education District Student Services Plan 2009-10). The constructs are *characteristics of students, schools* and *teachers*. These constituted the hypothesised theoretical framework for the study upon which the empirical investigation was based.

The aims of the study are, first to make explicit the characteristics of schools, teachers and students that constitute concern and hence indicate the need for school psychological services. Second, to identify the characteristics of schools, teachers and students which differentiate the level of need for psychological services between schools and third, to demonstrate the validity of the instrument development process. The research questions were:

1. Can a rating scale instrument be developed to measure school personnel perceptions of their school's need for psychological services? Specifically, in terms of measurement theory (Wright & Masters, 1982):

    (a) Was there uni-dimensionality?

    (b) Was there qualification?

(c) Was there quantification? and

(d) Was there linearity?

2. Is data from a measure of need for school psychological services associated with school demographic variables (e.g. socio-economic index)?

3. What facets of validity evidence described in the Wolfe and Smith (2007a and 2007b) framework are identifiable in the construction of a measure of school need for psychological services? Specifically:

(a) Evidence of the content aspect;

(b) Evidence of the substantive aspect;

(c) Evidence of the structural aspect;

(d) Evidence of the generalisability aspect;

(e) Evidence of the interpretability aspect;

(f) Evidence of the external aspect; and

(g) Evidence of the consequential aspect?

The methodology chosen for this research is quantitative and applies the principles of Modern Measurement Theory, using the Rasch Rating Scale model for measurement. The research was conducted in three developmental phases, with each phase building upon the preceding phase. First, theoretical framework refinement and item writing; second, developing and trialling a 120-item scale, leading to the third phase, the construction of a parsimonious 35-item scale which was used to measure the psychological service needs of a sample of schools. Careful documentation of the developmental process forms an important and necessary step in formulating a validity argument as evidence to support applications of the new measure. Furthermore, this has crucial implications for the credibility of any inferences that may be drawn from applying the instrument as an intended measure.

In addition, publicly available school-level data were collected, such as socio-economic index, suspension and exclusion data, truancy, and students with individual behaviour management plans. The study identified examples of six aspects of validity evidence in the empirical investigation of school need for psychological services. This confirmed the usefulness of the multi-level theory of validity evidence postulated by Wolfe and Smith (2007a and 2007b). In addition, the analyses and graphical displays generated by the RUMM2020 computer program (Andrich,

Sheridan, Lyne & Luo, 2005) proved invaluable in illustrating validity evidence. The measure of school need for psychological services was found to be significantly related to student suspensions data.

The empirical findings of the study are discussed in the context of their application to informing decisions about the level of psychological services that should be provided to schools, congruent with measures of need for such services.

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Chapter One

Introduction

Overview

This thesis is about the school psychology profession in Western Australia. In particular, it explores how school psychology services evolved and examines contemporary school psychology practices against international calls for reform of the profession. The changing context of services is examined. Questions are raised concerning the apparent reluctance of the profession to bring about change, particularly that of moving away from a traditional medical model orientation in favour of an expansive multi-dimensional suite of services. The West Australian School Psychology Services enjoys an enviable psychologist to student ratio of 1:1,203. Survey data in the United States found that favourable ratios were associated with more expansive services (see Reschly, 2000). This has yet to be fully realised in Western Australia. Psychologists have historically been allocated to schools on the basis of school demographic data coupled with a subjective notion of "school difficulty". Together, these factors have determined the quantum of service provided to each school. Determining psychological services needs for schools has been a perennial problem for schools and school psychologists. The basic thrust of this research focuses on developing a measure of school need for psychological services that will satisfy the criteria for fundamental measurement (see Wright & Masters, 1982).

The Problem

Psychological services to government schools in Western Australia are allocated at local level by a decision-making mechanism based on an *ad hoc* conception of school need. Consequently, differential resourcing of schools, which does not include characteristics that are associated with need, remains problematical.

The momentum of the thesis derives initially from the author's interest in the problematic issues inherent in the manner in which a finite number of school psychologists in an education district are deployed across increasing numbers of new

primary, secondary and special needs facilities. Such increases are evident in the two districts chosen for the study. In addition, the rapidly changing nature of schooling requires an appropriate response from the school psychology service.

Current deployment practices in both districts are *ad hoc* rather than objective; the allocation of psychologists to schools is based on variables at school level, such as student population, socio-economic status (SES) and anecdotal notions of school difficulty. Such considerations are then used to inform decisions about the school's level of need for psychological services. Because of the subjectivity of this process, the aim of this research project is to develop a linear scale to measure schools' need for psychological services based on a posited theoretical framework. The study intends to identify the performance characteristics of schools, teachers and students that contribute to a potential need for school psychology services and to differentiate levels of needs among schools within the target districts. Establishing need would be a beneficial addition to the current process of deploying psychologists to schools.

The Research Investigation

The researcher has many years experience in managing school psychologists and developing innovative, comprehensive services within the West Australian government school system. The motivation for the research arose for a number of reasons. These were:

- Various reforms and re-structures of the service have changed little at the point of delivery;
- Anecdotal information reports a widely held view among school psychologists that the service, since its inception, was essentially good and operational changes were not necessary. This was reinforced by the belief that as school psychologists were trained in both teaching and psychology, they were ideally placed to decide what services were needed by schools;
- The absence of a needs-basis criterion in the formula for allocating school psychologists to schools; and
- The researcher believes it is possible to construct an instrument to measure school need for psychological services.

The aim of the research is threefold: first, to make explicit those characteristics of schools, teachers and students that constitute concern and hence a need for school psychological services; second, to construct a linear scale in accordance with the principles of fundamental measurement; and third, it is critically important to ensure the validity of the instrument development process. The research has been conducted in three phases with each phase building upon the preceding phase. The three phases are: Phase One, Item Writing; Phase Two, The 120-Item Instrument; and Phase Three, Validity Evidence.

Context of the Research

The study is set within two Department of Education school districts in Metropolitan Perth. The two districts have, superficially at least, similar structures and modus operandi. District One, characterised by disadvantage and significant welfare issues, featured target schools with socio-economic indices from 87.64 to 107.77. Most indices were at the lower end of the range. A low index indicates social disadvantage. The schools of District Two, perceived as middle class and professional, were classified with socio-economic indices from 99.71 to 116.10. Most of the schools' indices were greater than 103. The client schools, the recipients of school psychology services, in addition to different socio-economic parameters, were expected to show different student characteristics and perhaps also to show different parental aspirations for their children's success in achieving academic, behavioural and life skills outcomes.

Research Focus and Questions

The focus of the research has been to develop an objective measure of school need for psychological services, in accordance with the principles of Modern Measurement Theory. The Rasch Rating Scale model (Andrich, 1978; Andrich, Sheridan, Lyne, & Luo, 2005) was chosen to develop a linear scale to attain the measure. In addition, to test the validity of the development process, the re-conceptualisation of construct validity illustrated by the Wolfe and Smith (2007a; 2007b) framework was utilised. The framework encompasses seven aspects of validity evidence. These are the content aspect, the substantive aspect, the structural aspect, the generalisability aspect, the external aspect, the consequential aspect and

the interpretability aspect. The seven aspects of validity were applied as standards to examine examples of validity evidence in the tables of results and graphical reports generated by the Rasch analyses of the data. The study addresses three principal research questions, as follows:

1. Can a rating scale instrument be developed to measure school personnel perceptions of their school's need for psychological services? Specifically, in terms of measurement theory (Wright & Masters 1982):

   (a) Was there uni-dimensionality?
   (b) Was there qualification?
   (c) Was there quantification? and
   (d) Was there linearity?

2. Is data from a measure of need for school psychological services associated with school demographic variables (e.g. socio-economic index)?

3. What facets of validity evidence described in the Wolfe and Smith (2007b) framework are identifiable in the construction of a measure of school need for psychological services? Specifically:

   (a) Evidence of the content aspect;
   (b) Evidence of the substantive aspect;
   (c) Evidence of the structural aspect;
   (d) Evidence of the generalisability aspect;
   (e) Evidence of the interpretability aspect;
   (f) Evidence of the external aspect; and
   (g) Evidence of the consequential aspect.

Significance of the Study

The allocation of psychologists to government schools in Western Australia has, to date, been based on demographic-based methodologies, because of the paucity of research on determining what psychological services are needed by individual schools. This study, which is based in two education districts in metropolitan Perth, endeavours to fill this gap in the research by proposing three critical aspects of schooling that contribute to the need for psychological services.

These are: characteristics of students, characteristics of schools and characteristics of teachers. Each of these theoretical parameters of need is explained in greater detail in Chapter Five.

As the research is a new area of study there were no available instruments to measure aspects of school need for psychological services. Indeed, education authorities have not explored the benefits that an objective measure would bring to the procedures for allocating school psychologists to work in schools. This study of school psychology services is distinctive, in that it is underpinned by the principles of Modern Measurement Theory. A linear scale is developed using the Rasch Rating Scale model (Andrich, 1978) for measurement. The scale items were arranged in a hypothesised order of difficulty to affirm from easy to hard. This order was generally confirmed by the obtained measures of item difficulty. A suggested explanation for this result is offered in Chapter 7 .

The aim of the study is to demonstrate to Senior Officers, Regional Executive Directors and Lead Psychologists of the Department of Education, that the results of the study will be helpful in determining the levels of services to be delivered to individual schools. It is anticipated that schools will receive psychological resources commensurate with measured need, after school demographic factors have been applied (see Lazari, 2011).

Finally, it is hoped that the study will be acknowledged as a worthwhile contribution to the effective delivery of school psychological services in Western Australia.

Definition of Terms

An explanation of each of the technical terms used in the study is now presented.

True Score Theory or *Classical Test Theory* was the traditional approach to measuring person attributes in education and the human sciences. An underlying assumption of this approach is that an individual's raw score comprises a true score constituent and a random error constituent. Consequently the obtained 'measure' is

not linear, since equal differences between parts of the 'measure' do not illustrate equal amounts of the 'measure'.

Rasch measurement places raw data into a probabilistic framework and transforms the data into equal-interval scales by converting raw scores to their natural logarithm (Bond & Fox, 2007). This is a logarithmic transformation of the success-to-failure odds in affirming a test item. These are shown on a *logit* (log odds unit) scale. The model is predicated on the notion that persons are more likely to answer easy items correctly than they are difficult ones, and all items are more likely to be passed by persons of high ability than by those of low ability. As a result, item difficulties and person abilities can be calibrated on the same linear scale. Rasch analyses can detect patterns in the data that would not be found using classical statistical methods.

Latent trait refers to a variable that cannot be directly observed or is physically evident. The trait under enquiry in this study was school personnel (teachers and principals) perceptions of their school's need for psychological services. The data are required to fit the model and to do so the seven sub-constructs are required to show the presence of the latent trait. Responses to the items comprising the instrument are deemed to be indicators of the level of presence of the trait of interest.

Unidimensionality is the term given to a focus on measuring a single dimension of an object of interest at a time. For example, attempts to measure the physical characteristics of objects such as a motor vehicle are best served if only one aspect is measured at a time. A vehicle has many attributes and it is only by considering its length, height, weight, width or colour separately that meaningful estimations of the vehicle can be achieved.

Summary Test-of-Fit Statistics examines the response patterns for teachers across items and also for items across teachers. Test-of-fit is determined by the difference in value between the expected scores summated for all items for each teacher and for all teachers summated for each item. When the data fit the model, the analysis approximates a distribution whose mean value is close to zero and a standard deviation close to one.

Item-trait Interaction is shown by a Chi Square statistic and its fit probability, which tests whether or not a unidimensional scale has been constructed in accordance with

Rasch model requirements. It shows the consistency of judgements of item difficulties, across the range of respondent measures on the scale. A total Chi Square probability value > 0.05 suggests that the data characterise a unidimensional trait. *Person Separation Index* is a RUMM2020 (Andrich, Sheridan, Lyne, & Luo, 2005) statistic, which is an estimate of true score variance among the teacher respondents and the estimated observed score variance. This is achieved by applying estimates of teacher ability measures and the standard errors of these measures (Andrich & van Schoubroeck, 1989). The index is interpreted as an indication of the scale's internal consistency or reliability. Indices close to 1.0 are said to be ideal, indicating that the teacher measures are located along the scale and are separated by more than their standard errors.

Item Thresholds are the estimated difficulties in choosing one response over another (for example, the difficulty in choosing response category 2, "strongly agree", over response category 1, "agree"). Item thresholds can be estimated to specify the person ability estimate at which there is an equal probability (a 50:50 chance) of choosing one of two contiguous response categories. Thresholds for rating scale items are illustrated as the intersection of the item probability curves for each response category.

Item Characteristic Curves (ICC) are generated by RUMM2020 to show the relation between the anticipated value for items and teacher locations measured in logits. The ICC indicates the extent that items discriminate between teachers with different ability locations on the scale. Observed scores for class intervals are plotted on the ICC. The ICC shows whether or not observed scores are acceptably close to those predicted by the model.

Targeting is illustrated by a teacher-measure, item-difficulty graph in which both person ability and item difficulty are plotted on the same scale. The graph demonstrates how well the items and abilities of teachers are matched. Good targeting is seen if there are no gaps in the item distribution with a sufficient number of easy and difficult items across the teacher ability range.

The Government School System in Western Australia

At the time of this research, the government school system comprises 768 schools with a total student population of 257,000. The Department of Education employs 32,915 full time equivalent teachers. Public schools provide a comprehensive general education in pre-compulsory, primary and secondary schooling across 14 education districts. Approximately 73.2% of students are enrolled in schools within four education districts in the Perth metropolitan area. This study is based on the metropolitan districts of Swan (102 schools with a total student population of 39,158) and West Coast (122 schools with a student population of 51,946). School support programs target individual students with recognised needs and provide general support to schools to improve the educational outcomes of all students. The School Psychology Service is located within the School Support Programs Division of the Department of Education and provides specialist support to schools in the areas of student behaviour, learning, and mental health and wellbeing. This is achieved by working with school administrators, teachers, students and parents to make improvements that are beneficial for all students.

Structure of the Thesis

Chapter Two presents the Literature Review, which provides the background to the research and the need for service delivery reform as indicated in the more recent international research. This leads to a fuller discussion of the nature of school psychology and its evolution internationally. The chapter continues with an examination of the development of the profession in Western Australia and a description of contemporary practice in state government schools. Mechanisms by which psychologists are deployed to schools are examined next. A critical gap in the literature is that little attention has been given to identifying school factors that warrant a need for psychological services. A theoretical framework informed by the relevant literature is then proposed, around which the study to measure school need for psychological services is organised. Embedded in the model are the key attributes of school need: characteristics of students, characteristics of schools and characteristics of teachers.

Chapter Three examines calls for re-conceptualising school psychology and the profession's contemporary and future goals. Barriers preventing the implementation of reforms are then presented. A number of conclusions drawn from the literature review provide a summary of service reform requirements and the training needs to realise these. This is followed by a set of proposals that include dimensions of service delivery for the School Psychology Service needed to meet the changing demands of today's schools.

Chapter Four explains the limitations of traditional approaches to measurement, such as True Score Theory. The rationale for applying Modern Measurement Theory, in particular the Rasch model for measurement, is presented.

Chapter Five establishes the methodology underpinning the research, including research questions, research approach, research design, instrument development and measurement processes. The study was conducted in three phases, each phase building upon the preceding phase with the intention of developing a linear scale. Ensuring validity of the development activities was critically important. This was achieved by applying the Wolfe and Smith (2007a; 2007b) model of validity evidence to audit the instrument development activities during the three phases of the study. The chapter finishes with a discussion of any inherent ethical issues that may impinge on the study.

Chapter Six provides a summary of the results of the qualitative data collected in Phase One. This includes detailed written feedback on the initial 123-item draft questionnaire and interviews to document suggestions for improvement. Rasch data analyses during instrument development and refinement (Phase Two) are then presented. These include explanations of the statistical tables and graphical displays generated by the Rasch model analyses. Instrument refinement produced a parsimonious 35-item scale comprising items showing excellent data-to-model fit, good coverage of the sub-construct domain, and a range of difficulties that matched person abilities.

Chapter Seven initially identifies the links between gaps in the research literature and questions that inform the study. For example, research with a focus on school need for psychology services and how school psychologists are allocated to

schools has not received attention to date. The West Australian School Psychology Service has used a variety of mechanisms, with little evidence of validity, to deploy school psychologists to government schools. The mechanisms are based primarily on school demographic factors (Lazari, 2011; Skivinis, 1991). To fully understand school needs a metric is required, preferably informed by the requirements of Modern Measurement Theory. The chapter then describes how the theoretical framework was successfully applied in a three phase study to develop a linear measure of school need for psychological services. The close links between the constructs of the framework and the scale items applied to generate the measure are demonstrated. Finally, the chapter indicates practical applications of the findings and how the research contributes to the literature on the provision of school psychological services in Western Australia.

Chapter Eight is concerned with answering the research questions. In particular, identifying what types of validity evidence could be detected in the study. Examples of evidence are then audited against aspects of validity evidence featured in the Wolfe and Smith (2007a and 2007b) unified validity framework. The chapter continues with a description of the limitations of the study. This is followed by suggestions for further research on this topic. The chapter concludes by summarising the implications for educational administrators and principals, school psychologists and teachers.

Chapter Two

Literature Review

Overview

Since the late nineteenth century, school psychological services have been an integral feature of public education in all industrialised nations. The chapter begins with an examination of the development of school psychology. Such development has been influenced by changes to schools due to social and economic factors. The next section focuses specifically on the development of school psychology services in Western Australia and explores the tensions existing between the child-centred tradition and an ecological orientation that includes a more expansive range of indirect services. Contemporary school psychology services in Western Australia are then described, plus the need for training programs to support the expansion of services to be delivered to government schools. The chapter concludes with a proposed model for school psychology services in Western Australia. The importance of determining school need for psychological services as a prerequisite before allocating school psychologists to schools is discussed. The theoretical framework leading to the research study, by which this can be achieved, is then presented.

Context

School psychological services must adapt to meet the changing needs of schools in the twenty-first century. The literature is replete with debate on necessary changes in the role and functions of school psychologists (Bradley-Johnson & Dean, 2000; Denholm, Collis, Garton, Hudson, McFarland, MacKenzie & Owens, 1998; Zaki, 1982). Political, social and economic factors have impacted significantly on the nature of schooling in the developed western economies, with greater numbers of single-parent and low-income families, working mothers, immigrant groups and violent incidents in schools and the community (Paisley & Borders, 1995; Swerdlik & French, 2000; Sheridan & Gutkin, 2000). Despite calls for reform, they have yet to take hold at a grassroots level in North America (Sheridan & Gutkin, 2000). In Australia, however, school psychologists have become increasingly engaged at the

systemic level in schools, as evidenced by school-wide approaches to student health and well-being, welfare and discipline, as well as to aspects of curriculum development (Oakland, Faulkner & Annan, 2005). This is also the case in New Zealand, where the educational psychologist's role, in response to local reforms, is now described as an "idealized community psychology" because practitioners have moved away from an individual student framework to serve communities as well as schools, through ecological contextualised practice (Oakland, Faulkner & Annan, 2005, p. 13).

The literature on school psychological services provision in Australia, New Zealand and the United States demonstrates more similarities than differences. This is due, in part, to the fact that all countries have immigrant populations, their economies and government school systems are flourishing, they have English as a first language and their respective psychology professions are grounded in the values of Western style psychology based on respecting individual differences (Oakland et al., 2005). School psychological services in these countries are readily identified within the domains posited by Ysselkyke, Dawson, Lehr, Reschly, Reynolds and Telzrow (1997). These domains can be identified in service provision in Western Australia and can be summarised as: behaviour management; psycho-educational assessment of students at educational risk and of students eligible for special educational placement; student mental health and well-being; retention and participation of isolated, withdrawn or truanting students; crisis and risk management; and evaluation of gifted and talented students (C. Griffiths, personal communication, February 3, 2009).

The Australian context, within which school psychologists operate, has altered significantly in recent years (Denholm, Collis, Garton, Hudson, McFarland, MacKenzie & Owens, 1998). These changes highlight the need for practitioners to fully develop roles in: (a) psycho-educational evaluation and assessment interventions; (b) interventions to optimise educational services to students; (c) consultation and collaboration with parents and school staff; and (d) program development supervision. Notwithstanding identification of need, there is a lack of information about what school psychologists actually do in providing services to schools and students.

The Development of School Psychology

In this section, school psychology development in Western Education Systems is described with particular reference to the United States of America (USA) and Australia. School psychology began in the USA in the late nineteenth century, following a paradigm shift in psychology and changing social attitudes that saw children as important *per se*, and not solely as exploitable economic contributors to the work force (Fagan, 1992). Several factors created a demand for psychological services in the nation's schools (Metcalfe, 2001): the introduction of a range of social reforms including compulsory schooling legislation enacted and enforced between 1890 and 1930 (Braden, DiMarino-Linnen, & Good, 2001): juvenile courts; mental health services,; and vocational guidance and agencies providing services to children. As student numbers increased, educators became aware of increasingly wide student variability in physical health, educational needs, mental health and personal hygiene. Eventually, special classes for atypical students were established. This provision of special education generated a greater need for school psychologists because of the requirement for psychologists to identify students with special needs (Fagan & Wise, 2000).

The first psychological clinic in the USA was established in 1896 by Lightner Witmer, who succeeded James McKeen Cattell as head of the University of Pennsylvania's psychological laboratory. Witmer's major focus was the observation of individual differences and mental testing of the individual child. In addition, as Lambert (1993, cited in Braden et al., 2001) points out, Witmer's work included an orthogenic approach, examining normative aspects of child development and deviations from the norm. Alternatively, the then president of *The American Psychological Association,* Hugo Munsterberg and a colleague, E. L. Thorndike, also a student of James McKeen Cattell, were interested in applying child and experimental psychology to classroom instruction and organisational efficiency (Fagan, 2005). Witmer's approach to the study of children focused on prevention and intervention programs for individuals who deviated from the norm. This is clearly recognisable in modern school psychology practice. Witmer and Thorndike were the founders of the professional and scientific basis of school psychology practice. The school psychology literature continues to reflect variations in service delivery models as a result of this earlier fundamental difference in emphasis (see the *School*

Psychology Review, 2002 series), although both child-centred and school-oriented traditions were clearly committed to improving children's life experiences. Additionally, Bardon (1994) suggests that schools in the United States of America, due to their bureaucracy, have tended to restrict the practice of psychology to psychometric-related activities which have marginalised school psychologists as minor contributors to the process of schooling.

Fagan and Wise (2000) describe American school psychologists from 1890 to 1969 as a blend of many types of educational and psychological practitioners, whose dominant role was that of psycho-educational assessment for special class placement. These authors refer to this developmental period as the *hybrid years*. The time from 1970 to the present is described as the *thoroughbred years*, characterised by rapid growth in school psychology training programs, professional associations, a burgeoning research literature and regulations appropriate to school psychological service delivery. Trends evident during the 1970s and 1980s showed a focus on assessment, training and service delivery while the 1990s revealed a noticeable movement towards indirect services and greater regular classroom interventions.

In 1975, special education provision in the United States followed Public Law 94-142 (*Education of All Handicapped Children Act*), which when passed, excluded almost one million students from public education, and a further 3.5 million did not receive appropriate educational services (Hanley, 2003). This legislation was subsequently re-authored as *Individuals with Disabilities Act, IDEA*, 1997, and further amended in 2004. The 1997 amendment argued for a shift in assessment practices away from classifying children for special education purposes towards identifying resources and interventions to promote functional outcomes for all school students. Consequently, this amendment mandated the inclusion of all students in public schools and led to *No Child Left Behind* (2001) Public Law 107-110, a plan for school reform to improve education for all children by raising standards and to help all children to reach those standards.

In Australia, Jacobs (1986) and Ryle (J. Ryle, personal communication March 12, 1984) report a similar dichotomy between child-focussed and school-focused practice in the States of Victoria and Western Australia respectively. School psychologists in Western Australia continued to retain a gatekeeper function for

entry to special education programs. As a result, primary school teachers often suggested that it was in a student's best interest to attend a special education facility rather than remain in their current school. Oakland and Saigh (1992, cited by Oakland, Faulkner, & Annan, 2005), note that the growth of Australian school psychology has, in general, been readily identifiable with developments in other western countries. Faulkner (1993) reports that Australian school systems placed emphasis on group intelligence tests in the upper primary school years for subsequent streaming purposes in secondary schools. Consequently, psychologists became servants of the selection and classification system, as testing was seen as their most important professional task. This contribution and its acceptance by teachers, *"gave it an inertia resistant to change"* (Faulkner, 1993, p. 158).

Western Australia introduced similar reforms to those introduced in the United States of America, following *No Child Left Behind* (2001). It was believed that a continuum of services, if made available in regular schools, would enable students with disabilities to receive the appropriate degree of needed support. Consequently, these provisions maintained the mandated testing and categorical identification of students for education support classes, centres and schools (Vickery, 1984).

The research literature of the USA continued to feature articles urging school psychologists to alter their practices to provide optimum services to the largest number of students by means of more indirect delivery, especially consultation, professional collaboration and inter-agency co-operation. Reschly (2000) reports that school psychology flourished in the 1990s, ratios of school psychologists to students improved, the demand for school psychological services increased and legal provisions ensured appropriate levels of funding. Roles and functions have become increasingly complex during the past twenty years, with the enactment of the special needs reforms previously presented. As a result of these reforms a decline, over time, in the use of intelligence tests in determining placement eligibility for special education was to be expected (Canter, 1997). Canter predicted that in the near future there would be a greater emphasis on instructional needs and student intervention to increase student performance, rather than the diagnosis of student shortcomings. This prediction is explicitly articulated in Western Australia following the introduction of *Schools Plus: Resourcing Informed Practice Handbook* (2006) regarding funding for

students with disabilities. However, there is some evidence that the practice of intellectual assessment has not significantly diminished in Western Australia (Jimerson, et al., 2006), as school psychologists ranked psycho-educational assessment second among preferred role activities, with indirect services and prevention services ranked fourth and seventh respectively. A similar picture is evident in Scotland (Kennedy, 2006) and England (Farrell, Jimerson, Kalambouka, & Benoit, 2005). Interestingly, two decades ago, Towler (1988) reported that in Western Australia school psychologists expressed a preference for developing a range of indirect services but that schools preferred the traditional direct child-centred service that included intellectual assessment.

The Development of School Psychology in Western Australia

School psychological services in Western Australia originated in 1941 as a rudimentary careers guidance service, with the secondment of a teacher to serve as a careers officer in schools. The secondment became a permanent position in 1943. By 1945, the focus of the original service shifted with the appointment of Guidance Officers, who initiated counselling for high school students deemed to need psychological counselling. Principals and School Welfare Officers referred students to guidance officers. At this time, most secondary schools in the Perth metropolitan area had a dedicated guidance officer, while in rural schools the ratio was nearer one guidance officer to two schools. The service was further expanded so that at the end of the 1940s, teams of guidance officers offered a range of services, including vocational guidance, psychological diagnosis and "treatment of problem children", group intelligence testing, counselling primary aged students transferring to secondary schools and meeting the needs of students with intellectual disabilities (Young, 1985).

In 1951, the Superintendent of Guidance assumed responsibility for developing programs and facilities for children with special needs. Initial placement and later transfer within Special Education were achieved in consultation with the Superintendent of Primary Education. Referrals increased dramatically over the next five years and by the middle of the decade, approximately 12,000 students across the system were receiving services. At the same time, preventive services in the form of early screening tests of Years One and Two students were developed in line with

research indicating that "educational retardation" was often associated with the quality of experiences in the early years of schooling. Attention was also given to student transition from primary to secondary school, and guidance officers began to provide secondary colleagues and teachers with student data in the areas of "potential, attitudes, behaviour, health and ambition" (*Guidance Branch Policy*, 1985, p. 5). Students entering secondary school after counselling were allocated to classes according to their Year Seven group intelligence test data and personal reports. In 1959, a number of teacher-counsellors were appointed to conduct routine psychometric testing and counselling. However, those students presenting with particular needs were referred to guidance officers. Services continued to expand along these essentially psychometrically focussed lines, reflecting international trends.

By the 1960s, models with a greater preventive and behaviourist emphasis were more evident, complementing the existing psychometric tradition and reflecting the considerable gains in guidance officers' skills and awareness of the theoretical bases of counselling. Over the next 20 years, these services were supported by developments in personal counselling, group work and school-based systemic approaches to student behaviour management (personal communications with former District Guidance Officers). During the late 1960s, student discipline in secondary schools had emerged as a major concern. Consequently, as a result of a departmental enquiry, the *Dettman Report* (1972) recommended that corporal punishment should be phased out and replaced with other methods to deal with student misbehaviour. In 1982, the Western Australian Secondary School Principals Association drew attention to the adverse effects disruptive students were having on teacher morale and the public image of government secondary schools. The association reported increasing numbers of students electing to transfer to the non-government sector as a consequence. Work on a range of alternative behaviour management strategies designed to replace corporal punishment began following recommendations of the Louden (1985) report, *Disruptive Behaviour in Schools: Report of the Ministerial Working Party*. As recommended, a guidance officer was seconded to the Teacher Development Branch to facilitate collaborative work with a number of schools who expressed an interest in developing a whole school approach to minimising disruptive student behaviour. The resulting pilot study that emerged was gradually

expanded, and eventually led to the establishment of a systemic school-wide program to manage disruptive student behaviour (see *Managing Student Behaviour: A Whole School Approach*, 1989).

In 1983, the newly elected government in Western Australia commissioned a far-reaching enquiry into education across the state. *The Beazley Report*, *Education in Western Australia: Report of the Committee of Enquiry into Education in Western Australia* (1984) made recommendations that impacted significantly on the services offered by guidance officers. These were:

- Raising literacy and numeracy standards;
- Improving transition practices between primary and secondary schooling;
- Greater focus on the lowest achieving students;
- Provision of test materials and other resources to enable teachers to monitor and assess student achievement;
- Entry and exit criteria related to units for students with disabilities be made public;
- Adoption of early screening of students with special needs;
- Support for the abolition of corporal punishment, noting the relationship between a school's ethos and its success in dealing with student discipline problems;
- Support for a whole school approach to disruptive behaviour; and
- Development of a formal suspension system as an authoritative sanction to manage disruptive behaviour.

In response to the recommendations, the *Guidance Branch Policy* (1985) advocated the creation of senior specialist positions in the areas of learning, behaviour management and vocational education decision-making. The Guidance Branch Superintendent established working parties to identify core competencies in each of these three specialist areas of service provision. However, major reforms of the Ministry of Education following implementation of the *Beazley Report* (1984) were then under way and subsequently prevented the implementation of Guidance Branch plans for program development and restructuring during the years 1986 and 1987. Also, major structural changes in Central Office subsequently led to the establishment of twenty-nine education districts across the state system. The new

structure replaced the existing regional arrangements for the start of 1988. The central Directorate of Guidance and Special Education was disbanded. The permanent staff was absorbed into the new interim organisational units of Student Services and Education Support, many of whom were deployed to the newly created districts.

As a result, an interim Student Services Team, which included social workers and school attendance officers, emerged in each of the twenty-nine education districts. This arrangement remained in place for several years. Meanwhile, a review of student services in 1987 by the student services section of the curriculum branch revealed that the Ministry of Education (currently the Department of Education) was under pressure at the school, district office and central office levels to increase services provided to school age children. A report of the review process indicated that other government agencies such as the Department of Employment and Training, the Police Department, the Health Department and the Department for Community Services urged the Ministry of Education to take more responsibility for the welfare needs of their clients (see Frizzell (1988), *Student Services 1989 and Beyond: A Framework for Student Service Delivery*). These agencies cited recent reports on *Troubled Youth, Homeless Youth, Domestic Violence, Victims of Crime, Drug Misuse, Psycho-Socially Deprived Youth, Adolescent Suicide and Child Abuse and Neglect*. A number of agencies were already introducing programs which would have a direct impact on schools. School pastoral care and psychological services experienced increased expectations to participate in the amelioration of these identified social problems faced by school students.

Student Services Teams became over-stretched because they were expected to deal with a range of child welfare issues in addition to the major role of supporting teachers. The discussion paper *Student Services 1989 and Beyond: A Framework for Student Service Delivery* suggested that schools would need Student Service Team support in the following areas:

- Students with special learning needs;
- Behavioural intervention;
- Counselling;
- Truancy;

- Careers exploration;
- Student health and welfare;
- Inter-agency liaison; and
- School-home liaison (Frizzell, 1988, p. 5).

Delivery of these services would be achieved by functional intervention at the individual student, group and systemic levels in factors that affected the learning environment of students. The discussion paper then provided a brief structural outline of a possible *School Psychological Service*, which was established to take effect for the start of the 1991 academic year by the *Memorandum of Agreement* in 1990 between the Ministry of Education and the State School Teachers' Union of W.A. For the first time, the Ministry of Education stipulated what school psychologists should do, how they were required to do it and that they must be accountable for what they did. Devolution of responsibility was the basis of these reforms. The management of school psychologists was transferred to the districts where they became part of a support system that was required to respond to the needs of local school communities (Bant, 1991).

Since then, several Central Office restructures and district reconfigurations (1994 and 1997) have been implemented to provide greater local management responsibility for services to students. A feature of the Western Australian school psychology since that period has been an increased diversification of services to schools, students and their parents. These additional requirements were brought about by new legislative frameworks and central policies and initiatives from 1997 and subsequent years. These included:

- *Curriculum Framework* (1997). Perth: The Curriculum Council;
- *Making the Difference, Students at Educational Risk* (1998). Perth: Ministry of Education;
- *The School Education Act* (1999). Perth: Government of Western Australia;
- *Pathways to the Future: A Report of the Review of Educational Services for Students with Disabilities in Government Schools* (2004). Perth: Department of Education and Training;
- *Building inclusive schools: A professional training package* (2003). Perth: Department of Education and Training.

- *Disability Discrimination Act Standards for Education* (2005). Canberra: Commonwealth Government of Australia;

- *Schools Plus: Resourcing Informed Practice Handbook* (2006). Perth: Department of Education and Training; and

- *Disability Action and Inclusion Plan* 2007-2008 (2006). Perth: Government of Western Australia.

As a result of such initiatives, some aspects of school operations changed, and consequently, so did the support and psychological services required by schools. These changes were accompanied by a steady accrual of additional tasks to improve student academic performance, managing student behaviour and student and staff health and well being. In addition, school staff needed training in the new reporting requirements for instances of child abuse and the management of students with disabilities. In particular, the outcomes-based education introduced by the *Curriculum Framework* (1997) led to a greater need for and emphasis on curriculum-related psychological interventions. This was evidenced by the Swan and West Coast Education Districts' operational plans that included comprehensive welfare, health and well-being services for students, parents and school communities in addition to their primary focus on individual student behaviour and learning. This focus on the individual student was known as *the medical model* which is discussed in more detail in the next section.

The Medical Model

The school psychologist's role has been closely associated with assessing and diagnosing students identified by teachers as not maintaining educational parity with their peers (Murray, 1996). School psychologists were routinely used for identification of learning difficulties (Bardon, 1994; Fine & Holt, 1983; Murray, 1996) and this assessment role continues to be conspicuous in many services, as it reflects the predominant training paradigm that existed from the 1950s to the present. It relies heavily on the medical model, which encourages professionals to concentrate on assessing, diagnosing and treating students referred for learning and/or behaviour difficulties (Sheridan & Gutkin, 2000). A commonly held view was that individual differences could only be understood by means of data obtained from testing instruments, including both norm and criterion-referenced ones. Some practitioners

may, therefore, have been pre-occupied with finding a diagnosis for labelling students, rather than with providing useful data for teachers to facilitate jointly planned intervention programs.

The focus on providing assessment-related services resulted in psychologists becoming trapped in a cycle of reactive rather than proactive responses to school and student needs. This reinforced the perception that school psychologists were more concerned with problem identification than with problem resolution and prevention. By focusing almost exclusively on student-related deficiencies (LeCapitaine, 2000) and learning problems, the medical model encouraged school psychologists to both ask and answer the wrong questions (Conoley & Gutkin, 1995, cited in Sheridan & Gutkin, 2000). On the other hand, there were often legitimate reasons for applying the medical model. Namely, to establish eligibility for education support purposes, as this was mandated by the legislative framework in Western Australia such as *The School Education Act*, (Government of Western Australia, 1999) and in the United States *Individuals with Disabilities Education Act Amendments*, (United States Congress, 1997).

The shortcomings of the traditional medical model of practice have been well documented in the literature, (Braden, DiMarino-Linnen & Good, 2001; Bradley-Johnson & Dean, 2000; Dawson, 2000; Elias, Zins, Graczyk & Weissberg, 2003; Faulkner, 1993; Hosp & Reschly, 2002; Lambert, 2000; Larney, 2003; Miller & Leyden 1999; Nastasi, 2003; Paisley & Borders, 1995; Reschly, 2000; Sheridan & Gutkin, 2000; Walsh et al., 2002; Weist, 2003; Ysseldyke, 2000). Elias et al. (2003) report that school psychologists and other school support staff are frequently expected to "fix" students who have withdrawn from the system, while the system itself continues to generate further educational and social casualties. The core business for schools is to improve student academic achievement. Bernard (2006) recognises that students' social and emotional development plays a crucial role in their academic achievement. Sustained effective intervention to enhance the social and emotional aspects of student development is also seen by Elias & Dilworth (2003) as a priority for building effective learning environments that contribute to academic success.

Sheridan and Gutkin's (2000) cogent analysis of traditional practice draws attention to the medical model paradigm's faulty conceptualisation of presenting problems and inadequate interventions. The consequence of this approach is that training programs for practitioners have focused mainly on assessment, diagnosis and management of the within-student difficulties of referred students. School psychologists have attempted to deal with the ever-increasing range of psychosocial problems emerging in contemporary American schools in this way. Such a focus is limiting and the problems that impact negatively on school success and post-school options (Crockett, 2004; NASP, 1997) have not been adequately addressed. In Western Australia, Silburn and Zubrick (1996) report an increased prevalence of psychosocial problems and difficulties among school students. These include:

- Child suicides;
- Sexual abuse;
- Student assault;
- Mental health needs;
- Dysfunctional parenting; and
- Low academic performance.

The Silburn and Zubrick (1996) findings not only emphasise the educational implications that mental health issues bring to teaching and learning, but are a timely reminder of the critical protective value schools can serve for many students. In view of the epidemiological data recently reported by Wood and Daly (2007), the traditional medical model is clearly inadequate in providing comprehensive services for contemporary schools in Western Australia. Short (2003) urges school psychology to reach beyond the traditional problem-triggered and child-by-child practice. A student's academic, behavioural and emotional difficulties are influenced by family, schooling, local community and societal variables and their complex interactions (Elias, Zins Graczyk & Weissburg, 2003). The traditional resource-intensive medical model is applied to a relatively small group within the student population presenting with the difficulties described by Elias et al. In this regard, it has limited success in dealing with large numbers of students.

A further difficulty encountered by American, British and West Australian school psychology practice, as previously noted, is that legal frameworks mandate

standardised assessment procedures for special needs students. While this is important to determine eligibility for special education services, it requires an excessive amount of professional time to assess a small proportion of the student population and generates little information of value for planning curriculum adjustments that are now required by the *Schools Plus: Resourcing Informed Practice Handbook* (2006). Among the more persistent problems in current practice based on traditional medical model formulations, with their linear refer, test and place elements, are:

- Absence of authentic accountability for results;
- Focus on the service delivery process rather than consequent student outcomes;
- Gaps between documented learning and behaviour change principles and what is typically implemented; and
- Continuing concentration on classification and placement of students in alternative programs rather than designing interventions. The central point here is the use of assessment protocols that have little relevance for designing useful and effective interventions and the erroneous belief in presumed internal student deficits (Reschly, 2004).

According to Nelson, Hoover, Young, Obrzut et al. (2006), there is general agreement in the literature over the past ten years that school psychologists need to explore alternative delivery models that provide a comprehensive range of services. Dawson (2000) argues that school psychologists need to focus on solving larger problems rather than attempting to solve the problem of academic underachievement at the individual student level. There is extensive acceptance among psychologists of the centrality of preventive services (Annan, 2005; Elias & Dilworth, 2003; Sheridan & Gutkin, 2000). Yet, despite this, the profession has not moved toward effective prevention and intervention models (Gilman & Gabriel, 2004; Jimerson et al., 2006; Sheridan & Gutkin, 2000).

If school psychologists are to become more effective in today's school systems, they will have to develop a more hands-on approach, enabling effective engagement with teachers and students in the daily enterprise of schooling (Braden, DiMarino-Linen & Good, 2001; Gilman & Gabriel, 2004). Similarly, Faulkner

(1993) argues that the way forward for Australian school psychologists is to develop the means by which they can promote those changes within schools that can best serve the needs of teachers and students. Faulkner also advocates the adoption of a model of school psychology practice that concentrates on changing the contextual social settings that contribute to student failure rather than attempting to neutralise within-child deficits. For this to happen, according to Fagan (2002), trainers of psychologists need to provide the appropriate preparation and for school administrators to facilitate such changes through policy initiatives.

Over-reliance on the medical model has led to inefficient use of school psychologists' time, because of its concentration on a relatively small proportion of the student population. The next section examines how school psychologists spend their time in schools.

Differential Allocation of Psychologist Time to Functions in Schools

National studies in the United States of America in 1986 and 1991 indicated that half of school psychologists spent 75% of their time engaged in special education services. A later survey by Curtis, Hunley, Walker and Baker (1999) showed that most American school psychologists still spent in excess of 70% of their time assessing student eligibility for special education placement. These activities continued to dominate school psychology practice in the last decade of the twentieth century (Lowry, 1998). Reschly (2000) also reports that across the USA, school psychologists working in public schools continued to spend most of their time providing direct services to students with disabilities. In Australia, even though the nature of Australian school psychological services has diversified considerably since its beginnings, its rationale retains a close association with its special education origins (Oakland, Faulkner & Annan, 2005). Despite this, school psychologists have conducted their practice as relatively autonomous professionals outside the organisational structures of the schools in which they worked (Talley & Short, 1995).

Woods & Farrell (2006) report that 65% of educational psychologists in England and Wales who responded to a questionnaire indicated they used a "high" number of psychometric cognitive assessments. In Australia, 85% of school psychologists reported that they spent 22% of their time engaged in psycho-educational assessments (Jimerson et al., 2006). Although the British data suggests

high levels of standardised psychometric testing, psychologists did, in fact, employ a broad assessment repertoire (Woods & Farrell). Assessments using standardised psychometric instruments that do not have direct implications for designing interventions appear noticeably resistant to repeated calls for reform, according to Boyle and MacKay (2007), Nastasi (2004) and Ysseldyke (2000). However, Reschly (2000) reports that school psychologists typically spend 45% of their allocated time on direct intervention, problem-solving intervention, systems consultation, applied research and program evaluation.

Gilman and Gabriel (2004) conclude that education professionals in general still consider school psychologists as primarily assessment experts. Their roles and functions have been a focus of continued debate, with discussion repeatedly asking how the profession could move towards designing and implementing academic and behavioural interventions and move away from the emphasis on assessment-related activities (Gresham, Beebe-Frankenberger & Macmillan, 1999; Roberts, Marshall, Nelson & Albers, 2001, cited in Gilman & Gabriel, 2004). That is, a move toward consultation (Sterling-Turner, Watson & Moore, 2002, cited in Gilman & Gabriel, 2004) and group and individual counselling (Prout, Alexander, Fletcher, Memis, & Miller, 1993, cited in Gilman & Gabriel, 2004). Results of a survey by Gilman and Gabriel (2004) indicate that the current practice in many schools is perceived as professionally less than satisfying for the majority of school psychologists. Moreover, their data suggests that teacher, administrator and school psychologist groups have different perceptions and beliefs and these have impacted on the nature of local school psychological services. These findings are consistent with those of Hosp and Reschly (2002), who point out that the roles undertaken by school psychologists are local and region-specific. They pose the question "Do school psychologists with larger caseloads (that is, higher student-to-psychologist ratios) administer more tests per month?" (Hosp & Reschly, p. 12). The next section explores the relevance of student-to-psychologist ratios, as these differ widely across education districts.

The Importance of Psychologist to Student Ratios

It is interesting to note that survey data in the USA indicates that school psychologists working in areas with more favourable ratios provide a broader range

of services (Reschly, 1998, cited in Reschly, 2000). In addition, the school psychologist-to-student ratio is claimed to be "one of the most robust of the influences on school psychology practice in public schools" (Reschly, 2000, p. 513). On this basis a broader range of services could be supported in Western Australian government schools, since the ratio in 1985 was reported to be 1:1,227 (Young, 1985).

Ysseldyke et al. (2006) report that higher psychologist-to-student ratios are associated with practices that concentrate on prevention and intervention. Recent research (Jimerson, Skokut, Cardenas, Malone & Stewart, 2008) identifies 83 of the 192 member states of the United Nations as having school psychology services and of these, professional associations for school psychology exist in 39 countries. Jimerson et al. report that school psychologists across many nations demonstrate a wide range of skills and competencies to offer school communities. Numbers of practising school psychologists vary across countries and estimates of the ratios of school psychologist to students also differ. Faulkner (1993) notes that in 1955 the *United Nations Educational, Cultural and Scientific Organisation* (*UNESCO*) recommended a ratio of one school psychologist to every 6,000 to 7,000 students. By the 1980s, ratios had improved markedly, for example: Denmark 1:1,400; the United Kingdom, 1:8,000 and Australia 1:3,000 (Faulkner, 1993). By 2002 the average international ratio was reported as 1:11,000 (Oakland, Faulkner & Annan, 2005). Reschly (2000) reports a ratio of 1:1,930 in the United States. Fagan (2005) later estimates the United States ratio to be about 1:2,000. This figure, however, masks large variations among various states, ranging from 1:610 in Connecticut to 1:7,071 in Texas. *The National Association of School Psychologists* (NASP, 2005) recommendation was a ratio of 1:1,000.

The school psychologist to student ratio for Australia as a whole was initially reported to be 1:1,560 (Jimerson et al., 2006). The Western Australian ratio is currently 1:1,203 (B. Saraceni, personal communication, February 25, 2011). Despite the reported shortage of school psychologists in rural Australia (Grant, 2007), Western Australia has a very favourable school psychologist to student ratio compared with other states and with most other countries (Jimerson et al., 2006). In light of Reschly's comments and the epidemiological data provided by Wood and Daly (2007), it is opportune to reassess how this strategically important resource

might be better utilised within the government school system in Western Australia for the benefit of all students, parents and teachers.

Deployment of School Psychologists in Western Australia

This section is concerned with deployment and issues related to the variety of roles adopted by school psychologists and how these could determine whether or not appropriate services are meeting the needs of particular schools. As pointed out above, earlier studies in Western Australia (Leach, 1989; Towler, 1988) have shown that little agreement existed among principals, teachers and school psychologists on preferred services. This was in part due to the dichotomy between student-centred and school-centred services; the former being preferred by principals. The current situation lacks documentation. Little has changed in Western Australia, as attested by recent international surveys that have shown school psychologists' allocation of time to particular roles remains essentially the same as they were decades ago (Jimerson et al., 2006).

Written systemic policy governing school psychological service provision is lacking in Western Australia. Contemporary data regarding the functions of local practitioners and how they spend their time in schools is also unavailable. Overseas, school psychological services are well documented (Gilman & Gabriel, 2004; Jimerson et al., 2006; Oakland et al., 2005). In Western Australia, psychometric assessment of students' eligibility for education support placement and other specialist facilities is mandated by *The School Education Act* (Government of Western Australia, 1999) and relevant legislative frameworks such as *Schools Plus: Resourcing Informed Practice Handbook* (Department of Education and Training Western Australia, 2006). According to Jimerson et al., the medical model orientation continues as a noticeable feature in Western Australian contemporary practice. This has had the effect of perpetuating the problematic issues discussed by Sheridan and Gutkin (2000) and others (see Oakland et al., 2005; Swerdlik & French, 2000). There is, however, a clear intent to provide a continuum of psychological services to schools in two West Australian education districts (*Swan Education District Student Services Operational Plan*, 2009-2011; *West Coast Education District Student Services Operational Plan*, 2009-10). School psychologists elsewhere have also shown a clear desire to reduce time spent on psycho-educational

assessment (Dawson et al., 2004; Ehrhardt-Padgett et al., 2004; Gilman & Gabriel, 2004; Hosp & Reschly, 2002; Oakland et al., 2005; Reschly, 2000).

Farrell, Jimerson, Kalambouka and Benoit (2005) report variations across countries, including Australia, in the amount of time school psychologists spend in schools and this is related to their perceived value as service providers. A key finding is the mismatch between what school psychologists think they ought to be doing and teachers' views of their role, which often suggest an over-emphasis on individual student assessment. A comparison of teachers' perceptions of the frequency with which school psychologists performed a range of tasks with those which teachers preferred them to do, resulted in a statistically significant negative correlation.

Towler (1988) reports that educators in Western Australia preferred traditional services for individual students rather than the indirect consultative services which school psychologists were keen to promote. On the other hand, Leach (1989), in a study of Western Australian teacher perceptions of school psychologists' work, found that teachers wanted more systemic services and that psychologists recommended interventions that were impractical and the resulting written reports were of minimum value. There were also marked differences between principals' and teachers' views of school psychologists' competence. This may be due to the fact that psychologists tended to do "what principals require of them" (Leach, 1989, p. 372). Principals preferred more traditional rather than broader systemic services, leading principals to support calls for more psychologists *per se* rather than for changes to their professional practice.

There is an absence of data available to show how the school psychology service has responded to the implementation of the education reforms of the past decade, and particularly so in the light of the findings of the *Report of the Taskforce on Structures, Services and Resources Supporting Government Schools* (Robson, 2001). The report recommends that support services should be located closer to schools and allocated differentially to meet the diverse requirements of school leaders, teachers, students and school communities. School psychologists have now been accommodated in schools since the start of the 2011 academic year. The other Robson recommendations were also alluded to more recently in the *Director General's Classroom First Strateg*y (Department of Education and Training, 2007).

To date, there are no published data available on the impact and uptake these recommendations and initiatives have had on the delivery of school psychological services across government schools in Western Australia.

The allocation of school psychologists to education districts has, until recently, relied on local variants of a formula agreed to in 1991 by the then Ministry of Education, the Western Australian Secondary Principals Association and the State School Teachers' Union (see Skivinis, 1991). Elements of the formula are:

- Incorporating the number of students in a district;
- Number of *Priority Schools Program* students in a district;
- School classification;
- Distance between schools; and
- Special district factors (attachment 2, p. 6).

Skivinis's paper notes and emphasises that no data regarding the specific psychological service needs of individual school districts in terms of desired outcomes were available at that time (Skivinis, 1991, attachment 2, p. 3). A recently developed formula is currently under trial across the government school system (Lazari, 2011). The constituent factors of the latest formula, mainly based on school level parameters, are:

- Enrolled student numbers;
- Number of students with disabilities (*Schools Plus* criteria are used to provide student weightings ranging from 1to 4 predicated on the severity of the disability);
- School attendance data (if the attendance ratio is 90% or greater no extra weighting is applied, if less than 90% extra weighting is added on a sliding scale contingent on the actual ratio);
- School community socio-economic index (if equal to or greater than 100 no additional weighting is applied, but if less than 100 extra weighting is added with decreasing index values); and
- Rural and remote factor (The Ministerial Council for Employment, Education, Training and Youth Affairs ratings are applied, ranging from 1.1 for metropolitan schools to 3.2 for remote schools).

The final allocation of a full time equivalent (FTE) psychologist for a particular school was determined by the base student number plus the various weightings that are expressed in additional student numbers, generating an adjusted student number. Regional Executive Directors were then assigned an aggregated allocation of FTE school psychologists for each region plus an additional 5% allocation to be used at their discretion (Lazari, 2011).

The total regional FTE school psychologist allocation is then shared among individual schools by means of local decision-making processes. The allocative mechanism, based on the five factors identified above, arguably reflect ethological principles of service delivery need. However the effectiveness of this process in determining appropriate psychological services for individual schools has yet to be documented.

Gaps in the School Psychological Services Literature

Denholm et al. (1998) note the lack of research concerning the roles of Australian school psychologists. This, together with the need for conceptual unification of distinctly different roles, may contribute to an undervaluation of school psychologists' services. In these circumstances, schools might have difficulty in knowing and then deciding what potential services are available to best meet their needs. With the exception of Leach (1989) and Towler (1988), there is little published empirical data on existing West Australian practice such as:

- System-wide data on how school psychologists allocate their time among services;
- School psychologists' actual functions and preferred functions;
- Department of Education expectations of the role and functions of school psychologists (apart from education district student services' operational plans); and
- Mechanisms by which school psychologists are allocated to individual state government schools.

If the confusion discussed above persists across Western Australia, then more data is required to show that school psychologists do have the ability and range of skills to

provide services to meet school needs. Teachers and school psychologists therefore need to develop dialogues that clearly articulate school needs for services.

The inclusion of a validated measure of school need for psychological services to the Lazari (2011) allocative mechanism would provide greater confidence in procedures used to deploy psychologists to government schools in Western Australia. With the possible exception of Western Australia, the literature of the USA, Great Britain and Australia is notable for the lack of published information concerning procedures for deploying psychologists to schools. It is clear there is a need for research to measure school need for psychological services using modern measurement methods. Traditional applied psychological measurement techniques tended to rely on rating scales which were unable to provide linear measures of the construct of interest. The application of modern measurement such as Rasch (1980/1960) measurement has successfully constructed linear scales to provide useful and valid measurement instruments in health science (Hagquist & Andrich, 2004) and attitudes and behaviours (Waugh, 2003). Rasch measurement applications to the field of school psychology have considerable potential to transform the way we think about psychological measurement.

The next section describes the features of a theoretical framework by which it is intended to develop a linear scale to measure school need for psychological services.

Theoretical Framework

This section presents the theoretical framework for the current investigation. A theoretical framework of schools' need for psychological services is developed. The framework is explained, together with supporting details from the literature. The section also discusses the critical importance of ascertaining schools' needs for service prior to allocating psychological resources to schools.

The previous review of the school psychology literature indicates the potential range of services that schools might expect in order to increase student performance in cognitive, affective and behavioural domains. No research related to schools' need for services or how such need could be ascertained has been reported. A useful starting point is the comprehensive domains of service identified initially by

Ysseldyke et al., (1997) in Blueprint II and reiterated in Blueprint III, p. 5. The various elements of school need for psychological services are posited to cluster around constructs informed by a number of the domains of service.

These are:

- Effective Instruction;
- Development of Cognitive / Academic Skills;
- Socialisation and Development of Life Competencies;
- Student Diversity in Development and Learning;
- Prevention, Wellness Promotion and Crisis Intervention;
- Home / School / Community Collaboration; and
- School Structure, Organisation and Climate (Ysseldyke et al., 2006).

The domains describe school-based activities and processes in which a school psychologist might be expected to participate if asked. The delivery systems described by Oakland et al. (2005), and services delivered in Western Australia (Swan Education District Student Services Plan, 2009-2011; West Coast Education District Student Services Plan 2009-2010); and the Constable (2010) competency framework for school psychologists are compatible with these domains. It is generally accepted that the purpose of school psychology services include; first, to increase the competencies of all students; and second, to build the capacities of the systems that support students.

For the purpose of this research, the seven domains of competence have been clustered into three constructs reflecting school need for psychological services. The constructs are considered to be *characteristics of students*, *characteristics of schools* and *characteristics of teachers*. These three constructs are seen as pivotal in determining school need, and constitute the preliminary conceptual framework upon which the current empirical investigation is based. Exemplars of the constructs are:

- *Characteristics of students*: learning difficulties, disruptive behaviours, truancy, special needs, mental health issues, disabilities, suspension and exclusion data;
- *Characteristics of schools*: presence of agreed vision and goals, evidence of inclusive practices, evidence of culture of improvement, staff morale, staff

collaboration, willingness to consult with school psychologist, willingness to liaise with parents, involvement of other agencies; and

- *Characteristics of teachers*: knowledge of pedagogy, behaviour management, rapport with students, presence of high expectations for student achievement, skill in identifying student difficulty early.

A representation of the framework is presented in Figure 2.1.
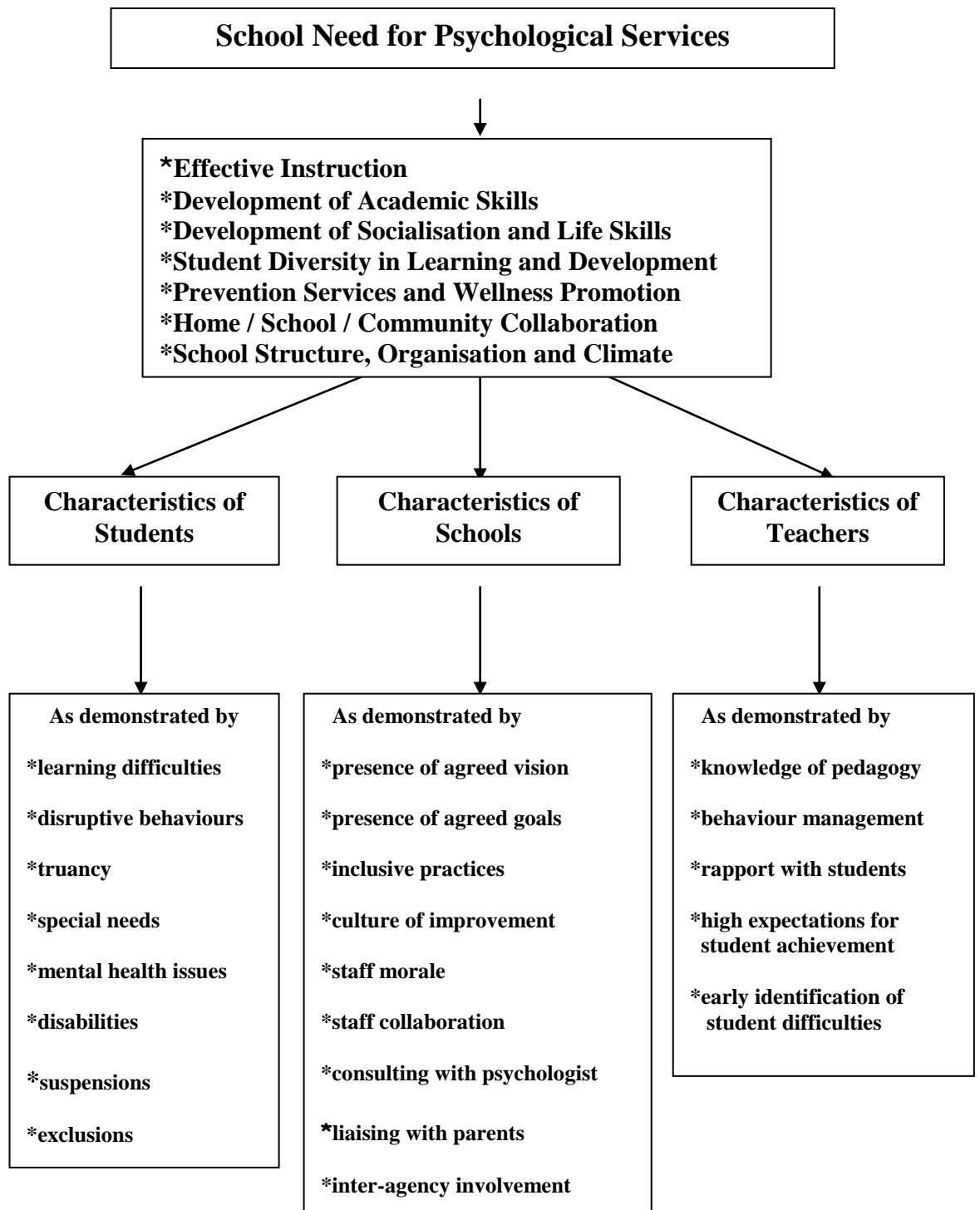
Figure 2.1: A Theoretical Framework of School Need for Psychological Service

The last element of the Theoretical Framework provides the criteria for developing items comprising the preliminary Likert-type questionnaire. Written items expressing the three constructs of Characteristics of Students, Schools and Teachers are arranged in seven sub-scales determined by the seven domains of

competence. Items within each of the seven sub-scales are presented in hierarchical order of difficulty to affirm; initial items are hypothesised as easier to affirm and succeeding items increasingly difficult to affirm. This initiates the three phase developmental process that would lead to the construction of a linear scale to measure school need for psychological services.

Summary

The defining aspects of Characteristics of Students, Schools and Teachers and their dynamic interactions are utilised to generate a theoretical framework to measure the need for psychological services in schools within the two West Australian Education Districts of Swan and West Coast. Application of the framework is intended to identify aspects of student, school and teacher processes that would provide the research data. The elements of the theoretical framework create an opportunity to generate survey items encompassing aspects of students, schools and teachers, by which data could be gathered, processed and then analysed using the RUMM2020 computer program (Andrich, et. al., 2005) to determine whether or not the resulting instrument constitutes a linear measure of school need for psychological services.

The chapter began with a brief introduction followed by a history of the development of school psychology internationally and some of its limitations in the light of school and societal reforms. Research data with a focus on psychologists' roles, functions and psychologist to student ratio and their relationship to effective service delivery were discussed. The literature survey established that the international literature and the Australian literature lack any documented accounts of validated procedures to measure school need for services prior to deploying psychologists to individual schools. This omission forms the impetus for the present study. The chapter concludes with a description of the theoretical framework, informed by the literature review for the present study, which intends to construct a linear scale to measure school need for psychological services.

The following chapter examines the literature which reports discussions on how psychological practice and training should be accomplished to overcome identified limitations.

Chapter Three

Re-conceptualising School Psychology Services

This chapter describes the various aspects of school psychology practice that have been promoted to bring about a change in the way psychological services are conceived and delivered.

In 1976, the impetus for reconstructing British educational psychology practice was initiated by new training programs at Exeter University (Burden, 1976). The need for reconstruction was also articulated by Gillham (1978) and reiterated, in greater detail, by Boyle and MacKay (2007). Historically, a persistent undercurrent for change had existed from the early 1970s within the profession, but had little success in bringing about the desired reforms. Many school psychologists have advocated a change in their role towards a more expansive range of services to accommodate the needs of children and their families (Nelson et al., 2006). There is a general consensus in the literature that this would involve adopting alternative models that go beyond traditional assessment and placement practices.

The major elements of the movement to re-conceptualise school psychology practice and training can be seen in the tension that existed between a student-focus practice as opposed to a school-focus one, the shortcomings of medical model applications, and the restrictive aspects of assessment and diagnosis. In addition, persuasive new models emerged that argued for the efficacy of ecological, evidence-based and collaborative practice applications. Another pressure was that the introduction of new legislation and policies requiring school psychologists to formally assess students with disabilities to establish their eligibility for special education places reinforced the *status quo* of student-centred services. Student cultural considerations, inclusive education practices and reporting requirements to ensure student health and wellbeing also increased the calls for a broader range of school psychology services. Considerations such as these have been explored in the series of conferences that became known as the "Futures Conferences" in the period 1949 to 1981 (Ysseldyke et al., 2006). Their purpose was to review the existing status of school psychology and identify those aspects in need of reform and improvement. The first was the Boulder Conference in 1949, followed by the 1954

Thayer Conference, which examined the profession's current status and attempted to re-define school psychology by articulating a vision for the future (Fagan, 2005). The conference's main purpose was to establish and promote a plan to professionalise school psychology (Oakland, 2005). The conference strongly recommended that school psychology in the United States should provide services to all students and not just those with disabilities. This was followed by the Vail (1973), Spring Hill (1980) and Olympia (1981) conferences. A synthesis of the planning scenarios at the 1981 Olympia Conference (Cardon, 1982 cited in Curtis et al., 2004, p. 50) predicted a number of future changes that would likely impact on school psychology. These turned out to be accurate forecasts, indeed. The predicted changes were:

- High technology impact on society, especially schools;
- Increased percentages of minority children and those with disabilities;
- Education may undergo major changes;
- Regular and special education may merge;
- Universal lifelong education; and
- Educators' roles may change dramatically with new professionals appearing.

Miller and Leyden (1999) argue for the introduction of a coherent framework for the delivery of psychological services in schools. The authors point out that psychologists working in schools have, as a profession, been typified as being on the horns of one dilemma or another, such as whether:

- To be clinic-based or school-based;
- To continue or withdraw from norm-referenced assessment;
- To work with individual students or school systems;
- To be preventive or reactive; and
- To support special schooling or an inclusive system.

Issues such as these are at the heart of calls from within the profession for reform. The major responses to meet the need for reform include the goals set by *The Conference on the Future of School Psychology* (2002), referred to as the Indiana Multi-Site Conference. In addition, specific role and service delivery initiatives such as; ecological considerations, collaborative practices, evidence-based practices, student health and well-being, and student cultural considerations are discussed in

detail in the following sections. These reform initiatives underpin the inclusion of Characteristics of Schools and Teachers as important elements of the Theoretical Framework of School Need for Psychological Services introduced in the previous chapter. The next section discusses the importance of the Indiana Conference and is followed by an account of major reform initiatives introduced to school psychology during the past decade.

The Indiana Conference on the Future of School Psychology

More relevant roles and functions of school psychologists have been advocated for some time (Passaro, Moon, Wiest & Wong, 2004). A number of authors have suggested that school psychology practice has not kept up with the debate and need for a broader conceptualisation of school psychology (Gutkin & Conoley, 1990; Sheridan & Gutkin, 2000). Others have advocated expanded roles for school psychologists in student social and emotional development, teacher consultation and collaboration (Elias & Dilworth, 2003).

Following the Olympia Conference, Ysseldyke et al. (1997) anticipated the need for a reappraisal of professional practices of school psychology in the twenty-first century. Under the auspices of The National Association of School Psychologists (NASP), they produced a blueprint to enable school psychologists and university departments to work together to improve the practice of school psychology and develop appropriate training programs. Blueprint II, as it became known, advocates an expanded role for school psychologists in a more interventionist and preventive paradigm.

The earlier series of "futures" conferences, (Boulder 1949; Thayer 1954; Vail 1973; Spring Hill 1980 and Olympia 1981) provided momentum for the future planning of school psychologists' training and practice. However, these conferences were unable to bring about what participants identified as the appropriate role of school psychologists (Dawson, Cummings, Harrison, Short et al., 2004). The Indiana Multisite Conference was organised to examine critical issues and challenges facing school psychologists and to identify goals and reforms necessary for the continued development of the school psychology profession. This most recent of the "futures" conferences articulates the following goals (Cummings, 2005, pp. 265-266):

- Improved academic competence and school success for all children;

- Provide more effective education and instruction for all learners;

- Enhanced family-school partnerships and parental involvement in schools;

- Improved social-emotional functioning of all children; and

- Increased child, family health and mental health services in schools.

It was then recognised that while the demands for school psychology services increased, the number of school psychologists has been steadily decreasing (Ysseldyke et al., 2006). Changes in practice and the way services are delivered are therefore required to adapt to this imbalance. To ensure that services to schools and students are maintained, Blueprint II was updated. The original ten domains were replaced by eight domains of competence (Ysseldyke et al., 2006) that identified the standards for school psychologists' service delivery designed to support schools in the improvement of the performance of all students. In addition, Blueprint II encourages school psychologists to develop the capacities of school systems to meet student needs as they proceed to adulthood. The first four competencies are foundational competencies that underpin the second four competencies. The latter describe the processes and contexts through which school psychologists conduct their work. The competencies are:

A: Foundational Competencies

- Interpersonal and collaborative skills;

- Diversity awareness and sensitive service delivery;

- Technological applications; and

- Professional, legal, ethical and social responsibility.

B: Functional Competencies

- Data-based decision making;

- Systems-based service delivery;

- Enhancing the development of cognitive and academic skills; and

- Enhancing the development of wellness, social skills, mental health, and life competencies (Ysseldyke et al., 2006, p. 15).

The competency domains and their implications for service delivery have clarified the role of school psychology and reduced the confusion that inhibited the further development of professional practice and its acceptance in the wider community. It was suggested earlier (Bardon, 1994) that school psychologists need to adapt to school reforms and the societal and demographic changes in their communities. Bardon also urges school psychologists to spend less time on assessment related activities. Together such changes would help to ensure the successful development of the profession. Additional literature from the past decade tends to support this view, and argues that the future direction of school psychology must include role expansion (Bradley-Johnson & Dean, 2000; Dwyer & Bernstein, 1998; Fagan, 2002; Gutkin, 1995; Swerdlik & French, 2000).

Ecological Considerations

As noted previously, Elias and Dilworth (2003) and Sheridan and Gutkin (2000) assert that the school psychologist can only be effective by working collaboratively with the home, the school and the neighbourhood, applying a change for improvement approach. Similarly, Faulkner (1993), critical of the Victorian government school psychology service's reactive approach to school referrals, suggests curriculum reform as a means to meet all students' needs. He also advocates a greater focus on co-operative teaching and learning, authentic assessment and evaluation practices and a drive to adopt parents as partners in their children's education. A modern statement of this approach is evident in the ecological model described by Sheridan and Gutkin. They argue that, as school psychology practice has not responded adequately to the changes in schooling evident in the literature, school psychology should consider an ecological framework of service delivery that looks at needs at "multiple eco-systemic levels" (Sheridan & Gutkin, 2000, p. 245). In such a scenario, teachers, parents and schools would together play crucial roles in creating the environments that foster student progress and reduce the incidence of student problems in learning and behaviour.

The alternative paradigm introduced by Sheridan and Gutkin (2000) is based on ecological and contextual considerations that underpin the professional practice and training of school psychologists to best serve students, teachers, schools and their communities. Sheridan and Gutkin discuss the issues that have constrained

school psychological services in the past. They criticise services that rely on written reports of questionable value to teachers and parents, and professional roles that have largely ignored the systemic forces that shape teaching and learning and the appropriate services schools require. They also advocate a more judicious and extended application of scientist-practitioner principles to the delivery of services, such as adopting a problem-solving strategy to find the best intervention in a particular instance. To have a noticeable effect on children's lives, services have to focus on models that emphasise developing healthy school systems and environments (Tharinger, Pryzwansky, & Miller, 2008; Vondracek & Porfeli, 2002). Additionally, individual, group and systemic level services that include a problem-solving orientation and involve caregivers are more likely to have a positive and meaningful impact on students (Christenson, 2004; Curtis, Chesno Grier & Hunley, 2004).

Contemporary services for students, parents and teachers need to move away from models that have an exclusive focus on student deficits towards an ecological and multilevel paradigm. There has been strong support for this change in the United States of America (see Braden et al., 2001; Carlson & Christenson, 2005; Engelbrecht, 2004; Sheridan & Gutkin, 2000; Vondracek & Porfeli, 2002). Similar views have been expressed in New Zealand (Annan, 2005; Oakland et al., 2005), Scotland (Kennedy, 2006) and Australia (Jimerson et. al., 2006).

Elias and Dilworth (2003) also encourage school psychologists to consider an ecological-developmental perspective as the basis for practice, since the socialisation of children and their attitudes to academic learning are influenced by the social forces that impact upon them. Furthermore, they argue that school psychologists should be trained to become leaders in the social and emotional aspects of schooling, so that they have opportunities to influence school policy and aspects of school climate. As Pianta (2003) suggests, the context, not the child, should be the focus of practice. School psychologists have an understanding of research, child development and psychology and in this respect are in a unique position to facilitate school improvement and to promote a healthier school environment for all students (Braden et al., 2001). The social and political reforms in South Africa have resulted in a noticeable movement from a traditional child-deficit model of school psychological services towards an ecological and multi-systems paradigm (Englebrecht, 2004). The

emphasis on school context and provision for all students was reinforced by the recommendations made by *The Future of School Psychology* (2002) multisite conference in Indiana USA.

Services that incorporate an ecological perspective are known to enhance teacher perceptions of school psychologists as worthwhile, effective and supportive of school programs (Nelson, Hoover, Young, Obrzut et al., 2006). However, any major paradigm shift relies on a set of shared assumptions. The ecological model is at variance with the basic belief system of many school psychologists, according to Rosenfield (2000). Furthermore, training institutions must also embrace the new paradigm and explore any differences in their underlying assumptions, and design programs to match the new models of practice. This is "fundamental to establishing an ecological paradigm in school psychology" (Rosenfield, 2000, p.506). The training institutions would then be able to inform and influence contemporary practitioners towards adopting a range of different modes of service delivery.

Collaborative Practices

A prominent feature of school psychological practice has been the excessive number of individual student referrals for issues related to learning. It is clear that this is an ineffective way to solve systemic problems such as low academic achievement. Despite this, the student deficit model retains some prominence in educational systems (LeCapitaine, 2000). It is only recently that calls for reform have concentrated on developing collaborative partnerships with stakeholders (Bierman, 2003; Miller & Leyden, 1999; Ross et al., 2002; Sheridan & Gutkin, 2000; Strein et al., 2003; Weist, 2003 and Ysseldyke et al., 1997). In the United Kingdom, Stobie, Gemmel, Moran and Randall (2002) recommend that educational psychologists ought to develop a role for systemic psychology to replace what they perceive to be a defunct traditional model. The Norwich (2005) systemic model which later emerged focuses on:

- Affecting schools' organisational structures to the benefit of all;
- Targeting staff development;
- Management and support of learning and behaviour; and
- Altering people's values and attitudes (p. 390).

An alternative model reported by Fantuzzo et al. (2003) describes strategic partnerships to promote mental health science and services for vulnerable children. Their conceptual framework is population-focussed, child-centred and partnership-based. Consultation is rapidly emerging in the United Kingdom as an alternative to the traditional referral-driven models that typify most psychology practice in schools. The popularity of the developing consultation movement is evidenced by the establishment of a collaborative exchange network (Larney, 2003).

Systemic models can coexist with the traditional child centred practice, with the advantage that schools can be conceptualised as influential social-emotional contexts for students as well as places for teaching and learning. School psychologists would therefore have to establish strategic working partnerships with teachers, parents, principals and other professionals to engage in system-level issues. This is consistent with the following important developments that have recently emerged:

- The ecological perspectives of Sheridan and Gutkin (2000);
- The public health focus of Hanley (2003), Koch (2001), and Nastasi (2004);
- Behavioural interventions (Gresham, 2004);
- Consultation in multi-agency work (Kratochwill & Shernoff 2004, Leadbetter 2006 and LeCapitaine 2000); and
- School consultation and psychological advice (Boyle & MacKay 2007; Cameron & Monsen 2005; Christensen, 2004; Ehrhardt-Padgett et al., 2004; Farrell et al., 2005; Jenkins 2001; Larney, 2003; Ross et al., 2002; Walsh & Galassi, 2002).

There are clear indications in the literature (Bierman, 2003; Daly & McCurdy, 2002; Harrison et al., 2004; Passaro et al., 2004) of mounting support for a conceptual move away from traditional practices in favour of more collaborative models. The theoretical framework for the present study reflects a much more expansive, collaborative, scientist-practitioner model of psychological services. This is developed further in the next section.

Evidence-Based Practice

The research literature of the past decade has featured arguments for a reduction in the gap between research and practice (Ehrhardt-Padgett, Hatzichristou, Kitson & Myers, 2004; Shernoff, Kratochwill & Stoiber, 2003; Ward & Erchul, 2006), by introducing empirically determined intervention and prevention strategies to university training programs and registered school psychologists. The evidence-based intervention movement in school psychology (Daly & McCurdy, 2002) has gained momentum in recent years through the work of the *Task Force on Evidence-Based Interventions in School Psychology* (Kratochwill & Shernoff, 2004). The agenda of linking research and practice through the adoption of data-based interventions is vitally important for improving services to students and schools (Bierman, 2003; Kratochwill & Shernoff, 2004; Kratochwill & Hoagwood, 2005; Nastasi, 2004; Sheridan, 2005). There is now confirmation that professional psychology has begun to adopt evidence-based practice (Sharpless & Barber, 2009). School psychologists in New Zealand seem to have been less focused on the gate-keeper role in the distribution of special education resources than have their Australian and American counterparts. Consequently, they have been more involved in supporting students with a wide range of learning needs. In the process they have acquired a reputation for evidence-based decision-making in delivery of services (Oakland et al., 2005).

Reschly (2004) has been an advocate of data-based student outcomes approaches for twenty-five years. Lambert (2000) argues that maintaining a research and scientific perspective enhances professional development and ultimately school-based services. The success of behavioural interventions has been one of the first alternatives to the prevailing refer-test-place tradition in school psychology, even though the latter practice is reportedly still dominant (Curtis et al., 2004; Hosp & Reschly, 2002).

A recent review by Christenson and Carlson (2005) reports significant evidence that interventions at family level produce positive changes in children's behaviour and learning at school. Their data indicates families are not only important but, perhaps, essential for optimal student school performance. Reforms are evident and are leading to noticeable progress in narrowing the gap between science and

practice. This has been achieved through the implementation of a series of evidence-based practices, according to Kratochwill and Hoagwood (2005). In addition, Kratochwill and Hoagwood draw attention to the rather poor science and weak measurement characteristics of much school psychology practices and instruments. Reschly (2004) reports that perspectives on best practice in school psychology vary considerably. For example:

- Identifying underlying aspects or correlates of learning and behaviour problems rather than establishing effective interventions;
- Excessive reliance on standardised cognitive ability tests as opposed to investigations of student skills and behaviours in classroom contexts; and
- A focus on processes which are assumed to translate into educational interventions, instead of empirical analyses of student responses to interventions (p. 409).

Services that are directly related to documented improvements in student educational, behavioural and emotional competencies are clearly beneficial. Those that lack beneficial relationships are not justifiable and should be discontinued (Reschly, 2004). This constitutes a basis for developing problem-solving strategies at the school level. In addition, it facilitates a move away from matching students to programs following assessment of their cognitive processes or ability, to an experimental approach. This is evidenced in deciding whether to intervene by maintaining, changing or withdrawing services, using the response to intervention (RTI) model (Gresham, 2004). RTI is predicated on the idea of discrepancy between the pre-intervention and post-intervention levels of performance and is consistent with an experimental orientation. RTI is evident among education authority psychological services in the United Kingdom, as a tangible aspect of the current moves towards evidence-based practice (Woods & Farrell, 2006).

However, school psychologists are confronted with the dilemma of providing more indirect services to students while simultaneously developing more evidence-based assistance to teachers, principals and parents. Passaro, Moon, Weist and Wong (2004) note that very few models have been tested in schools to demonstrate how this is to be achieved. Nevertheless, student instruction programs should be informed, in part, by objective measures and observations of prior learning and each

student's achievement in particular learning areas (Lambert, 2000). This is a major contribution to the promotion of the educational and psychological well-being of all students and the prevention of school failure.

Student Health and Well-Being

Historically, the focus of school psychology has been on deficit-oriented models rather than on primary prevention (Meyers & Meyers, 2003). Primary prevention would provide students with strategies that enhance social competence, resiliency and self-efficacy (Meyers & Nastasi, 1999, cited by Ehrhardt et al., 2004; Paisley & Borders, 1995). The "new morbidities" noted by Walsh and Galassi (2002, p. 675) have led to demands for action and reform within the United States school system and are also of critical concern in Western Australia, as recently reported by Wood and Daly (2007). These social and emotional difficulties, which students bring with them into the school environment, impinge on their academic progress. Such difficulties can only be ameliorated by a combination of within-school and community-based services.

Dwyer and Osher (2000) describe a comprehensive model of service delivery that links intervention and prevention with a focus on:

- Building a school-wide ethos of supporting positive behaviour, academic success and emotional well-being through teaching appropriate behaviours, problem-solving skills and academic instruction;
- Early intervention by introducing services and support with a focus on risk factors and establishing protective elements for students at risk; and
- Intensive interventions that are comprehensive, co-ordinated and culturally appropriate in addressing family and student needs.

The model would therefore enable school psychologists to apply their psychological and educational expertise to assist parents, teachers and school administrators to achieve the most beneficial outcomes for students. *The Australian Psychological Society* (Drent, Garton, Hudson, Ruzyla, & Tinney, 2000) conceptualises services as a broad continuum that ensure that a wide spectrum of services is available to support the teaching and learning process. Services should be *"*indirect as well as direct; ecological and contextual; evidence-based and systemic

within schools supporting management processes*" (pp. 3-4). Similarly, *The Connecticut School Psychology Service* mission statement urges the promotion of psychologically healthy environments for all students by implementing research-based effective programs that reduce problem behaviours, enhance student independence and promote optimal learning (Commissioner Sternberg, Connecticut State Department of Education, 2004).

Bernard's keynote address to the *Australian Council for Education Research Student Well-Being Conference* (2006) emphasises social and emotional development as "The 'New' Knowledge Base." He suggests that schools need to place greater emphasis on improving non-cognitive student outcomes. This is known to have a beneficial effect on cognitive outcomes. Pianta (2003) contends that in the context of teacher-student and student-peer interactions, psychologists and educators have de-contextualised academic learning from student social-emotional processes. If schools continue to think of their purpose as solely providing students with educational content, they risk marginalising the importance of developing non-cognitive areas. These are considered to be essential for academic progress (Braden, DiMarino & Good, 2001; Elias et al., 2003).

The report of the *Surgeon General's Conference on Children's Mental Health* (United States Public Health Service, 2000) expressed widespread concerns about student underachievement, school violence, over-referral to special education, mental health problems and poorly delivered mental health services. In response, Nastasi (2004) and Strein, Hoagwood and Cohn (2003) advocate the adoption of a public health perspective for school psychological services. Their intention was to provide a broad framework to increase the efficacy and efficiency of school psychologists' work by refocusing on indirect student services rather than direct services to individual students. Their views reiterate the 2002 *Future of School Psychology Conference* call for a new paradigm. They also reflect the thrust of the Surgeon General's (2000) action agenda which was population-based and emphasised prevention, education, empowerment and advocacy (Strein et al., 2003). Preventive measures include aspects of epidemiology, the assessment of and management of risk factors and the evaluation of their impact on developing protective behaviours (Short, 2003).

Nastasi (2004) paraphrases the public health perspective to include components such as interagency and interdisciplinary collaboration, a continuum of services from prevention to treatment, an ecological focus, empirically determined interventions and systematic evaluation. Crockett (2004) and Ehrhardt-Padgett et al. (2004) note that the public health model has been successfully implemented in a number of schools in the United States of America. For example:

- In the management of disruptive behaviours (Hunter, 2003);
- Child maltreatment (Fantuzzo, McWayne & Bulotsky, 2003);
- Preventive and intervention programs in mental health promotion (Hanley, 2003);
- Social and emotional skill development (Ross, Powell & Elias, 2002); and
- Building partnerships between school personnel and community members to address student mental health needs (Bierman, 2003; Nelson et al., 2006).

In addition, Ross, Powell and Elias (2002) show that psychologically competent young people are more likely to avoid high-risk activities that might jeopardise their health and general well being. Schools, therefore, have a considerable part to play in developing social-emotional skills, because such skills clearly impact on academic functioning (Pianta, 2003).

School psychology in the USA is the specialty in American professional psychology that is closely linked with population-based thinking about student mental health (Short, 2003; Tharinger, Pryzwansky, & Miller, 2008). Hoagwood and Erwin (1997) report that 75% of mental health services for children and young people are provided in schools where staff has access to a large number of students at risk. Elias et al. (2003) call for greater understanding of the interrelationship between academic and social-emotional learning and, as noted by Braden et al. (2001) and Hanley (2003), this is a fundamental consideration for school psychology practice.

Data reported in Western Australia (Silburn & Zubrick, 1996) emphasises the need to introduce preventive programs such as improving parenting skills and family functioning to complement existing services. Silburn & Zubrick imply that simply increasing direct individual treatment of children would be insufficient. Key findings of a recent follow-up study carried out during 2006-2007 in Western Australia

(Wood & Daly, 2007) report that little has changed in the last decade. Findings include:

- An estimated 15,200 children were reported to be doing poorly in school, of whom 12,000 were aged ten to fifteen. The proportion increased with age;
- An estimated 108,000 children were bullied by other children;
- 14.4% of children lived in poorly functioning families, equivalent to 63,000 WA families; and
- One in seven parents/carers reported having been diagnosed with a mental health problem and of these 57.7% were receiving treatment (pp. 6-10).

Such epidemiological data provide further confirmation of the inter-relationships known to exist between educational progress, mental health, family characteristics, social-emotional factors and behavioural issues (see, for example, Crockett, 2004; Nastasi, 2004; Strein et al., 2003). These data also represent large numbers of children failing in the Western Australian school system. The high rates of adverse incidents affecting school-age children are not likely to be remedied by traditional refer-test-place strategies. *Mind Matters Plus* (Griffiths, 2003) an initiative of The Australian Guidance and Counselling Association (AGCA) was designed to address high school student mental health problems systemically and has since been introduced and implemented successfully across West Australian secondary schools. *Kids Matter* (2009) is the first national mental health promotion, prevention and early intervention initiative for primary schools. It is a whole school approach encompassing ecological, evidence-based and collaborative features.

Student Cultural Considerations

Like their United States counterparts, schools in Western Australia have become more diverse (Silburn & Zubrick, 1996). Diversity is evidenced by the increasing complexity of families and parenting practices. The third volume of the Silburn and Zubrick survey focuses on aspects of children's health, mental health and academic performance. These authors point out that all three aspects can be "directly affected by schools, their staffing and pastoral care arrangements" (p. 4). Since 1945 Australia has received immigrants in large numbers, with cities providing homes to many culturally and ethnically diverse communities (Oakland et al., 2005).

In recent years Western Australia has welcomed an increasing number of refugee families from African, Asian and Middle Eastern countries because of political upheaval, war, famine and natural disasters. As a result, schools have significant numbers of students presenting with linguistic and cultural issues, high-risk behaviours and sporadic interracial conflict (R. Pitcher, personal communication, March 29, 2011). Schools in the northern suburbs of Perth assist students with a variety of programs such as Intensive English Centres or specialist in-school programs. School psychologists face greater challenges in providing services that meet the educational and social-emotional needs of all students (Dawson, Cummings, Harrison, Short et al., 2004; Henning-Stout & Meyers, 2000, Oakland et al. 2005; and Wampold 2002). The typical school psychologist's role is variable, multi-faceted and demanding. School psychologists in New York City are said to be over-loaded, stressed and unable to do anything really well (see Fenichel, 2005 *School Psychology on Life Support*). However, culturally-aware school psychologists recognise that knowledge of student values, beliefs, traditions, customs and parenting styles of families are required in the schools of the twenty-first century (*National Association of School Psychologists*, 2004 and 2005). These school psychologists are also aware of the impact of their own culture on interactions with students when planning and delivering services (Ehrhardt-Padgett et al., 2004).

The next section examines possible reasons why repeated calls for reform of school psychology have not resulted in significant improvements in service delivery.

Barriers to Implementing Reforms in School Psychology

Considerable growth in consultative services in the United Kingdom and the USA has been reported by Larney (2003). Systemic models of practice have been developed in Scotland (Boyle & Mackay, 2007) and the provision of a continuum of services to parents, teachers and schools as well as students is well documented (see Bierman, 2003; Kratochwill & Shernoff, 2004; Lambert, 2000; Leadbetter, 2006; Myers, Myers, & Grogg, 2004; *Task Force on Psychologists in the Educational System in Europe*, 2001). These developments, however, as reported in the literature by Jimerson et.al. (2006), Larney (2003) and Sheridan and Gutkin (2000), have not been accompanied by noticeable adoption levels of systemic, consultative, indirect services. As Gilman and Gabriel (2004) note, the fact that these calls for reform have

continued for some time indicates that the desired reforms had not reached fruition, or simply that the profession has not moved quickly enough. This was noted previously by Fagan (2002) and Ysseldyke (2000). Senge (1990, p. 174) proposes that "new insights fail to get put into practice because they conflict with deeply held internal images of how the world works, images that limit us to familiar ways of thinking and acting."

At the school level, it is known that practitioners perceive a lack of control over their role in schools (Gilman & Gabriel, 2004; Leach, 1989) and emphasise their lack of training in assisting schools to engage with them and resolve large issues such as school instructional problems (Ysseldyke, 2000). It was noted more recently by Ashton and Roberts (2006) that teacher recipients of psychological services prefer traditional roles, while school psychologists insist that a wider range of services is much more valuable to schools.

In addition to school psychologists' training needs and limited control over the type of school work they perform, there are a number of systemic and logistical reasons that the school psychology profession as a whole is reluctant to fully implement these reforms. First, legislation pertaining to students with special needs requires the individual assessment of students (see *Individuals with Disabilities Act, IDEA*, United States Congress, 1997; Larney, 2003; *The School Education Act*, 1999; and *Schools Plus: Resourcing Informed Practice Handbook* (Banks, 2006). The effect of this targeted legislation is not "conducive to consultative working" (Larney, 2003, p. 17).

Second, there are the competing demands of students, parents, teachers and school systems for psychological services which require targeted training to enable school psychologists to provide these services. Third, the tension between school psychologists' actual and preferred roles (Jimerson et al., 2006) adds to the challenge of providing services to all students so strongly advocated in the literature (see, for example, Braden et al., 2001; Dawson et al., 2004; Henning-Stout & Myers, 2000; Nelson et al., 2006; Wampold, 2002).

Fourth, school psychologists may be uneasy about foregoing their traditional role in which they tend to be perceived as "experts", and therefore are expected to provide definitive answers to presenting problems (Larney, 2003). Fifth, as Adelman

and Taylor (1998) noted, mental health and non-academic outcomes are not viewed as accepted educational priorities; this mitigates against efforts by school psychologists to expand their services to embrace these new roles. Sixth, training programs are not necessarily closely aligned with the underlying assumptions of a new paradigm, according to Rosenfield (2000).

A similar situation may exist in Western Australia. However, published data describing contemporary professional activities and preferred modes of delivery of school psychological services are to date unavailable. Nevertheless, the adoption of a continuum of psychological services and support strategies including those discussed above is endorsed by professional associations such as Drent, Garton, Hudson, Ruzyla, and Tinney (2000); *The Australian Psychological Society* (*APS*): *Standards for the Delivery of School Psychological Services*; Glasgow, (2001); *The School Psychologists' Association of Western Australia*; and two Perth metropolitan education districts' Student Services Operational Plans 2009-10 and 2009-2011.

When the need for more expansive services is acknowledged by schools, school psychologists are likely to become active participants in determining what kinds of services schools want. This raises the issue of obtaining a measure of individual school need for services. Gilman and Gabriel (2004) note that active participatory collaboration with important stakeholders is essential for the future reform of school psychological services and their delivery. Teachers may be school psychology's most effective ally in expanding services (Benson & Hughes, 1985, cited in Gilman & Gabriel). This level of advocacy is necessary to generate the momentum required for the re-conceptualisation of the profession in Western Australia. Overcoming the barriers to reform uptake and negotiating a wider role in schools requires training for teachers as well as school psychologists in organisational/systems consultation (Gutkin & Curtis, 1999, cited in Larney, 2003).

Future Training Needs for School Psychologists

Rosenfield (2000) suggests that "psychology not only attracts individuals who have a strong commitment to the assumptions of the traditional model, but our training programs also reflect that perspective" (p. 506). School psychologists have training and experience in education and can use their specialised knowledge of assessment, learning and interpersonal relationships to assist school staff to enrich

the experiences and growth of all children (Tharinger et al., 2008). Notwithstanding this, however, the more psychologists are immersed in teaching and learning activities such as program evaluation (Bradley-Johnson & Dean, 2000) and outcome-based assessment (Canter, 1997; Sharpless & Barber, 2009), the more their services are valued. Teachers rely less on information about student characteristics to plan instructional programs, as these are determined primarily by a student's previous learning and current level of achievement. The school psychologist's overarching goal should be to promote the educational and psychological development of students and the prevention of school failure (Lambert, 2000).

The needs of schools and students are changing and school psychology must also change if it is to retain and increase its relevance (Ross, Powell & Elias, 2002). The success of psychological intervention depends on the adults who interact directly with students in their natural setting. Lambert (2000) points out that while learning to be a school psychologist, simply giving tests to individual students encourages psychologists to avoid the challenges and frustrations of becoming involved with the teacher-student interactions within the classroom. Pianta (2003) also notes the fundamental importance of teacher-student interactions for program success. In addition, *The National Association of School Psychologists* (NASP, 2005) mission statement urges school psychologists toward active participation with teachers in classroom activities. The school psychologist's task essentially "is building ecological systems that can support children, youth and families so they can function effectively without us" (Sheridan & Gutkin, 2000, p. 490).

System level skills and new paradigms should be a feature of training courses for school psychologists (Bradley-Johnson & Dean, 2000; Rosenfield, 2000), enabling trainees to operate at both the school and individual student levels. In addition, trainees need practice opportunities in providing system level services to school staff (Ysseldyke et al., 1997), because the success of psychological interventions is dependent more on the adults who interact directly with students than on the school psychologist *per se*, as claimed by Ross et al. (2002). Training programs must also meet the growing needs of schools and families, due to standards-based school reforms and changing student demographics. Service delivery standards stipulated by professional organisations and legislative requirements also deserve consideration in pre-service training (see, for example, Drent et al., 2000;

Grant, 2007; Swerdlik & French, 2000; *Disability Action and Inclusion Plan 2007-2008*, 2006).

Many training programs in the United States now have a focus on adopting elements of theory and scientific perspectives for decision-making within a problem-solving model (Pianta, 2003, 2007). This requires realigning the structural features of schools and of school psychology service line managers to: programs supporting data-based practices (Ward & Erchul, 2006); group focused services; collaborations and partnerships; and expertise in cultural matters (Crockett, 2004; Ehrhardt-Padgett et al., 2004). School psychologists also need to be trained to develop a leadership role within schools, to promote the improvement of children's socialisation skills and focus on the reported impact such skills have on academic learning (Elias & Dilworth, 2003). Psychological intervention planning ought to incorporate professional awareness of the role of the significant adults who interact with students in school settings, as alluded to by Pianta (2003). This is crucial, as the traditional practices of report writing and case conferencing have proved insufficient to clearly communicate intervention goals and strategies to parents and teachers in Western Australia, according to Leach (1989), and in the USA, according to Sheridan and Gutkin (2000).

Becoming an effective school psychologist requires the acquisition of a conceptual framework reflecting the empirical and professional knowledge that make up the foundation of school practice. Once the framework for practice is established, school psychologists should be in a position to impart effective psychological services to school personnel and parents (Lambert, 2000).

At the local level, school psychologists in Western Australia, like their overseas colleagues, will be required to maintain a working knowledge of state-wide learning standards and develop academic intervention skills. These are necessary to support schools to initiate, implement and evaluate programs for students at risk (Baxter & Frederickson 2005; Ehrhardt-Padgett et al., 2004; Swerdlik & French, 2000). The next section introduces the elements of a framework for school psychology practice in Western Australia that is underpinned by reforms and initiatives identified in the literature.

A Framework for School Psychology Practice in Western Australia

School psychologists acknowledge the importance and value in actively promoting the academic, personal and social development of all students. To realise this, according to Lambert (2000):

> assessments and interventions and consultation and collaboration with education professionals, are expected to promote a psychological perspective in schooling that will enhance educators' knowledge and plans for the education of children and adolescents for whom they have responsibility (p. 120).

Silburn and Zubrick (1996) and Zubric and Silburn (1997) report data describing the low educational standards, health and competence of Western Australian children. The authors suggest that in order to increase the academic performance of large numbers of school children, urgent action is needed to improve parenting skills and family functioning. Their research reveals that these factors are shown to impact negatively on students' school performance. A follow-up epidemiological study ten years later (Wood & Daly, 2007) reports student data that indicate little has changed in the intervening decade, despite considerable inter-agency efforts to ameliorate the family factors highlighted in the original study.

As discussed previously, the psychologist-to-student ratio in Western Australia is currently 1:1,203 (Saraceni, personal communication February 25, 2011). It is now generally accepted that this ratio, which is better than most ratios identified in the literature, has the potential to significantly influence school psychology practice (Reschly, 2000), with lower ratios associated with more comprehensive services. On that basis, the West Australian ratio would be capable of supporting the kind of expansive services that are strongly advocated in the literature and discussed in this chapter. Such services are more likely to successfully manage the problems documented by Wood and Daly (2007). A broad spectrum model for training and practice in school psychology could be based upon the three major components of *domains of competence, delivery system and outcomes* depicted in Blueprint III (Ysseldyke et al., 2006, p. 12). For a pictorial representation of the model see Appendix M. Four foundational competencies form the basis of the model, since they are the foundation upon which the other competencies are supported. The

competencies are underpinned by two fundamental aspects of practice: an established knowledge base of the principles of psychology and education, and application of the scientific method in service delivery. The foundational competencies are described below, followed by the functional competencies, the delivery system and model outcomes.

Foundational Competencies:

- Enhancing the development of cognitive and academic skills;
- Enhancing the development of wellness, social skills, mental health, and life competencies;
- Data-based decision-making and accountability; and
- System-based service delivery.

Functional Competencies:

- Professional, legal, ethical, and social responsibility;
- Technological applications;
- Diversity awareness and sensitive service delivery; and
- Interpersonal and collaborative skills.

Service Delivery

Blueprint III suggested a tri-level delivery system that adjusts intervention strength in accordance with student need. The lowest intervention level is *universal interventions* (system programs) which are directed at most students. For the 10% to 20% of students for whom this is inadequate, *targeted interventions* to address specific academic or social-emotional skills are required. A further 1% to 7% of students presenting with more severe needs or problems are provided with *intensive interventions*. Professional knowledge *per se* is not sufficient to deliver these outcomes. School psychologists require a skill set that includes applying problem-solving within a scientist practitioner methodology to develop and evaluate evidence-based interventions at the individual student and school system levels.

Outcomes

Stated outcomes are to improve the competencies of all students and to build and sustain the capacities of the systems to assist students to achieve these competencies. A coherent and integrated model for school psychology training and practice would enable school psychologists to demonstrate the comprehensive nature of their work within and for schools. They would then be in a better position to inform school communities about what school psychological services could be offered, thereby creating an effective dialogue with teachers, principals and parents (Miller & Leyden, 1999). Evaluation of school psychological services could then focus on developing objective measures of changes in student academic progress. In addition, evaluation would be extended to the broader outcomes at the school level; for example, changes in the epidemiology of increases or decreases in the prevalence of both positive and negative outcomes related to mental health issues and "behaviour referrals, suspensions and exclusion or placements in more inclusive settings" (Strein et al., 2003, p. 33).

Concluding Comments

Following the seminal work by Sheridan and Gutkin (2000), a number of new paradigms emerged, the intent of which are to reform school psychological practice from a narrower to a more expansive perspective. The close links between special education and school psychology has historically confined psychological services to student assessment and determination for special education placement. This restricted role has created difficulties for school psychologists in their efforts to increase their engagement in consultation, early intervention and prevention systems, inter-agency collaboration, and school staff development (Nastasi, 2004). As summarised by Pianta (2003, pp. 334-335), "Despite all these arguments, our profession is still more responsible for testing and diagnosing lots of children than it is for evaluating and improving the classrooms and schools those children attend."

The discrepancy between what school psychologists actually do, what they prefer to do and principals' preference for child-focused services has maintained a state of confusion and lack of understanding between service providers and the recipients (Gilman & Gabriel, 2004; Sheridan & Gutkin, 2000; Ysseldike et al., 1997). The contributions of the newer paradigms and the update of Blueprint III

(Ysseldike et al., 2006) "reflects the best vision for the future of the field" (p. 2) in considering training and practice for the next decade and beyond. Blueprint III offers a broad-based model of service delivery and system change within a preventive perspective for Western Australia's school psychology service. Schools and teachers are seen as vital partners with school psychologists in providing services and programs to improve student competencies and build the capacities of the schools to achieve this goal. The service delivery system and outcomes contribute to the major sub-constructs comprising the Theoretical Framework for the present study to develop a linear measure of school need for psychological services.

The next chapter discusses aspects of traditional measurement in education and psychology, including its limitations. The chapter continues with an examination of modern measurement theory and why this approach was chosen for the present study.

Chapter Four

Measurement

Historically, four basic measurement scales have been identified by Stevens (1946, 1951 cited in Glass and Stanley, 1970), showing differential adherence to objective measurement principles. These are:

- *Nominal measurement* in which objects are classified and classes denoted by numbers. This system can only state that objects are different and is unable to say anything about the objects' properties;

- *Ordinal measurement* assigns numerical codes to objects that reflect the amount of the attribute possessed by each object. However the distances separating pairs of numbers are not assumed to be equal. This prevents valid mathematical comparisons among the objects since it does not follow that score differences between pairs of scores represent equal amounts of the construct under enquiry;

- *Interval measurement* orders objects by a unit of measurement so that equal differences between the numbers denotes equal amounts of the attribute being measured. Zero point is arbitrary and does not mean absence of the attribute. Examples are temperature measured in degrees Centigrade and Fahrenheit; and

- *Ratio measurement* has all the properties of the interval scale and an absolute zero that reflects absence of the property measured. Examples are temperature measured in degrees Kelvin, height and weight measures.

Traditional approaches to measurement in education and psychology, such as Classical Test Theory and True Score Theory (de Klerk, 2008) assert that a person's raw score (X) is an additive composite of a true component (T) and a random error component (e_x). Therefore, the person score can be expressed as $X = T + e_x$. These measurement models have two conceptual constraints. First is the absence of an ordered range of items that represent a unidimensional construct. Second is a lack of additivity within the data. The basic assumptions upon which the person's score is predicated lead to a number of shortcomings with respect to objective measurement. These include:

- Raw scores are not measures, due to the inequality of the units counted and the non-linearity of the raw scores obtained (Wright, 1997);

- Scores near the centre of raw score distributions show a positive bias and a bias against scores at either extremes of a symmetrical set of items (Wright);

- The procedure of utilising raw score totals to determine person scores generates ordinal data only which results in a rank order scale. Due to the scale's lack of linearity, any subsequent parametric statistical analysis is questionable;

- Rank order scales have historically been treated as if they were linear scales, the outcomes of which were deemed to be *measures*. However, the summed scores viewed as a *measure* is not linear, since equal differences between parts of the measure do not denote equal amounts of the attribute being measured. As Wright (1999) notes, these scales do not necessarily possess additive features, which are necessary for linear measures;

- Test items are not ordered on this kind of scale in terms of increasing difficulty from easy to hard, and are not independent of the distribution of abilities of the person sample taking the test; and

- In addition, person ability estimates are not independent of the distribution of item difficulties being used. When task or item difficulty and person ability are differentiated, a clearer description of the attribute of interest is obtained (Bond & Fox, 2001).

Interval and ratio measurement scales, by virtue of their arbitrary and absolute zero points together with constant units of measurement, present the opportunity for objective calibration in psychological measurement. The need to define terms with such precision reflects good scientific method and appeals to the ideal of operationalism. However, as Hempel (1966) cautions, precise definition of terms can lead to further definitions. An operational definition of measurement in this sense must, therefore, be rejected (Michell, 1990). Alternatively, operationalism, whereby theoretical constructs are specified by a nominated testing operation, provides a criterion for construct identification. Such a criterion is usually referred to as an operational definition. This weaker form of operationalism sustained the development of psychological measurement until the 1990s. Introducing an operational definition increases the likelihood that the results can be obtained

objectively and are not dependent upon the test respondents. Furthermore, this allows for objective testability of scientific statements (Hempel, 1966).

Psychology has long been associated with both qualitative and quantitative methods, with a conspicuous reliance on ordinal data obtained from tests and protocols. Investigators have concentrated on the statistical analysis of raw data to the detriment of the authenticity of the measures being analysed. Psychological research has utilised Likert-type scales to measure a variety of behavioural traits and attitudes, and as Bond and Fox (2001) state, the psychological definition of measurement is flawed in that numbers are simply assigned to objects or events. This procedure ignores the fact that for a construct to be measurable, it must have an additive structure Michell, (1990). Because of this, psychologists were accused of ignoring the structure of quantitative attributes. Thus, the practice of assigning numbers to objects in psychological research proliferated in the belief that this satisfied the requirements of scientific measurement (Michell, 1997).

When Likert-type scales are used, response values to items (ordinal-data) are then summed and the total score subjected to statistical analysis as if it were a measure. These ordinal data are dealt with as if they were interval-level data and no hypotheses are tested to check if this particular assignment of numbers represents a falsifiable hypothesis. In this way, the additive structure of these quantitative attributes is ignored (Bond & Fox, 2001). Quantitative investigators should, therefore, avoid analysing raw data by quantifying magnitudes such as *more* and *less* so that they can be measured. This can be achieved by presenting persons with some statements and asking them whether or not they agree or disagree with them. These discrete responses can then be transformed by a mathematical model into measurements (Andrich, 1988). A further weakness of Likert-type scales is the underlying assumptions that:

- Each item is weighted equally therefore contributing equally to the obtained "measure" under study; and
- All items are measured on the same interval scale which has the same interval distances between successive judgement points.

However, the psychological distance between successive judgement categories is not necessarily equal and this is influenced, to a greater or lesser degree, by particular items. In addition, the lack of linearity within items can also be seen across items. That is, the value of distances between the rating categories might differ for each item and for different respondents (Bond & Fox, 2001).

Psychological measures would have greater credibility if they adopt the measurement standards observed in the physical sciences. These must be abstractions of equal units so that they become reproducible and additive (Bond & Fox, 2001). As Wright (1997) observes, measures need to be linear so that arithmetic can be applied to them. It has already been noted that the crux of scientific inquiry is objectivity, which ensures the measure given to an attribute is not a function of the observer. Conventionally, an item's difficulty level was determined by the number of respondents passing that item or, in other words, the distribution of abilities among the test's respondents. Bond and Fox (2001) suggest that item calibration and attribute measurement are therefore confounded. These authors argue that measurement instruments must be developed and calibrated, so there is universal agreement on the "reproducibility of their locations" (p. 3). It is only then that meaningful inferences about the underlying construct of interest can be made rather than the mere descriptions of raw data prevalent in much psychological research. Bond and Fox conclude that, in the absence of deliberate and scientific construction of measures, psychosocial research will continue to make limited progress.

The creation of a linear measurement scale requires that person measures and item difficulties are calibrated on the same scale. The flaws discussed above have been repeated in educational assessment and evaluation since the inception of True Score Theory (Bond & Fox, 2007). For example the popularity of Likert scales in psychological measurement, which are also subject to the bias discussed above, delayed early adoption of the principles of objective measurement elucidated by Thurstone (1927 and 1931). The goal, as expressed by Bond and Fox (2001, p. 3) is to "create abstractions that transcend the raw data, just as in the physical sciences, so that inferences can be made about constructs rather than mere descriptions about raw data."

Quantitative Methods and Educational Research

In everyday life, we observe, ask questions, hypothesise and evaluate events as they occur or impinge upon our behaviour. These activities are not, however, conducted systematically and under controlled conditions, both of which are prerequisite to scientific research. Appropriate processes are, therefore, critical in gathering data or evidence to either refute or support existing facts or theories (Fraenkel & Wallen, 2001). Choosing a particular methodology depends on the nature of the enquiry, the questions posed and the subjects in the study. The crucial decision in selecting a methodology is therefore based on the investigative context in question so that valid and reliable data are generated to test the research questions.

It has been suggested that quantitative researchers assume that the world is a single reality made up of facts that can be discovered and measured (Fraenkel & Wallen 2001) and that this tradition has developed from positivism promoted by Compte (1824, cited in Fraenkel & Wallen, 2003), and later described by Reese (1980, cited in Wiersma, 2000) as a family of philosophies that exemplify a positive view of science and scientific method.

The process of incorporating the scientific method is an important and accepted way to collect information that is both accurate and reliable. It is clear that quantitative methods are more structured and prescriptive than qualitative methods and that designs are intended to optimise the validity of the investigator's data interpretation. This enables the investigator to confidently state that outcomes are attributable to variables intrinsic to the design. When statistical procedures are used to test hypotheses, it is necessary to obtain an estimate of the random variance within the data. The more precise the estimate, the greater is the confidence in interpreting the effects of the treatments. That is to say, the statistical analysis has an increased likelihood of demonstrating an effect if, in fact, one does exist. Any extraneous variables present increase the random variance estimate which, in turn, is likely to reduce the sensitivity of the statistical analysis to detect the presence of any real differences. The remainder of this chapter will focus on the quantitative methodology and related issues.

Over time, quantitative research conducted according to the positivistic scientific method has utilised a particular paradigm to guide quantitative researchers in their investigations. Quantitative research methodologies are predicated upon a number of philosophical assumptions distinguishable from qualitative alternatives. For example: reality exists independently of the researcher; research can potentially result in accurate statements about the world; the researcher can stand apart from that which is being researched; and the purpose of research is to explain and be able to predict relationships among phenomena (Fraenkel & Wallen, 2003).

Quantitative research in education typically begins with a critical appraisal of the research literature from which a number of constructs pertinent to the research problem are derived. Then the researcher identifies and categorises potential associations between these constructs by applying the complementary activities of inductive and deductive reasoning, leading to positing a preliminary organisation of constructs. This model is then stringently compared with what is already known about the problem under investigation and if found to have sufficient validity, is retained for use in the empirical investigation. Irrespective of the particular research design adopted, quantitative investigators proceed through an acknowledged series of steps to collect information that is both accurate and reliable (Wiersma, 2000) as follows:

- A stated problem or area of interest, if considering basic research;
- A hypothesis;
- A review of pertinent literature;
- A sample of experimental subjects;
- A measuring instrument or experimental treatment;
- A description of the research procedure;
- Time line for data collection; and
- Data analysis to be carried out.

In conducting research in this manner, quantitative investigators posit relationships between variables, collect data on variables, and apply statistical techniques to test hypotheses about the posited relationships. The approach described by Weirsma (2000) aims to provide answers to the research questions by controlling unwanted variance in the data by:

- Randomly assigning subjects to treatments;
- Incorporating such factors into the design as independent variables;
- Holding factors constant (i.e. reducing a variable to a constant); and
- Statistical adjustments (p. 88).

This optimises the investigator's confidence that outcomes are attributable to variables intrinsic to the design. When statistical analysis is applied to test hypotheses, it is necessary to obtain an estimate of the random variance within the data. The more precise the estimate, the greater is the confidence in confirming hypothesised associations between variables.

Educational research investigates phenomena that influence teaching, learning and school functioning. A utilitarian argument is that such endeavours eventually lead to improved classroom practice. Wiersma (2000) observes that empirical research should be systematic, reliable and, therefore, valued. The investigator establishes research hypotheses, generates data sets, organises these and generates further hypotheses and so on in a cyclical and often dialectical process that is progressively refined. Kerlinger (1986) describes research as being systematic, controlled, empirical and, therefore, critical in investigating phenomena guided by theory.

Reynolds and Cavanagh (2005) advocate the application of quantitative methods in educational research. The authors argue that such methods are neither narrow nor limiting of themselves and that the criticisms that have arisen were due to an inaccurate perception of the nature and role of this approach. Research procedure is, to some extent, guided by the researcher's perception of its end point, given the quantitative method's processes for hypothesis derivation and testing. However, as Reynolds and Cavanagh caution, a problem arises when one's view of the research end point is heavily influenced by the methodology selected to reach that end point. Conflating ends and means is a persistent difficulty to overcome philosophically and methodologically. The claim that objectivity in research provides sufficient justification for a quantitative orientation lacks due consideration of the context in which it occurs, and also minimises the likelihood of considering alternative, potentially promising ways of conducting the research (Reynolds & Cavanagh, 2005). The authors suggest the risk of ends and means conflation can be avoided if

researchers reflect on the potential benefits of adopting a speculative philosophical approach as a start point.

The inherent rigour of quantitative methodology has resulted in charges of an excessive focus on research technique and statistical analysis. Yet, the quantitative-scientific approach retains a substantial probability of realising its empirical goals because it continues to do just that. The strength of this approach is the degree of accord between research hypotheses, data collection method and the data analysis. This is more likely to lead to meaningful results that can be easily interpreted, replicated by others or subjected to additional measurement in pursuit of further knowledge.

Wright and Masters (1982) identify four essential criteria for scientific measurement whereby research can be identified as quantitative or otherwise. These are paraphrased as:

- Uni-dimensionality - the data measures a single or dominant trait;
- Qualification - the data can be compared;
- Quantification - variables are measured in common units; and
- Linearity - data can be placed on a line or scale.

This categorisation, by restricting application of the term quantitative to empirical studies that measure variables, does reinforce the notion that such research is essentially scientific and deductive in nature, as discussed above (Reynolds & Cavanagh, 2005). Educational research must be valid and meet the requirements of both *internal validity* (the extent to which results can be accurately interpreted) and *external validity* (the extent to which the results can be said to describe the population from which the research sample was obtained or real situations or conditions). Educational research must also be reliable in that independent researchers ought to be able to replicate the study using the same methodology, procedures and conditions and obtain similar results.

As noted above, the scientific method is embedded in quantitative research and, as observed by Fraenkel and Wallen (2003), quantitative educational research is the application of the scientific method to educational problems. However, research in domains other than the physical sciences has historically experienced difficulty

establishing exactly what is being measured. Michell (1990) refers to the long history of doubt regarding the status of quantitative practice in psychology. Bond and Fox (2001) draw attention to traditional analyses of psychological data that relied on correlational or factorial methods that have no logical relationship with the underlying theoretical constructs under inquiry. Furthermore, the statistical analyses were unable to provide any information about the performance of test items and any effects particular items may have had on person responses.

Michell (1990) summarises his concerns by arguing that if measurement is the assessment of quantity, the only way forward for research psychologists is to show that psychological variables under inquiry are quantitative, and that psychologists' procedures to measure these variables are such that they demonstrate that the quantitative relations between the values can be assessed. The psychophysics tradition, prevalent from the late nineteenth century through the earlier decades of the twentieth century, relied on operationalism. Since then, psychology has modelled itself on the prevailing scientific orthodoxy: that to be seen as scientific it must be a quantitative discipline (Michell, 1990). But not everything under inquiry in psychology has magnitude and is therefore, measurable. Some variables are quantitative, that is, they have the characteristic of additivity, while others are non-additive and qualitative. Michell suggests that measurement need not be a necessary determinant of scientific status and asserts that it is the method of observation that denotes a science and furthermore, it is only through observation that the structure of a variable can be known. There can be no *a priori* knowledge of this, and the hypothesis of quantifiability must be rigorously tested. According to Michell, this is the critical step that has been missing from the development of modern psychology, because the discipline has become defensive in its pursuit of psychological measurement and, in part, this position has shaped future theorising.

In his pursuit of a theory of measurement, Michell's (1990) cogent criticism led him to reject operationalism as the basis of such a theory and in its place advocated conjoint measurement, as outlined by Luce and Tukey (1964). Operationalism, unfortunately, has been the basis of psychology's claim to be a quantitative discipline since the days of psychophysics until the 1990s. If Michell is correct, the ability of a recognised operation to provide a measure of a particular

variable is still an issue for psychology. Even though there are many number-producing procedures in psychology, the discipline may not have any real measurement procedures at all (Michell, 1990, p. 28).

In addition, Bond and Fox (2001, p. viii) claim:

> Without a technique that delivers the possibility of genuine, interval scale, linear measurement of individual variables, data analysis in the human sciences will be condemned to the sort of number-crunching gymnastics that we in the past have mistaken for what other scientists call measurement.

The early reliance of educational research on psychological research methodologies (Reynolds & Cavanagh, 2005) and its subsequent development may have been similarly restricted by a naïve adherence to the quantitative imperative. Initially, this reliance evidenced a focus on investigating behavioural traits of individuals or groups and, in time, the emphasis shifted to what Wiersma (2000) calls the phenomena that influence teaching, learning and how schools work. Reynolds and Cavanagh draw attention, in particular, to classroom organisation and inherent social systems and cultures. These authors suggest that quantitative educational research's biggest challenge is ensuring that research questions and preliminary theoretical formulations are thoroughly considered prior to any data collection and analysis. To this end, Reynolds and Cavanagh advocate the following principles, to enhance the scope of quantitative methods in education:

- Philosophical considerations underpin quantitative as well as qualitative research;
- A pluralist philosophical orientation is consistent with the objectives of quantitative research; and
- Theorising in quantitative research requires consideration of the interpretive-philosophical dimension of qualitative research (p. 225).

Theorising begins during the review of literature relevant to the stated problem, to generate models and hypotheses that will subsequently be empirically tested. A number of differing constructs may be identified and considered in the light of the research problem. Through a cyclical application of inductive and deductive processes, unsuitable constructs and formulations are rejected, and those that have

relevance and validity against existing knowledge are retained in a preliminary theoretical framework for empirical investigation. While the above considerations strengthen the quantitative approach in terms of making explicit its philosophical foundations, the question of what educational research actually measures remains an issue.

Research methodology in its various forms has been considered with respect to its utility in conducting educational and psychological research. Inventive theorising, to develop preliminary models that can be tested empirically, advances knowledge. Quantitative methods predicated on the scientific method, incorporating inductive and deductive reasoning, are successfully applied in the physical sciences. The principles of scientific measurement have been developed over time, and are well documented in the history and philosophy of science literature (Hempel, 1966). Rigorous approaches have been lacking in the human sciences, particularly in education and applied psychology, in which a narrow definition of measurement (Bond & Fox, 2001) has influenced the nature of research methodology in both disciplines.

The development of conjoint measurement (Luce & Tukey, 1964) and probabilistic models advocated by contemporary researchers (Andrich et al., 2005; Michell, 1990; Rasch, 1960; Wright, 1993; and Wright & Masters, 1982) provide better alternatives to traditional approaches that are based on True Score Theory and Classical Test Theory.

Rasch Model Analysis

Modern Measurement Theory seeks to provide the human sciences with measures comparable with those that have been developed and used in the physical sciences. A persistent problem in attempts to measure human attributes such as attitudes and abilities, referred to as latent traits, is they are not directly observable, and so are not amenable to direct measurement. The success of scientific measurement in the physical sciences was based on units which could be concatenated. Examples are weight, height and length, which could be measured directly. However, other physical science measures such as density, which also has an additive structure, could not be measured directly using concrete units. Density

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itself cannot be physically concatenated. A measure of density is determined by calculating the ratio of Mass / Volume and is therefore a derived measure. The work of Luce and Tukey (1964) on simultaneous conjoint measurement offered a partial solution. If mass and volume measures of a wide range of objects with different densities are ordered from small through to large, and the data entered into a matrix as shown in Table 4.1, then a density measure can be derived from the constant ratio that exists between mass and volume. The additive mass and volume scales shown across the top and left-hand side of the matrix provide derived density measures by their conjoint measurement values. The measures are represented by the diagonal dotted line, from bottom left of the matrix to top right, showing that the density measures increase as mass increases and volume decreases. Even though density cannot be physically concatenated, it can be ordered provided that the orders of the two quantities of mass and volume, that can be physically concatenated, are known.

Table 4.1
Conjoint measurement of density

Mass	0.2 kg	0.4 kg	0.6 kg	0.8 kg	1.0 kg
Volume 0.5 lr	0.40	0.80	1.20	1.60	2.00
1.0 lr	0.20	0.40	0.60	0.80	1.00
1.5 lr	0.13	0.27	0.40	0.53	0.67
2 0 lr	0.10	0.20	0.30	0.40	0.50
2.5 lr	0.08	0.16	0.24	0.32	0.40
3.0 lr	0.07	0.13	0.2	0.27	0.33

(Adapted from Bond and Fox, 2007, p. 7)

The simultaneous use of the two fundamental scales of volume and mass creates a third (derived) measure of density. Although the derived measures retain the properties of scientific measurement, the additive measurement structure of the data illustrated in Table 4.1 provides the necessary element.

As noted by Bond and Fox (2007, p. 8):

> According to Luce and Tukey the crucial indicator of an additive measurement structure in the data (for density and quite likely for some psychological attributes as well) is in the observable relationships between and amongst the matrix cells themselves.

Bond and Fox point out that the observed relationships are that any cell value in the matrix is less than the cell value to its right in the row, the cell value above it in the column, and the cell value diagonally to the right and above it.

Because of these relations among cells in the data matrix, simultaneous conjoint measurement also provides a solution to the problem of developing fundamental measures for the human sciences. Measuring a latent trait such as ability to complete mathematical computations can be achieved, providing indicators of two attributes such as task difficulty and person ability to complete this task are available. Table 4.2 shows task difficulty expressed as the percentage of persons completing each task, and person ability as the percentage of tasks successfully completed by a person.

Table 4.2
Data matrix with persons ordered by ability and items ordered by difficulty

Task / Persons	A	B	C	D	E	F	Proportion correct (Person ability)
Bill	x	x	x	x	x	x	100%
Anne	x	x	x	x	x		83%
James	x	x	x		x		66%
Janis	x	x	x	x			66%
Bob	x	x	x	x			66%
Henry	x		x	x			50%
Clare	x	x		x			50%
Damien	x	x					33%
Sean	x	x					33%
Daniel	x						17%
Proportion correct (Item difficulty)	100%	80%	60%	60%	30%	10%	

(Adapted from Cavanagh and Waugh, 2011, p. 5)

Conjoint measurement theory is evident if the levels of a particular attribute, in this case the probability to complete mathematical computations, increases as the levels of task difficulty and person ability increase. In this way, measures of latent traits in psychology and education, such as attitudes, perceptions and abilities, can be generated if there is an observed additive measurement structure inherent in the data that is generated by the measure. The presence of additive conjoint measurement is necessary for data to fit the Rasch model (Rasch, 1980/1960). Although these measures reflect different levels of the latent trait among persons, they are said to be invariant, as the scale against which individuals are measured does not vary. Additive conjoint measurement of latent traits produces measures that are ordinal, but not necessarily linear. Linearity is achieved by utilising Rasch model computer programs like RUMM2020 (Andrich, Sheridan, Lyne, & Luo, 2005) that calculate success-to-failure odds for persons completing a task, and then transforms the odds to their natural logarithm, known as a logit score. When the odds are 50:50, the logit value is zero. Persons less likely to complete a task or affirm a test statement have a negative logit location on the scale, while those more likely to do so have a positive logit location. Logit values and how they are computed are discussed in more detail in a later section.

Current procedures for constructing objective empirical approximations of latent constructs are predicated on logistic distributions (Wright & Stone, 1979). Andrich (1988) describes a model developed by Rasch to construct objective measures in psychology, with the aim of overcoming the prevailing problem of defining a test item's difficulty independently of the population responding to it. Each test or rating scale item must retain its difficulty level, irrespective of those responding to it. Similarly, the person responding to the item must maintain the same level of ability to endorse any particular items, provided that the items are part of the set of items that define the variable under enquiry (see Wright & Linacre, 1989). Analysing data using a Rasch model gives an idea of what the construct of interest might look like, if a ruler had been developed to measure the construct. This family of models enables the generation of approximations of measures that help to clarify why respondents and items behave as they do. Bond and Fox (2007) contend that Rasch modelling is the only procedure that has the techniques for "approximating objective, reproducible, additive measures in the human sciences" (p. 8).

According to Bond and Fox, the Rasch model is based on:

- The notion that data ought to conform to a hierarchy of more than / less than, on a single continuum of interest;
- Using the total score, the summation of item ratings, to estimate probabilities of responding. Respondents are more likely to answer easy items correctly than difficult items;
- All items are more likely to be passed by higher ability people than those of lower ability;
- Traditional test terms such as ability and high item difficulty are replaced by "agreeability" and "difficult to endorse" respectively; and
- The intent to measure a single variable is illustrated with a map of items and respondents on the same scale.

Because of this, test developers are able to specify:

- Those items that are less likely to be endorsed than others, and which respondents register more item affirmations than others;
- Gaps along the continuum where items are clearly missing; and
- The degree to which the range of item endorsability matches the range of affirmativeness of the respondent sample.

Bond and Fox (2001, p. xxi) state that the Rasch approach encourages researchers to participate in a dialectical process, whereby theory informs practice through measurement, and practice informs theory through measurement. In addition, Bond and Fox argue that any useful model applied to human behaviour theories needs to have the following characteristics:

- Sensitivity to the ordered acquisition of the skills or abilities under inquiry;
- Capability to estimate the developmental distances between these ordered skills or respondents; that is, how much more able one respondent is than another; and
- Ability to show whether or not the general developmental pattern shown among items and respondents is able to explain the pattern of development shown by every item and respondent.

Rasch model analysis satisfies all of these criteria. Furthermore, the Rasch approach is ideally suited to human science research (Bond & Fox, 2007; Wright, 1993 and 1997; Wright & Linacre, 1989). The Rasch Rating Scale Measurement Model (Andrich, 1988) has been successfully applied in a number of applications including: health science (Hagquist & Andrich, 2004; Tennant & Conaghan, 2007); intelligence testing (Styles & Andrich, 1993); attitudes and behaviours related to studying and learning among university students (Waugh, 2003): mathematics achievement (Van Wyke & Andrich, 2005); and student engagement in learning (Asano-Cavanagh & Cavanagh, 2009; Cavanagh, Kennish & Sturgess, 2008; Kennish & Cavanagh, 2009). Rasch model analysis is therefore ideally suited for application to the measurement of school need for psychological services.

Using Likert scale scores as an example, an investigator typically quantified and recorded each subject's data across all items in rows and data for each item across all persons in columns. There has been a tendency to express a person's ability on the test in terms of a raw score total, with a focus on the person's performance and little, if any, consideration of the difficulties of the test items. Information that is more useful can be gained by constructing a matrix of person data arranged in order of ability from top to bottom and item data in order of difficulty from left to right. Such a matrix provides information about the suitability of the items to permit all persons to respond, and whether or not the range of items is adequate to discriminate among the very able with appropriate level of difficulty items. The matrix provides useful developmental information about the interaction of ability and item difficulty, and from this it is possible to see the "expected" and "unexpected" responses of persons according to ability. The matrix can be further refined by converting ability raw scores (number of correct items) as a percentage of total items. This, however, is likely to group people around the middle scores and may not discriminate between more and less able persons. The problem with this, identified by Bond and Fox (2001) is that it is assumed that the distance between percentage scores has real meaning, when all it indicates is the order of test respondents' performance. As identified by Wright and Linacre (1989), scientific measurement depends on the arithmetical properties of interval scales.

The relative distances between raw scores for items and persons can be clarified by converting a raw score percentage to its success-to-failure ratio or odds. These ratio or odds, if then transformed to their natural logarithms, produce linear measures which, if plotted, have the properties of a linear scale where the value of the scale is retained at any position on the scale. Items and persons are, therefore, plotted on the same scale, providing critical information on "missing" items, and improvements to ensure the test items and the respondents' ability levels are adequately addressed. The fundamental principles of Rasch measurement (see Bond & Fox, 2007, pp. 32-41) are:

- Unidimensionality - despite the complexity of human behaviour and human attributes, only one of these attributes can be estimated at a time;

- Item fit - this helps the researcher to see whether the notion of unidimensionality holds up. Central to this is construct validity, which relates to the idea that data collected refers only to a single underlying construct that is specified in the theoretical model and whose existence is reflected in the items. The responses are the inferred behavioural manifestations of the underlying ability. Basically, how well does each item fit the construct under inquiry, and how closely do the items adhere to the notion of a straight measurement line?;

- Difficulty/ability estimation and error. Persons who are more able have a higher probability of answering all the items correctly. In addition, easier items are likelier to be answered correctly by all persons. Both these propositions are necessary to express the unidimensionality of the data, and they highlight the concept of order in affirming that unidimensionality. The logarithmic (logits) transformation discussed above converts item and person data from ordinality to interval data, and item and person performance probabilities fix the size of the intervals. Error in items is assumed to be greater if the ability logit is further away from item logits, and similarly for ability error estimates; and

- Reliability. The person reliability index assesses the replicability of person ordering to be expected if this particular sample of people responded to another item set measuring the same construct (Wright & Masters, 1982). The item reliability index assesses the likelihood that these items would be

similarly placed on the scale, if these items were presented to another sample of people with the same ability.

The Rasch measurement model offers a mathematical paradigm to examine data, on the basis that meaningful measurement involves investigation of one human characteristic or construct at a time, using a more than/less than line of inquiry (Bond & Fox, 2001). The methodology chosen for the current research will apply the principles of modern measurement theory (Wright, 1999). However, as stated above (Bond & Fox) this approach has not necessarily been adhered to in human science research, particularly in applied psychology and education. To overcome this deficiency, contemporary psychometricians have developed conjoint measurement and probabilistic models (Andrich, 1988; Michell, 1990; Rasch, 1960; Wright & Masters, 1982). These measurement models offer an alternative to inferential methods and, most importantly, ensure development of objective (person-free) measures (Bond & Fox). As noted by Wright and Linacre (1989), the Rasch measurement model provides a necessary and sufficient way to transform ordinal data into linear measures.

Data Analysis

This section describes the methods used for data analysis. Earlier discussion noted the limitations of traditional measurement and pointed out that True Score Theory fails to provide an acceptable measurement methodology for psychology and education. The preferred alternative is Rasch modelling, which transforms raw ordinal data into data that can be used to generate linear measurement scales. The Rating Scale model (Andrich, 1988) is applied to Likert-type rating scales with more than two response or judgement categories. If an item has three response categories (strongly agree, agree and disagree), it is modelled to have two thresholds. Each item threshold has its own difficulty estimate which is modelled as the threshold at which a person has a 50:50 chance of choosing one category rather than another. The Rating Scale model achieves this by transforming ordinal Likert-type scale data to natural logarithms (to the base e = 2.7318) by means of the following equations (Bond & Fox, 2001, p.203):

$$P_{ni1}\,(x = 1/B_n,\, Di,\, F1) = \dfrac{e^{\,(B - [D_i + F_1])}}{1 + e^{\,(B - [D_i + F_1])}}$$

where B_n is person ability and P_{ni1} is the probability of person n choosing category 1 (disagree) over category 0 (strongly disagree) on any item i. F_1 is the difficulty of the first threshold. The threshold difficulty F_1 is added to the item difficulty D_i ($D_i + F_1$) to show the difficulty of threshold 1 on item i.

Modelling other thresholds in the rating scales follows a similar procedure. For example, the difficulty of affirming category 2 rather than category 1 is as follows:

$$P_{ni2}\,(x = 2/B_n, D_i, F_2) = \dfrac{e^{\,(B_n - D_i - F_2)}}{1 + e^{\,(B_n - D_i - F_2)}}$$

The purpose of the model is to develop linear measures. Fit statistics are applied to demonstrate that where probabilistic conjoint measurement principles have been realised in practice, the results can be used as a measurement scale with demonstrable interval measurement properties.

Data were analysed using the Rasch Unidimensional Measurement Model (RUMM2020) computer program (Andrich et al., 2005). RUMM2020 applies the complex statistical equations to data imported from an Excel (Microsoft Office Home and Student, 2007) spreadsheet and then performs a number of diagnostic test-of-fit statistics to identify discrepancies between the Rasch model expectations and the actual data collected.

RUMM 2020 estimations

The diagnostic estimations and their applications used in the study are summarised as:

(a) *Summary test-of-fit statistics* estimates global fit of data for persons and items to the Rasch Rating Scale model and is expressed by a separation index and item and person fit residuals. The separation index measures the degree to which teacher affirmation locations are distributed along the scale compared to their errors of measurement. The ideal theoretical distribution of affirmation scores would result in

a separation index which is close to 1.0. The item and person fit residuals are the differences between the obtained values and those predicted by the model. These statistics should have a mean value approaching 0.00 and a standard deviation approaching 1.0.

(b) *Item category probability curves and threshold locations* test the data to check whether or not the response categories were answered logically and consistently. This was achieved by generating category probability curves and thresholds. In these circumstances, scores were expected to be distributed across the Likert scale judgement categories and, therefore, the nature of this distribution is crucial. The RUMM2020 computer program (Andrich, et al., 2005) was applied to check the distribution by estimating un-centralised item thresholds. Items with good model fit (see Figure 4.1) have thresholds ordered in line corresponding with the item response categories. Those items that lack this correspondence show poor fit to the model (see Figure 4.2).

I0007 Descriptor for Item 7   Location = -1.474   Residual = -0.113   Chi Sq Prob = 0.848
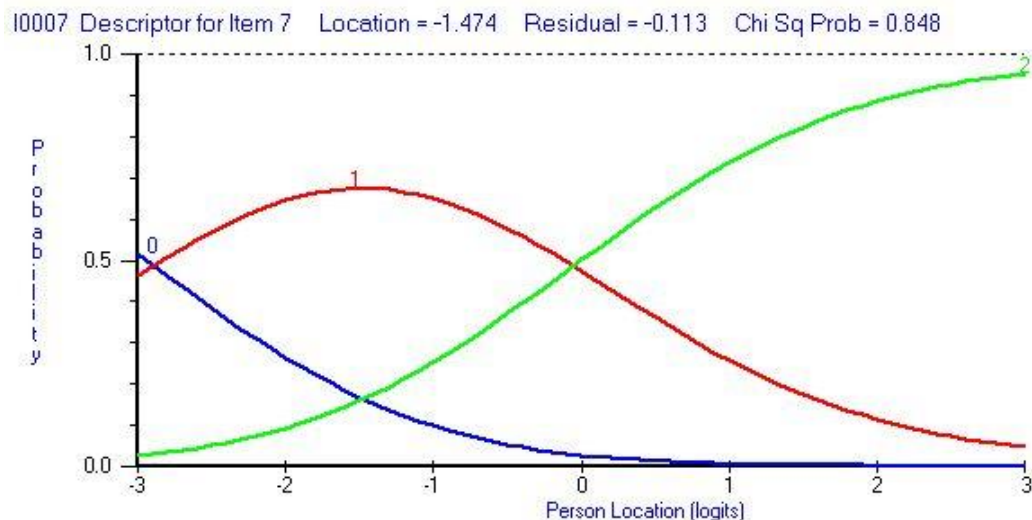
Figure 4.1: Category Probability Curve for Ordered Thresholds

In Figure 4.1, the vertical axis indicates the probability of choosing a particular response category. The horizontal axis indicates personal ability location estimates measured in logits which are the success to failure odds expressed in natural logarithmic units. The scale has an arbitrary mean set at zero. Item thresholds were estimated to illustrate the person ability estimate at which there exists the same probability of selecting either of two contiguous response categories. Figure 4.1

shows a Category Probability Curve for Ordered Thresholds. Persons with more item affirmativeness are located to the right of the horizontal axis and those with less lie to the left. The vertical axis shows the probability of selecting a response category. Curve 0 (disagree) indicated that the probability of a person located 3 logits below the mean is 0.52, and this decreases to zero as person ability increases. For Curve 1 (agree) the probability increases from 0.46 for a person located 3 logits below the mean to a maximum of 0.68, and subsequently decreases for higher person locations. The intersection of Curves 0 and 1 is the threshold for disagree and agree categories with a value of -2.92 logits. The other threshold for Curve 1 and Curve 2 is -0.12 logits. The ranking of the threshold values is ordered in line with increasing person location values.

If an item discriminates correctly, then the two extreme categories, in this case 0 and 2, ought to intersect approximately at the midpoint of the person location scale. The other points of intersection should occur at about the midpoint (0.5) of the probability scale. Both of these conditions are satisfied by this particular item. For Item 87, the thresholds were -0.19 and -0.58, respectively, as illustrated in Figure 4.2, a Category Probability Curve for Disordered Thresholds.
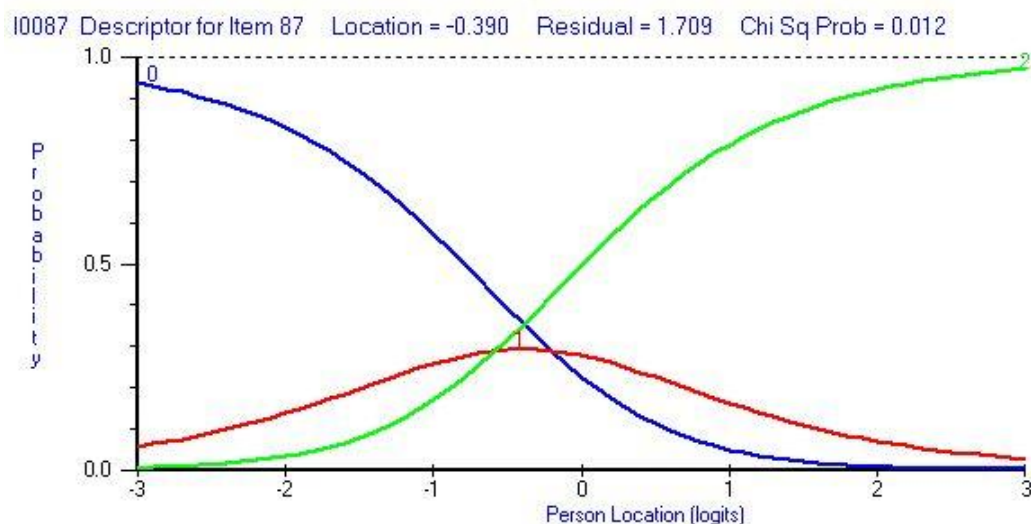
Figure 4.2: Category Probability Curve for Disordered Thresholds

The Category Probability Curve for Item 87 has disordered thresholds, indicating the item does not discriminate correctly. This is demonstrated by the location of the thresholds which are not sequential.

(c) *Individual item fit statistics* tests data-to-model fit for individual items.

In Rasch measurement, fit statistics enable identification of any discrepancies between Rasch expectations which are idealised prescriptions and the actual data collected (Bond & Fox, 2001). The fit of data to the model for each of the scale items was estimated and when the data fit the model well, the fit residual (i.e. the difference between the score predicted by the model and the obtained score) ought to be low. The difference should approximate the default value of $< \pm 2.5$ set by RUMM2020. In addition, RUMM2020 estimates a Chi Square with Bonferroni adjusted probability values indicating data to model fit. Inadequate fit is demonstrated in Figure 4.3, the Item Characteristic Curve for Item 9.
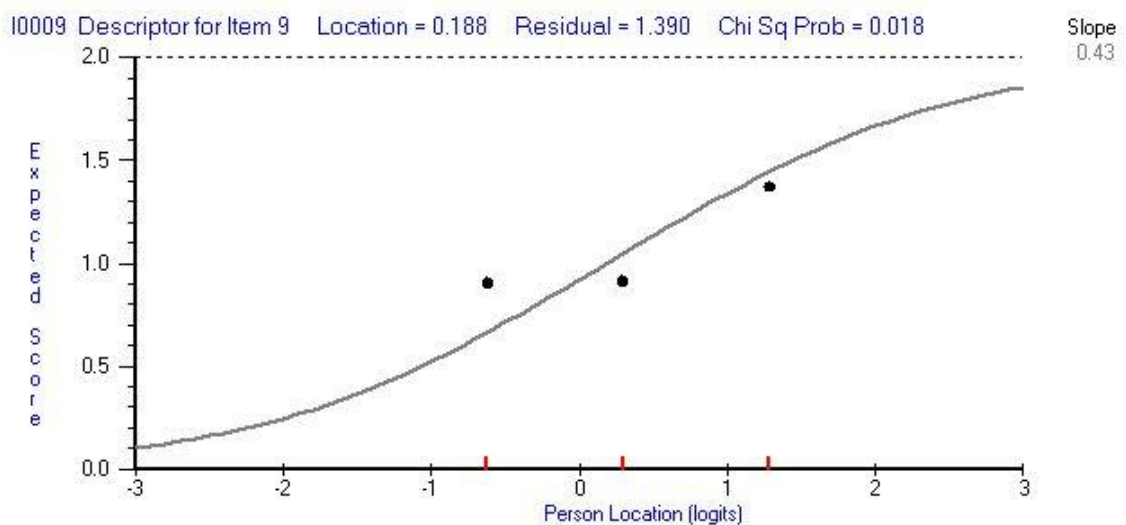
Figure 4.3: Item Characteristic Curve when Data do not fit the Model well

The ogive illustrates the theoretical relationship between the person location and the expected value for Item 9. The three class interval observed scores do not fit the ogive, as the Class Interval 1 score is higher than expected and the Class Interval 3 score is lower than expected. Figure 4.4 shows all three interval observed scores fit the ogive as expected, demonstrating that the item functioned as intended.
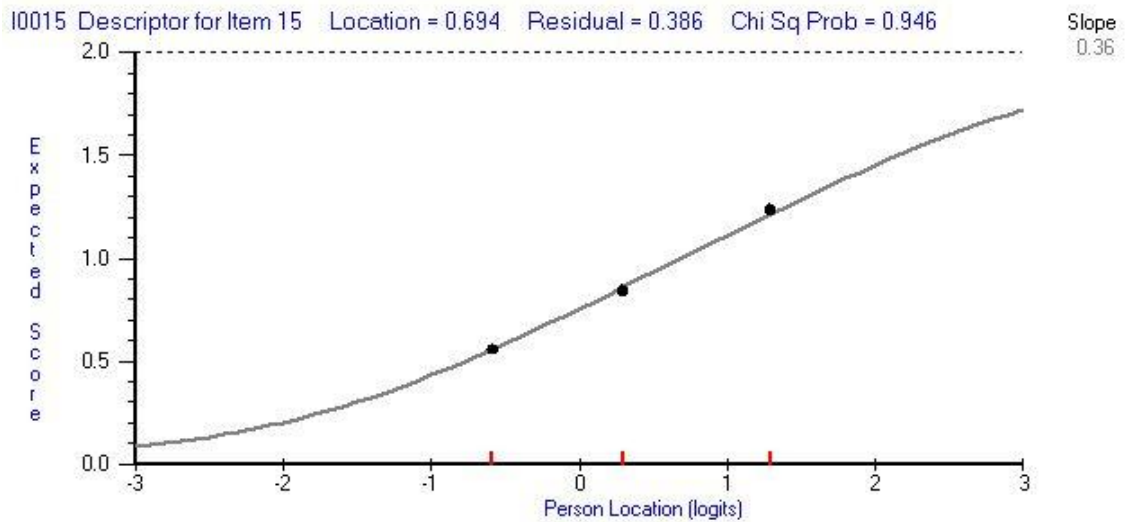
Figure 4.4: Item Characteristic Curve when the Data fit the Model well

(d) *Person-item location distributions* compare the distributions of person scores and item difficulties on the same logarithmic odds scale. The Figure 4.5 display represents the level of difficulty a particular item presents to respondents on the lower scale and respondent ability to affirm increasingly more difficult items on the upper scale. This enables simple comparison of respondent scores with item difficulties. It also illustrates any gaps in the item difficulty range along the respondent ability continuum. A good correspondence between the two metrics is desirable, as this means the respondents were well targeted by the items ranging from easy to difficult along the scale. (See Chapter 6, Results, for more detailed discussion).

(e) *Principal components summary* of factor analysis of residuals tests, whether or not the data are uni-dimensional. This is achieved by initially extracting the linear measure element from the data on the assumption that all of the items are weighted equally on the first component. A principal components factor analysis is then conducted on the standardised residuals after the initial Rasch scaling. If the total variance accounted for by the principal components is evenly distributed across the principal components, uni-dimensionality in the data is suggested. Multi-dimensionality may be present if an even distribution is not evident.

Validity Theory

When a new instrument has been developed, it is always designed for a particular purpose, and due consideration must be given to the context within which it is intended to be used (Wilson, 2005). This, in turn, provides the catalyst for the emergence of a construct that becomes the theoretical substance of interest in the eventual test respondents (Wilson). The construction of a new instrument ought to proceed through a series of sequential stages (Wilson, 2005; Wolfe & Smith, 2007a). Documentation of the subsequent process forms a necessary prerequisite step in formulating validity arguments as evidence that can subsequently be introduced to support applications and inferences regarding the obtained measures (Wolfe & Smith, 2007b). As Kane (2001) observes, validity as described in educational and psychological measurement in the early years of last century was seen in the context of a realist philosophy of science, with an emphasis on the accuracy of obtained estimates of the variable in question, such that greater accuracy was interpreted as greater validity. Such a criterion-based view of validity was predicated on the assumptions that the criterion measure was equivalent to the value of the variable of interest, and that an appropriate criterion measure was available. This is not always so; for example, in the case of latent traits that can neither be operationally defined nor directly observed. In the absence of a suitable criterion, Kane's approach to the problem is to use a criterion measure that includes some desired performance and to interpret the scores with respect to that type of performance.

During the middle to latter years of the last century, the content-based and criterion-based definitions of validity embraced the view that measures ought to be observable indicators of underlying theoretical constructs or of a theoretical framework. This third concept was referred to as construct validity. This definition, in which measures were deemed to be observable exemplars of theoretical constructs, viewed validity as the extent to which measures behaved in a way that was consistent with the theoretical framework (Wolfe & Smith, 2007a). Thus, three validity models came into use, each tending to be used for particular purposes without following any recognised principles as to when each concept of validity should be applied. Separation of validity into constituent elements was considered fragmentary by Messick (1995), and did not consider any evidence of the value

implications of score meaning as a basis for action, nor the social consequences of using the scores. The introduction of the construct-based model led to the emergence of three methodological principles required for validation: "an explicit statement of the proposed uses and interpretation of measures, extended analyses of multiple sources of evidence and the consideration of alternative theory-based interpretations of the meaning of measures" (Wolfe & Smith, 2007a, p. 98). The application of these principles to the criterion and content validity models resulted in the unification of the validity models. The construct-based model was considered as the basis for a unified theory of validity by Messick (1995, p. 37) particularly, as he incorporated criteria, content and consequence considerations into a "construct framework for the empirical testing of rational hypotheses about score meaning and theoretically relevant relationships."

As stated by Wolfe and Smith (2007a):

> Messick (1989) summarised the philosophical basis of and historical trends in the concept of validity, and that summary emphasises the shift in considering multiple types of validity to viewing validity as a unified concept for which multiple types of evidence are appropriate, depending on the nature of the interpretations and uses of the measures (p. 98).

Wolfe and Smith (2007b) adopt Messick's (1995) validation framework comprising six aspects of validity evidence in order to specify instrument development activities, that would then lend support to subsequent validity arguments. They add the additional aspect of interpretability, adopted from the Medical Outcomes Trust Scientific Advisory Committee (1995). The seven aspects of validity in their framework are:

1. Evidence of the content aspect;
2. Evidence of the substantive aspect;
3. Evidence of the structural aspect;
4. Evidence of the generalisability aspect;
5. Evidence of the external aspect;
6. Evidence of the consequential aspect; and
7. Evidence of the interpretability aspect. (p. 205)

The seven aspects of this model of validity evidence were applied to evaluate the methodology and outcomes of the present study to measure school need for psychological services. Aspects of validity evidence obtained in the evaluation process are explained in detail in a following chapter.

Summary

The chapter commences with a critical discussion of the traditional approach to measurement in education and psychology and its inherent limitations. Modern measurement theory is presented as a preferable alternative particularly the application of Rasch modelling to create interval measures. The importance of validity to the construction of a new instrument is stressed, followed by an explanation of the validity framework used to judge the appropriateness of the instrument development activities during the three phases of the research.

The next chapter explains the methodology for the study.

Chapter Five

Methodology

Because of its limitations, traditional educational and psychological measurement based on True Score Theory and Classical Test Theory was considered inadequate to answer the proposed research questions. Quantitative methodology and its application to educational research, together with Rasch Model Analysis, were considered more adequate for the study, because of their strengths when applied to measurement in the human and behavioural sciences. The validity of the measurement development process was a key consideration during the research. A review of the relevant literature confirmed the lack of published work to quantify school need for psychological services. The rationale for conducting the research underpinned choosing a quantitative research approach for the present study.

The current investigation, based upon a theoretically-grounded construct of school need for psychological services, adopted a random sampling research design in order to determine school need for psychological services. The Rasch Rating Scale model (Andrich, 1988) was used for measurement. The cross-sectional nature of the design ensured data were obtained from different types and sizes of public sector schools to address the major research questions. The research was conducted in three phases: Item Writing, The 120-Item Instrument, and finally, Validity Evidence. The subsequent phases were informed by the preceding one(s). The chapter commences with a statement of the research questions, which were formulated after an extensive examination of the research literature concerning domains of psychological service delivery, and a proposed model for service delivery and training school psychologists.

The chapter then provides a detailed description of the research design, including participants, data collection and analytic procedures. The administrative approvals obtained for the research and a consideration of ethical issues that might have arisen during the course of the study conclude the chapter.

The Research Questions

Current practices of allocating school psychologists to schools in Western Australia are based on a variety of combinations of school parameters, such as student population, number of students with disabilities and learning difficulties, and a measure of the socio-economic status of the school. The absence of evidence-based scientific measures of school need for psychological services perpetuates a reliance on school demographic factors, which is evident in the existing allocation formulae.

The literature review established the need for particular types of services, and the current investigation intends to make explicit those characteristics of schools, teachers and students that constitute the need for school psychological services. In addition, the investigation aims to identify those characteristics of schools, teachers and students that differentiate the need for school psychological services among schools. The research questions were:

1. Can a rating scale instrument be developed to measure school personnel perceptions of their school's need for psychological services? Specifically, in terms of measurement theory (Wright & Masters, 1982):

   (a) Was there uni-dimensionality?
   (b) Was there qualification?
   (c) Was there quantification? and
   (d) Was there linearity?

2. Is data from a measure of need for school psychological services associated with school demographic variables (e.g. socio-economic index)?

3. What facets of validity evidence described in the Wolfe and Smith (2007b) framework are identifiable in the construction of a measure of school need for psychological services?

Specifically:

   (a) Evidence of the content aspect;
   (b) Evidence of the substantive aspect;
   (c) Evidence of the structural aspect;

(d) Evidence of the generalisability aspect;

(e) Evidence of the interpretability aspect;

(f) Evidence of the external aspect; and

(g) Evidence of the consequential aspect?

Research Approach

The present study addresses the issue of allocating school psychologists to schools on a rational basis through the development of a linear measure of school need for such services. The research intention was to construct a calibrated instrument to measure schools' need for psychological services. Data derived from traditional use of a Likert-type scale was insufficient to provide such a measure. As identified by Wright and Linacre (1989), observations are always ordinal but measurements must be interval. In this investigation, a quantitative methodology incorporating Rasch model analysis was applied to produce data that were interval and that were measured in common units. This approach meets the requirements for measurement established by Wright and Masters (1982).

Research Design

The research was conducted in three phases with each phase building upon the preceding phase. The three phases were:

- Item Writing;
- The 120-Item Instrument; and
- Validity Evidence.

Samples

The combined education districts have a total of 224 schools comprising 167 primary schools, 33 secondary schools and 15 education support centres. The remaining schools were specialist facilities for students with severe disabilities and were not included in the study. Random samples of each of the three school types were selected to reflect the above ratios for Phases Two and Three. Teachers were either volunteers or selected within each school by the principal. A small sample of

school psychologists (4), teachers (6) and principals (3) formed an Expert Review Group for Phase One.

The instrument development process began with constructing a draft questionnaire of 123 items based on the seven variables comprising the preliminary conceptual framework. These were *Effective Instruction, Development of Academic Skills, Development of Socialisation and Life Skills, Student Diversity in Learning and Development, Prevention Services and Wellness Promotion, Home / School / Community Collaboration* and *School Structure, Organisation and Climate.* The draft instrument was then piloted with a randomly selected sample of teachers, principals and school psychologists. Results obtained from this process were used to refine the instrument. Eventually, a 120-item pool of items was generated with multiple items written for each of the seven variables. Multiple items were written due to the possibility of multi-dimensionality in the data which might have required constructing separate scales (the school need for psychological services construct is comprised of three major sub-constructs); the possibility of poor item-trait interaction leading to loss of items; and a lack of surety about item difficulties with the possibility of mis-targeting items to persons.

The 120 items were tested in a small pilot study in which respondents commented on clarity of wording and ease of response. Following revision, the instrument was trialled with a large number of teachers from a random sample of twelve schools taken from two education districts. Data analysis revealed good data-to-model fit. A parsimonious 35-item instrument incorporating the best items was subsequently developed.

Phase One: - Item Writing

Any new instrument development process needs to investigate the theoretical elements underpinning the construct of interest and the attempts, if any, to measure its content (Wilson, 2005). Extensive literature searches revealed little relevant information related to measurement of school need for psychological services, other than a series of subjective strategies designed to allocate school psychologists to schools within education districts in Australia. As a consequence, the theoretical framework adopted for the present study was predicated on the domains of service delivery reported in the literature. As discussed in Chapter Two, the elements of

school need for psychological services for research purposes were operationally defined as:

1. *Characteristics of students* - learning difficulties, disruptive behaviours, truancy, special needs, mental health issues, disabilities, suspension and exclusion data;

2. *Characteristics of schools* - presence of agreed vision, goals, evidence of inclusive practices, evidence of culture of improvement, staff morale, staff collaboration, willingness to consult with school psychologist, willingness to liaise with parents, involvement of other agencies; and

3. *Characteristics of teachers* - knowledge of pedagogy, behaviour management, rapport with students, presence of high expectations for student achievement, skill in identifying student difficulty early.

The construction of an instrument to measure school need for psychological services was guided by a series of sequential stages (see Wolfe & Smith, 2007a; Wilson, 2005). The researcher initially contacted school principals and district education office staff to elicit their participation in the research. Times were negotiated for the researcher to visit those schools and district office personnel who expressed an interest. This series of visits confirmed participation in the research and explained ethics clearances obtained from the Department of Education and Curtin University of Technology. In addition, school principals and site managers were fully advised of the research program in accordance with the ethics approval procedures obtained from the University Human Research Ethics Committee and the Department of Education Executive Director, Policy, Planning and Accountability (see Appendices A, B and G).

An Expert Review Group (ERG), comprising principals, teachers and school psychologists, was established to critically examine the internal relationships between the theoretical framework elements and dimensions of school need for psychological services. Written amendments were collected by the researcher and participants were given a brief interview to elicit verbal comments. Modifications to the preliminary theoretical framework were implemented to reflect existing theory and respondent suggestions.

A Likert-type survey was then developed, initially containing 123 items, hierarchically arranged in terms of their hypothesised difficulty to affirm, within seven sub-scales, each of which was aligned to one of the seven variables of the theoretical framework. The ERG was asked to provide written feedback on the hierarchical arrangement of items within each of the seven variables, item content meaning and ambiguity in item wording. Data collection was achieved by hand delivering the theoretical framework and draft questionnaire to either schools or district education offices during Term Two, 2008. ERG feedback resulted in changes to the wording of the seven variables, re-ordering of items and removing three items from the initial draft instrument.

Phase Two: - The 120-Item Instrument

The amended dimensions in the refined theoretical framework were operationally treated as variables. A 120-item rating scale instrument was developed with multiple items written for each of the seven variables. These were now referred to as:

- Teaching;
- Development of academic skills;
- School development of socialisation and lifeskills;
- Inclusion in learning and development;
- Prevention services and wellness promotion;
- Home/school/community collaboration; and
- School climate.

A three category Likert-type scale was provided for respondents to record responses from strongly agree, agree, and disagree categories. An unable to judge category was included to allow for respondents with limited school operational participation or who simply preferred not to respond to particular items. The items were tested in a small pilot study in which principals, school psychologists and teachers responded to the items and commented on clarity of wording and ease of response. Following revision, the items were trialled with a sample of 200 teachers in a random sample of ten schools selected from the two Education Districts. To ease pressure on respondents, four versions of the survey were administered with each

containing a common set of 40 items and an additional 20 items unique to each of the four versions. The items were selected to retain their hierarchical position within each of the seven variables. The 40 common items represented all of the variables.

The researcher once again followed up an initial telephone call to each school involved in the research with a personal visit to confirm and explain ethics clearances. Data collection was achieved by delivery and collection of the completed surveys from schools during Term Three 2008. Of the 200 instruments delivered to the schools, 140 were completed and then collected by the researcher, yielding a return of 70%. A fuller return was restricted by the smaller staff numbers in some of the primary schools and education support centres randomly selected for the study. A parsimonious scale of 35 items was then developed by a stepwise process using item-fit-statistics. The analysis of fit procedure (Wright & Stone, 1999, p. 48) followed the three steps of Responses (what is observed), Rasch (what is expected) and Residuals (the difference). The final set of items were chosen for good data-to-model fit, coverage of the construct domain and with a range of difficulties commensurate with person scores.

Phase Three: - Validity Evidence

The *Survey of Need for Psychological Services* (see Appendix L) is a 35-item instrument using a three-category response scale (strongly agree, agree and disagree). The 35 items were hierarchically arranged in order of difficulty within the seven sub-scales described previously, with five items in each of the sub-scales. The instrument was administered to 180 teachers and principals in a stratified random sample of 18 schools from two Department of Education and Training districts. Characteristics such as type of school and school size were represented as far as possible in the sample in the same proportion as they occurred in the population of schools in the two districts. The researcher followed up an initial telephone call to each school involved in the research with a personal visit to explain the details of the research and confirm ethics clearances (see Appendices F and G). Data collection was achieved by delivery and collection of the completed surveys from schools during Term Four, 2008. Of the 180 surveys delivered to the schools, the researcher collected 147 completed surveys from seventeen of the eighteen schools, yielding a return of 81%. Some of the schools were unexpectedly small primary schools or

Education Support Centres with less than 20 staff. The psychometric properties of the data were also analysed using RUMM2020. Differences in teacher scores accounted for by membership of the staff of different schools were examined by a one-way Analysis of Variance in the person scores.

The linear scale development activities and findings were assessed as examples of validity evidence using the Wolfe and Smith (2007a and 2007b) framework. The usefulness of the graphical displays and statistics generated by RUMM2020, to demonstrate evidence of validity, were also considered. In addition, publicly available school-level data were collected, such as socio-economic index, suspension and exclusion data, truancy and students with individual behaviour management plans. Parametric analyses of association between the linear measure of school need for psychological service and each of the school-level indices were examined initially by an SPSS estimation of bivariate correlation and next by Spearman Product Moment Correlations. The presence of meaningful associations would provide further independent evidence of validity for the instrument development process.

Ethical Issues

Before the commencement of the study, approval was sought at the University and Department of Education and Training levels. Approval to conduct the research was granted initially by Curtin University Human Research Ethics Committee (see Appendix B). Subsequently, approval to approach Department of Education and Training site managers, where the research was carried out, was given by the Executive Director, Policy, Planning and Accountability (see Appendix A).

Informed consent: all participants in this research were professional adults, including teachers, administrators or school psychologists employed in Government schools. Those participants on sick leave or on Workers' Compensation were not approached as potential subjects for this study. Due to industrial action at the time, one school declined to participate. All participating managers and principals gave written consent using a standard format endorsed by the Department of Education and Training (see Appendix G) and provided their staff members with explanatory letters (see Appendices C, D, E and F) that provided full details of the study, the researcher's obligations and responsibilities and the task involved by participating.

The researcher maintained *Confidentiality and Privacy* by negotiating pseudonyms for all individual participants and schools in the education districts in which the study took place.

Risks/Benefit Analysis: the risks in this research related mainly to breech of anonymity at the individual or school level. The researcher has undertaken confidentiality agreements with any third person involved in analysis of raw data or dissertation preparation to preserve the anonymity of all participants.

Adequacy of Method: the researcher and supervising committee took responsibility to ensure the methods used in this research permitted principals, teachers and school psychologists to accurately record their beliefs and perceptions. Additionally, these data were processed using transparent and defensible analytic methods.

Summary

The chapter begins with a brief review of the limitations of traditional measurement in education and psychology and the reasons for choosing a quantitative methodology. Next is a statement of the research questions followed by the Research Approach. The chapter continues by outlining the Research Design, including participants, data collection and analytic procedures employed for each of the three phases of the study. The chapter concludes with a description of the data collection and ethics approvals obtained for the research, and a consideration of ethical issues that might have arisen during the course of the study.

The next chapter presents the results for each of the three phases of the study.

Chapter Six

Results

Introduction

This chapter provides the results for each of the three phases of data collection. Brief descriptions of the Rasch model estimations of data-to-model fit are provided and displayed in tables and illustrative figures, highlighting items that performed well according to the model and those that did not. Next, the scales that were constructed are presented. Phase Two trialled and subsequently refined the 123-item survey originally developed in Phase One. In Phase Three, a parsimonious scale consisting of 35 items was then applied to measure school need for psychological services in 18 targeted schools.

The chapter begins with the Phase One results of the analysis of qualitative data obtained from an Expert Review Group who were asked for critical comment on the proposed theoretical model and the draft survey instrument. This is followed by presentation of Phase Two and Phase Three data-to-model fit statistics that were generated by RUMM2020.

Phase One: - Item Writing

The theoretical framework for the present study was initially informed by the domains of service delivery reported in the professional literature and local service delivery operational plans. As discussed in Chapter Two, the elements of school need for psychological services were operationally defined as:

1. *characteristics of students*: learning difficulties, disruptive behaviours, truancy, special needs, mental health issues, disabilities, suspension and exclusion data;

2. *characteristics of schools*: presence of agreed vision, goals, evidence of inclusive practices, evidence of culture of improvement, staff morale, staff collaboration, willingness to consult with school psychologist, willingness to liaise with parents, involvement of other agencies; and

3. *characteristics of teachers*: knowledge of pedagogy, behaviour management, rapport with students, presence of high expectations for student achievement, skill in identifying student difficulty early.

Consideration of the psychological service domains and delivery systems led to the proposition of a theoretical model with seven elements. These describe a series of school operations within which a school psychologist might be expected to operate. The seven elements were: *effective teaching*, *development of academic skills*, *development of socialisation and life skills*, *student diversity in learning and development*, *prevention services and wellness promotion*, *home/school/community collaboration, and school structure, organisation and climate*.

A draft survey instrument was developed initially containing 123 items, hierarchically arranged in ascending order of difficulty in seven sub-scales, each of which was aligned with one of the posited sub-constructs of the theoretical framework described above.

An Expert Review Group (ERG) was established to provide guidance in instrument development. This consisted of a small sample of three principals, four school psychologists and six teachers randomly selected from across two education districts that agreed to take part in the study. The Expert Review Group critically examined the relationship between the theoretical framework and the postulated dimensions of school need for psychological services. Suggested amendments and comments were noted by the researcher. Examples included:

- I have no problems with the three elements that reflect school need for services nor the sub-constructs as these are all important aspects of schooling. However I think that the heading *Effective Teaching* be altered to *Teaching*;
- We see the logical connections from school need for psychological services with the three elements you mentioned and these are well covered by the seven sub-constructs;
- The third sub-construct heading *Development of socialization and life skills* should reflect school-wide provision rather than individual teachers. Replace with *School development of socialization and life skills;*

- The model seems to have been well thought out and is internally consistent. Could I suggest *Student diversity in learning and development* be changed to *Inclusion in learning and development* which reflects Departmental policy and terminology;

- Sub-constructs are appropriate and fit to make a coherent model. The last sub-construct heading *School structure, organization and climate* appears too wordy, maybe you should rename it *School climate* which still captures what you want; and

- Our Psych. Service people should do something like this especially if it all works out.

As a result of the ERG feedback, the sub-construct headings were amended. They became *Teaching*, *Development of academic skills*, *School development of socialisation and life skills*, *Inclusion in learning and development*, *Prevention services and wellness promotion*, *Home/school/community collaboration* and *School climate*. The initial 123-item survey was reduced to 120 by discarding three items deemed to be repetitive of other items or subsumed in other items. These items were:

- Item 50 *Complex cases need school psychologist advice*;

- Item 66 *ADHD appears on the increase in the school*; and

- Item 67 *More and more students are being diagnosed with Autism Spectrum Disorder.*

The ERG members were then presented with a re-designed 120-item survey (see Appendix I). Examples of the sub-scale items were:

Sub-scale 1.   Effective teaching - *Teachers ensure all students succeed*;

Sub-scale 2.   Development of academic skills - *Students like to learn*;

Sub-scale 3.   School development of socialisation and life skills - *Bullying is quickly dealt with*;

Sub-scale 4.   Inclusion in learning and development - *The school has a diverse student population*;

Sub-scale 5.   Prevention services and wellness promotion - *Psychologists help develop mental health programs*;

Sub-scale 6.   Home/school/community collaboration - *The community helped to develop the school ethos;* and

Sub-scale 7.   School climate - *The school environment is supportive and safe*.

The ERG was asked to provide written comments and recommendations on: the sequential ordering of the hierarchical arrangement of items (progressing downwards from easy-to-affirm through to difficult-to-affirm) within each of the seven sub-scales contributing to school need for psychological services; item appropriateness for respective sub-constructs; and any potential for ambiguity in item wording. In addition, the participants were asked to comment on the user-friendliness of the survey and ease with which they could make judgements about survey items in accordance with Likert response categories such as strongly agree, agree and disagree.

Verbatim comments and recommendations recorded included:

- On the whole I am happy with the suggested order except to move Item 107 further down the order as it is quite a difficult item to agree with;
- In the Inclusion section I suggest you add: teachers understand the disability standards in education and obligations; teachers submit successful schools plus funding applications; teachers seek assistance from inclusive teams to cater for special needs students; and
- I am happy with the item order.

ERG members indicated their suggestions for re-ordering items and wording amendments on the survey forms. Feedback suggestions were categorised and tabulated as shown in Table 6.1.

Table 6.1
Item Refinement Data

Items re-ordered	Items replaced	Re-worded items
18 items	1 item	11 items
Ten items were moved up. #4, 9, 16, 19, 28, 30, 66, 91, 93, 119.	#91 The same parents stand for School Council. This was replaced by; Parents are welcomed into the school.	#1, 8, 28, 56, 62, 65, 68, 73, 84, 98, 114.
Eight items were moved down. #7,37,41,49,74,107,110,116 These items were seen as more difficult to affirm than their original position warranted.		

Re-ordered Items

The following items were seen by the ERG as easier to affirm than their original position warranted and were therefore moved up the scale.

- Item 4: *Teachers request assessments for students*.
- Item 9: *Feedback about teaching is good*.
- Item 16: *Test results are excellent*.
- Item 19: *Students struggle to learn*.
- Item 28: *Students access study skills training*.
- Item 30: *Students want to learn*.
- Item 66: *All ability levels are provided for*.
- Item 91: *Parents are welcomed into the school*.
- Item 93: *The school keeps the community informed*.
- Item 119: *Teachers participate in decision-making*.

The following items that were deemed by the ERG to be more difficult to affirm than their original position in the survey suggested, were moved down the scale.

- Item 7: *Teachers cater for individual differences*.
- Item 37: *Students get psychological advice*.
- Item 41: *The psychologist provides social skills training*.
- Item 49: *Students are safe at school*.
- Item 74: *Psychologists help develop mental health programs*.

- Item 107: *Teachers are student centred.*
- Item 110: *School policies facilitate achievement.*
- Item 116: *Psychological services improve school climate.*

Re-worded Items

The ERG identified items requiring re-wording. The most appropriate and succinct modification was adopted for particular items as shown in the following list:

- Item 1: *Teachers identify student needs.*
- Item 8: *Student progress is documented regularly.*
- Item 28: *Students access study-skills training.*
- Item 56: *We have difficult students.*
- Item 62: *Teaching students with special needs is satisfying.*
- Item 65: *All classes have students with learning difficulties.*
- Item 68: *Teachers need minimal psychologist input.*
- Item 73: *There is a need for child protection training.*
- Item 84: *Programs have improved student well-being.*
- Item 98: *The community helped develop the school ethos.*
- Item 114 :*Teachers analyse student performance data.*

At the conclusion of Phase One, the meaning of key terminology was clarified and made more descriptive, thereby improving the conceptual linkage between the preliminary theoretical framework and questionnaire items.

Phase Two: - The 120-Item Instrument

Following revision of the initial rating scale items in Phase One, a 120-item pool of appropriate items was generated with multiple items written for each sub-scale. This ensured an adequate pool of items in the event of loss of items because of poor fit to the model. Two analyses were performed. The first was of the 120 item data set to identify items with a good fit to the model. The second analysis was of the remaining data set of the 109 items that did fit the model well.

Application of the RUMM2020 computer program generated five estimations to test how well the data fitted the Rasch Rating Scale Model. The rationale for conducting the following five estimations is provided in Table 6.2.

Table 6.2
RUMM estimations and respective applications

Estimation	Application
(a) Summary test-of-fit statistics	Estimating global fit of data for persons and items to the Rasch Rating Scale model
(b) Item category probability curves and threshold locations	Testing the logical choice of the response categories
(c) Individual item fit statistics	Testing data-to-model fit for individual items
(d) Person measure-item difficulty distributions	Comparing distributions of person scores and item difficulties
(e) Principal Components Summary - factor analysis of residuals	Testing whether the data are uni-dimensional

The 120-item analysis

(a) Summary test-of-fit statistics

Table 6.3
Summary Test-of-Fit Statistics

	ITEM-PERSON INTERACTION			
	ITEMS		PERSONS	
	Location	Fit Residual	Location	Fit Residual
Mean	0.00	0.00	0.31	0.18
SD	1.35	1.09	0.89	1.73

The summary test-of-fit statistics is presented in Table 6.3. These global fit statistics are estimates only, as they are a summary of item data and person data (Rasch models use obtained raw scores to compute the probable values of person and item parameters). Furthermore, as stated in the RUMM2020 Analysis Manual, residual test-of-fit statistics are limited as they are constructed as a standardised normalised residual that is not normally distributed. Likewise, the Chi Square and its probability is constructed as an approximate Chi Square but is not perfectly distributed as the Chi Square. In general, the test-of-fit statistics applied by RUMM2020 need to be used relatively and not absolutely according to external criteria. The item-person interaction indicates the degree to which the data fit the measurement model and is based on residuals. Residuals are the differences between actual and expected responses calculated from the measurement model parameters. When the data fit the model, the distribution of the residuals, in this case the *fit statistic* has a mean value approaching zero and a standard deviation about 1.0. A

negative fit statistic shows that the data fit the model very well. A positive fit statistic indicates the presence of some noise in the data. The fit statistics mean values of 0.00 with a SD = 1.09 for the item data and -0.18 with a SD = 1.73 for the person data indicate an acceptable global fit to the measurement model.

The item-trait interaction summarises the individual Chi Square statistics linked with the items, and indicates the consistency of the sub-construct item difficulties across the range of teacher 'ability' measures on the scale; that is, the degree of agreement among the respondents concerning the range of item difficulties along the scale. When the data fit the model, the item-trait interaction (the Chi Square statistic) has a probability value greater than 0.05. Because the Chi Square statistic is sensitive to sample size, it must be treated with caution when large samples are involved. For these data, the obtained chi square value was 455.83 (df = 240.00, p < 0.05). The item-trait interaction chi-square is important as an indication of fit to the measurement model. If the chi-square is not significant, but is much higher than 0.05, then there is very good agreement among respondents about the difficulties of the items all along the linear scale. This would show a very good fit to the measurement model. The 120-item measure shows poor fit to the measurement model (p = 0.00) suggesting it is multi-dimensional.

RUMM estimates two reliability indices, Cronbach's Alpha when there is no missing data and a Person Separation Index. Cronbach's Alpha, the proportion of observed variance considered to be true, ought to be approximately 1.0. In the current analysis, Cronbach's Alpha, because of missing data, could not be estimated. In the RUMM program the Person Separation Index (PSI) is constructed as the ratio of the estimated true variance among the persons and the estimated observed variance among the persons using the estimates of their locations and the standard error of their locations (see Andrich & Van Schoubroeck, 1989, p.483). The PSI cannot be greater than 1 and or an ideal distribution across the measurement continuum, should be close to 1.0. For the current data, the Person Separation Index was 0.91 because the teachers with higher affirmation characteristics obtained higher scores on items and those with lower affirmation characteristics were inclined toward lower scores on items. The power of the test-of-fit was excellent.

(b) Category probability curves

RUMM2020 was applied to examine the data and check whether or not the response categories were chosen logically and consistently. This was achieved by generating two outputs, category probability curves and thresholds. A threshold, defined by Bond and Fox (2007), is "the level at which the likelihood of failure to agree with or endorse a given response category (below the threshold) turns to the likelihood of agreeing with or endorsing the category above the threshold" (p. 314). Thresholds for rating scale items can be illustrated as the intersection of the item probability curves for each response choice. Item thresholds were estimated to identify the person ability estimate at which there exists an equal probability (50:50 odds) for persons to select either one of two contiguous response categories. For any particular item the probability of choosing response categories ought to be ordered with respect to the ordering of the response categories themselves, that is, from 0 (disagree), to 1 (agree) and 2 (strongly agree). A notable feature of the Rasch model is that it can detect if the ordering of response categories does not work as intended by the model.
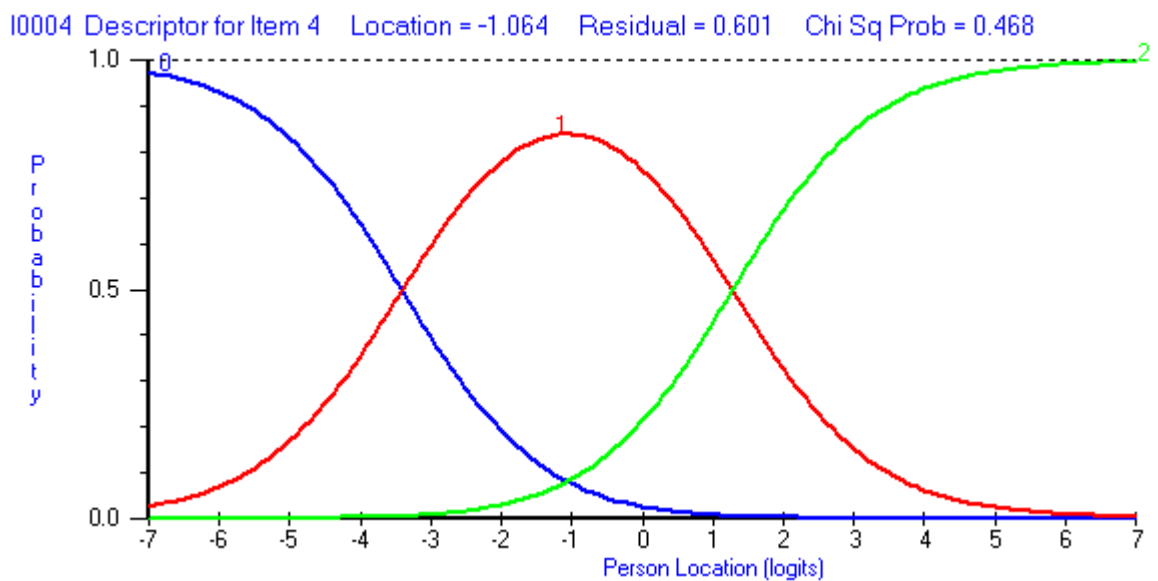
Figure 6.1 Category Probability Curve for Ordered Thresholds

Figure 6.1 shows Category Probability Curve for Item 4 (*Teachers request assessments for students*). In this example, the data analysis indicates that the thresholds are appropriately ordered, suggesting that the item was perceived by respondents to be succinct and its meaning unambiguous. The relatively low level of difficulty has a value of ─1.06 logits. The Category Probability Curve for Item 4

plots the probability of a particular response category being chosen against person location expressed in logits. Persons with the ability to affirm more difficult items are located to the right of the horizontal axis and those with less are located to the left.

The vertical axis shows the probability of selecting a particular response category. Curve 0 (disagree) shows that the probability of a person located 7 logits below the mean choosing this response category is 0.9. A person located 3.5 logits below the mean has a probability of 0.5 of choosing this response category. This probability then decreases to zero as person ability (expressed in logits) increases further. For Curve 1 (agree) the probability of choosing this response category increases from 0.02 for a person located 7 logits below the mean to a maximum of 0.85 for a person located one logit below the mean. The probability of a person choosing this response category subsequently decreases steadily for persons with higher locations on the logit scale. The intersection of Curve 0 and Curve 1 is the threshold for disagree and agree response categories and has a value of -3.40 logits. The other threshold for agree and strongly agree response categories depicted by the intersection of Curve 1 and Curve 2 is $+1.25$ logits. The ranking of these threshold values is ordered in line with increasing teacher ability to affirm more difficult items and their conceptual ordering from low to high as intended by the model.

For Item 6 (*Teachers are committed to student learning*), the respective thresholds were -1.23 and -1.86 logits as shown in Figure 6.2, the Category Probability Curve for Item 6.
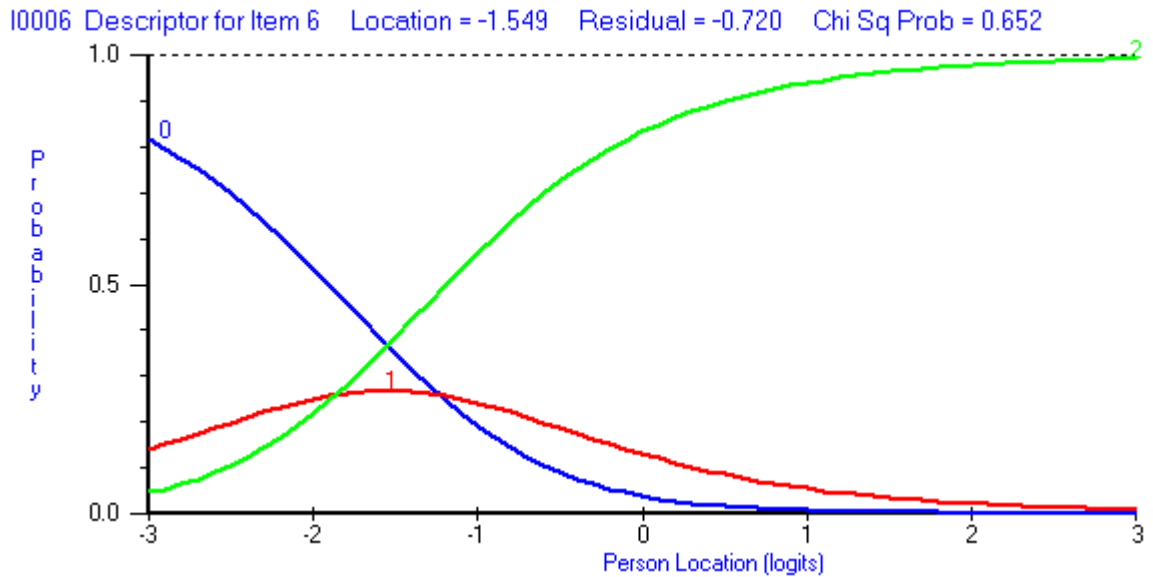
Figure 6.2: Category Probability Curve for Disordered Thresholds

The response categories are not functioning as intended since the two thresholds are not in their natural order, that is, increasing in order of person location expressed in logits due to the selection of the second (Curve 1) and third (Curve 2) response categories. The category probability curve for Item 6, therefore, has disordered thresholds. This particular item did not fit the Rasch Rating Scale model. Uncentralised thresholds were estimated for all items. Additionally, item 87 (*The P&C needs more parents*) and item 104 (*The school psychologist provides team building*) exhibited disordered thresholds and together with item 6 were removed from the data prior to further analysis. Those items with disordered thresholds are shown in Table 6.4.

Table 6.4
Items with disordered thresholds

Item Code	Mean	Threshold 1	Threshold 2
6	-1.54	-1.23	-1.86
87	-0.39	-0.19	-0.58
104	1.62	1.74	1.49

As illustrated in Table 6.4, the thresholds are anomalous, and not in order of increasing person locations, that is, the logit values for the first threshold should not be greater than the value for the second threshold. For Item 6 (*Teachers are committed to student learning*), the intersection of Curve 0 and Curve 1 is −1.23, the threshold for disagree and agree categories. The second threshold for agree and strongly agree categories has a person location value of −1.86, which is lower than

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expected. This particular item, therefore, did not fit the Rasch Rating Scale model. This is also the case for Item 87 (*The P&C needs more parents*) and Item 104 (*The school psychologist provides team building*) each of which has a lower value for the agree and strongly agree second threshold. In effect, the person location values for the thresholds in these three items were unexpectedly reversed.

There are several desirable reasons for having the appropriate thresholds between response categories. First, if thresholds are improperly ordered, respondents are less likely to use the categories consistently, therefore generating more noise in the data than would otherwise occur. This has implications for the reliability of the particular item. Second, disordered thresholds raise the question: do the response categories respectively convey the notion of more of the construct property within an item (RUMM Laboratory, 2007)?

(c) Individual item fit

In addition, the fit of data to the model was estimated for each of the 120 items. According to Bond and Fox (2007, p. 35), "fit is a quality control principle used to help decide whether the actual item and person performances are close enough to the Rasch model's requirements to be counted as linear interval scale measures." The quality of items can, therefore, be stringently tested through the estimation of statistics to demonstrate how closely the observed values distribution fits with the values predicted by a measurement model. RUMM2020 calculates residuals for every item. Residuals are the differences between the actual score and the score predicted by the Rasch Rating Scale model. When data satisfactorily fit the model, the fit residual ought to be low. RUMM2020 imposes a default value of $> \pm$ 2.5 logits. RUMM2020 also estimates a Chi Square statistic with probability values indicating data-to-model fit displays for all items.

RUMM2020 produces an Item Characteristic Curve (ICC) that illustrates the relationship between the expected values for each item and person locations measured in logits. The observed scores for class intervals are then plotted along the ICC. The ICC is non-linear and increases smoothly as the person location increases relative to the location of the item. The ICC is known as an ogive. Figure 6.3, the Item Characteristic Curve for Item 29 (*Students work hard*), shows that when the observed scores for three class intervals of respondents were plotted, they were close

to the respective values predicted by the model. The fit residual was 0.25 ($\leq \pm 2.5$) which is attributed to observed scores being close to predicted scores. If fit residuals are $\geq \pm 2.5$ they are considered to be extreme. In this example, the item functioned as intended by the Rasch Rating Scale model
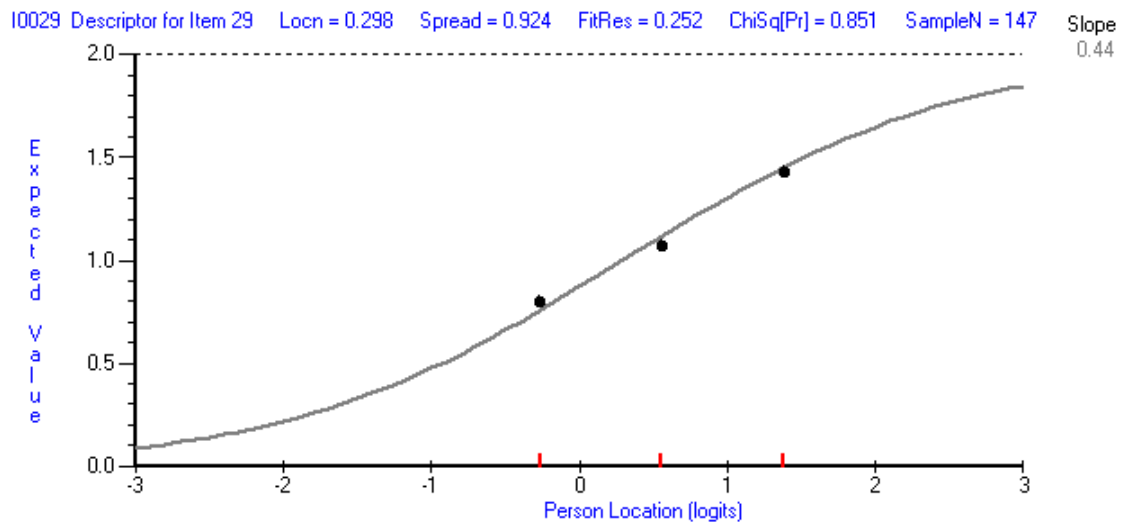
Figure 6.3: Item Characteristic Curve for Item 29 Data

Inadequate data-to-model fit is shown in Figure 6.4, the Item Characteristic Curve (ICC) for Item 24 (*Teachers and psychologists work with students*).
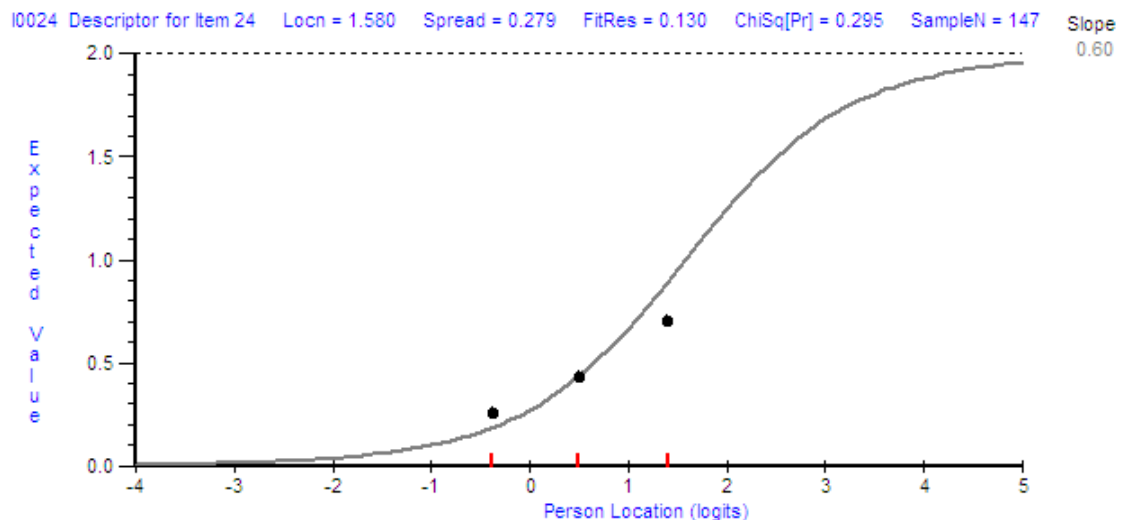
Figure 6.4: Item Characteristic Curve for Item 24 Data

The ogive illustrates the theoretical relationship between the person location and the expected value for Item 24. In this example, the observed scores do not closely follow the Rasch modelled expectations of performance, due to the Class

Interval 1 score being higher and the Class Interval 3 score being lower than the values predicted by the model. The RUMM2020 analysis revealed that nine of the 120 items had fit residuals greater than ±2.5 and/or Chi Square probability values lower than the Bonferroni adjusted value of ≥ 0.05. The items were 19, 20, 52, 60, 72, 75, 87, 105 and 117. The pertinent item statistics are shown in Table 6.5. In addition, the thresholds for Items 6, 87 and 104 were disordered (Table 6.4). A total of eleven items were, therefore, removed from the analysis at this stage of instrument refinement.

Table 6.5
Individual item fit statistics

Item	Location	SE	Residual	df	Chi Square	Probability
19	0.72	0.14	6.09	126.31	68.97	0.00
20	0.48	0.30	2.17	29.44	17.30	0.00
52	1.14	0.14	1.99	124.41	7.18	0.02
60	-0.89	0.14	3.85	130.11	27.09	0.01
72	-0.35	0.15	2.52	121.56	14.64	0.00
75	-0.92	0.33	2.83	30.39	13.91	0.00
87	-0.39	0.29	1.70	22.29	8.84	0.01
105	-2.88	0.38	-2.57	30.39	5.83	0.05
117	-2.53	0.34	-2.65	37.04	4.88	0.08

(d) Targeting of items

RUMM2020 generated a person ability and item difficulty distribution, shown in Figure 6.5 below.
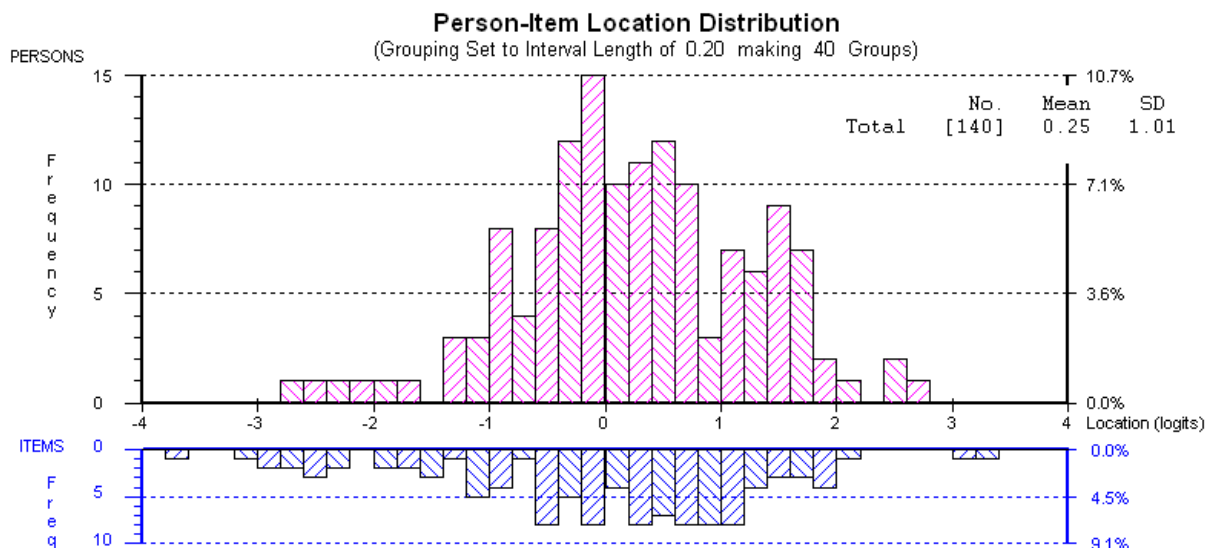
Figure 6.5: Person-Item location distribution

The difficulty of an item is represented on the bottom scale and teacher ability to affirm increasingly more difficult items is represented on the top scale. The logarithmic odds scale shows both item difficulty values (from −3.8 logits, easy to affirm to +3.5 logits, more difficult to affirm) and teacher ability values (from −2.8 logits, lower ability to +2.8 logits, higher ability) This display indicates agreement between the two parameters and, therefore, the persons are well targeted by the scale items with a satisfactory number of easy and difficult items across the scale.

(e) Principal components summary

It is important to demonstrate that the requirements of a unidimensional measurement model are met when a unidimensional trait has been measured as previously argued. This can be judged by extracting the principal Rasch measure from the data set and then conducting a Principal Components Factor Analysis of the residuals after the previous Rasch Model scaling. This analysis revealed that none of the items loaded on more than one factor suggesting that there was little likelihood of the data containing a second factor.

The 109-item analysis

The remaining data, after the eleven identified poor fitting items were removed, were analysed to test the fit of the retained data to the Rasch Rating Scale model. The summary test-of-fit statistics are presented in Table 6.6.

(a) Summary test-of-fit statistics

Table 6.6
Summary test of fit-statistics

	ITEM-PERSON INTERACTION			
	ITEMS		PERSONS	
	Location	Fit Residual	Location	Fit Residual
Mean	0.00	0.00	0.25	-0.24
SD	1.37	0.76	1.02	1.64

Global fit statistics are estimates only as they are a summary of item data and person data. The fit statistics mean that values of 0.00 with a SD = 0.76 for the item data and − 0.24 with a SD = 1.64 for the person data are marginally better than the 120 item scale data. The Separation Index indicating the proportion of transformed scores in the data that is considered to be true was 0.92. This suggests a good level of

reliability in the scale. The power of the test-of-fit was excellent. These statistics indicate good global fit to the measurement model.

(b) Category probability curves

Item thresholds were again estimated to identify the person ability measure at which an equal probability exists for persons to select either one of two contiguous response categories. Category probability curves for all 109 items of the refined scale exhibited ordered thresholds. The thresholds are now presented in Table 6.7.

Table 6.7
Item threshold values for the 109 item scale

Item	Location mean	Threshold 1	Threshold 2
1	-2.59	-4.97	-0.24
2	-1.11	-2.18	-0.05
3	-0.26	-3.49	1.19
4	-1.11	-3.49	1.27
5	1.15	0.25	2.06
7	-1.52	-2.92	-0.11
8	-0.51	-2.02	0.98
9	0.14	-0.86	1.15
10	0.51	-0.00	1.03
11	-0.41	-2.66	1.84
12	0.33	-1.27	1.93
13	1.89	1.29	2.48
14	1.54	-0.28	3.37
15	0.66	-0.66	1.98
16	1.79	-0.48	3.10
17	0.72	-0.00	1.44
18	-0.44	-1.02	0.13
21	0.21	-1.65	2.09
22	0.12	-0.99	1.24
23	1.06	-0.20	2.33
24	0.51	-0.63	1.65
25	0.92	-1.27	3.11
26	1.43	-0.75	3.62
27	0.43	-1.61	2.48
28	2.23	1.33	3.12
29	1.17	-0.39	2.75
30	0.73	-1.25	2.73
31	1.99	0.15	3.82
32	1.94	0.45	3.43
33	-0.27	-1.44	0.89
34	-2.81	-5.82	0.19
35	0.78	-0.99	2.55
36	-0.82	-1.77	0.12
37	0.94	-0.25	2.15
38	-1.20	-3.39	0.99
39	-0.31	-2.16	1.53
40	-0.92	-2.87	1.02
41	1.39	-0.10	2.88
42	-0.17	-1.44	1.09
43	3.12	-0.24	6.49
44	0.59	-1.82	3.02

Item	Location mean	Threshold 1	Threshold 2
45	1.07	-1.93	4.08
46	1.28	-1.09	3.67
47	1.46	0.36	2.57
48	-0.08	-2.02	1.85
49	-0.12	-2.69	2.45
50	0.99	-0.73	2.71
51	3.23	0.03	6.44
53	0.24	-1.50	1.98
54	0.31	-0.69	1.33
55	1.78	1.22	2.34
56	-1.06	-2.71	0.59
57	0.98	-0.77	2.73
58	0.84	0.44	1.25
59	1.95	-0.36	4.28
61	-1.53	-2.70	-0.37
62	0.46	-0.74	1.67
63	-0.39	-1.99	1.20
64	1.27	-0.49	3.04
65	-3.62	-5.64	-1.60
66	-0.14	-1.66	1.37
67	1.34	-0.28	2.96
68	0.95	-0.46	1.44
69	-0.84	-2.46	0.76
70	-0.40	-1.95	1.15
71	-0.35	-1.85	1.14
73	-0.43	-1.91	1.05
74	0.78	-0.27	1.83
76	1.16	-0.58	2.91
77	1.09	0.28	1.89
78	-0.25	-3.39	2.89
79	0.58	0.13	1.02
80	0.19	-0.98	1.37
81	0.29	-1.59	2.17
82	0.27	-1.56	2.10
83	0.43	-1.02	1.89
84	-0.04	-2.12	2.02
85	0.78	0.09	1.47
86	0.36	-1.49	2.21
88	-2.37	-5.73	0.99
89	-0.00	-1.64	1.62
90	0.73	-0.85	2.32
91	-2.90	-6.03	0.21
92	-0.81	-2.85	1.22
93	-1.09	-3.07	0.87
94	-0.44	-2.77	1.88
95	-0.09	-1.64	1.45
96	1.65	-0.06	2.36
97	1.03	-0.14	2.21
98	-0.07	-1.81	1.67
99	0.85	-0.69	2.40
100	0.74	-0.27	1.76
101	0.81	-0.41	2.05
102	-1.51	-3.22	0.19
103	0.11	-1.53	1.76
106	-1.09	-2.69	0.49
107	-3.15	-5.92	-0.37
108	-2.75	-5.66	0.15
109	2.37	-4.72	-0.02
110	2.65	-6.19	0.89

Item	Location mean	Threshold 1	Threshold 2
111	-1.76	-2.74	-0.77
112	-1.89	-4.33	0.54
113	-2.57	-5.90	0.74
114	-1.62	-3.54	0.29
115	-1.84	-4.12	0.44
116	0.25	-0.82	1.32
118	-0.74	-2.45	0.97
119	-0.55	-2.00	0.89
120	-2.57	-5.49	0.34

(c) Individual item fit

The fit of data to the model was estimated for each of the 109 items. When data fit the model satisfactorily, the fit residual should be low (RUMM2020 imposes a default value of $\leq \pm$ 2.5 logits) and Chi Square statistics with probability values $\geq$ 0.05. Table 6.8 shows the statistical analysis for all items.

Table 6.8
Individual item fit

Item	Location	SE	Residual	df	Chi Square	Probability
1	-2.59	0.18	1.42	131.70	3.31	0.19
2	-1.11	0.31	0.96	31.27	5.73	0.05
3	-0.26	0.16	1.07	121.28	5.22	0.07
4	-1.11	0.37	0.76	31.27	2.12	0.34
5	1.15	0.15	1.56	117.49	4.55	0.10
7	-1.52	0.31	0.01	37.90	1.51	0.46
8	-0.51	0.32	-0.09	30.32	0.32	0.84
9	0.14	0.14	1.73	127.22	8.49	0.01
10	0.51	0.28	0.62	28.42	1.78	0.40
11	-0.41	0.19	-0.16	118.43	1.18	0.55
12	0.33	0.30	0.50	36.00	0.34	0.64
13	1.89	0.16	1.39	126.01	14.18	0.00
14	1.54	0.35	0.57	29.37	6.94	0.03
15	0.66	0.15	0.75	124.12	0.66	0.71
16	1.79	0.38	0.16	24.63	0.19	0.90
17	0.72	0.29	-0.49	29.37	0.56	0.75
18	-0.44	0.24	1.40	37.90	4.76	0.09
21	0.21	0.17	0.95	119.38	2.74	0.25
22	0.12	0.32	0.88	25.58	0.72	0.69
23	1.06	0.33	0.67	26.53	1.08	0.58
24	0.51	0.15	1.21	118.43	1.77	0.41
25	0.92	0.40	-0.08	26.53	0.21	0.89
26	1.43	0.39	-0.11	36.00	0.98	0.61
27	0.43	0.18	-0.33	122.22	1.66	0.43
28	2.23	0.42	-0.37	23.69	0.17	0.91
29	1.17	0.34	-1.67	29.37	6.41	0.04
30	0.73	0.17	-1.20	126.96	5.78	0.05
31	1.99	0.35	-0.46	31.27	7.68	0.02
32	1.94	0.17	-0.68	117.49	2.95	0.22
33	-0.27	0.28	0.23	34.11	0.20	0.90
34	-2.81	0.37	0.15	31.27	3.43	0.17
35	0.78	0.35	-0.40	29.37	0.33	0.84
36	-0.82	0.30	0.15	31.27	2.04	0.35
37	0.94	0.16	0.94	110.85	6.21	0.04

Item	Location	SE	Residual	df	Chi Square	Probability
38	-1.20	0.33	-0.51	36.00	0.72	0.69
39	-0.31	0.35	-0.59	30.32	2.00	0.36
40	-0.92	0.18	0.80	118.43	0.17	0.91
41	1.39	0.35	-0.82	26.53	4.48	0.10
42	-0.17	0.32	-1.66	27.48	2.56	0.27
43	3.12	0.41	0.75	28.42	6.77	0.03
44	0.59	0.20	-0.36	124.12	1.40	0.49
45	1.07	0.46	-0.35	31.27	0.94	0.62
46	1.28	0.40	-0.53	29.37	2.85	0.24
47	1.46	0.28	0.45	37.90	0.24	0.88
48	-0.08	0.17	0.01	129.80	0.22	0.89
49	-0.12	0.42	-0.73	30.32	1.18	0.55
50	0.99	0.30	-0.42	36.00	4.73	0.09
51	3.23	0.39	-0.22	30.32	1.40	0.49
53	0.24	0.38	0.78	23.69	0.47	0.78
54	0.31	0.26	-0.62	34.11	2.03	0.36
55	1.78	0.16	0.92	119.38	11.16	0.00
56	-1.06	0.33	1.39	31.27	7.53	0.02
57	0.98	0.17	-0.37	114.64	2.65	0.26
58	0.84	0.30	0.41	23.65	0.55	0.75
59	1.95	0.40	-0.51	26.53	2.04	0.35
61	-1.53	0.31	-0.88	36.95	4.08	0.12
62	0.46	0.32	1.04	25.58	6.76	0.03
63	-0.39	0.16	0.51	130.75	4.12	0.12
64	1.27	0.35	0.13	29.37	7.05	0.02
65	-3.62	0.05	-0.27	29.37	1.01	0.60
66	-0.14	0.15	-0.53	126.96	3.63	0.16
67	1.34	0.37	-0.00	23.69	0.27	0.87
68	0.95	0.21	0.65	36.00	4.04	0.13
69	-0.84	0.16	-0.63	129.80	4.95	0.08
70	-0.04	0.32	-0.01	30.32	0.48	0.78
71	-0.35	0.33	0.74	29.37	1.70	0.42
73	-0.43	0.33	0.81	29.37	2.00	0.36
74	0.78	0.16	1.96	97.59	13.54	0.00
76	1.16	0.20	-0.05	88.12	1.05	0.59
77	1.09	0.32	-0.33	23.69	3.97	0.13
78	-0.25	0.54	-0.01	27.48	1.54	0.46
79	0.58	0.29	0.03	23.69	0.36	0.83
80	0.19	0.27	-0.48	35.06	2.28	0.31
81	0.29	0.38	-0.74	26.53	1.00	0.60
82	0.27	0.17	-0.47	119.38	1.74	0.41
83	0.43	0.32	0.08	29.37	0.96	0.61
84	-0.04	0.19	-0.83	109.91	1.79	0.40
85	0.78	0.27	0.07	29.37	0.92	0.63
86	0.36	0.39	-0.57	24.63	1.15	0.56
88	-2.37	0.40	0.85	28.42	2.04	0.35
89	-0.00	0.19	0.45	86.22	1.28	0.56
90	0.73	0.36	-0.48	24.63	0.97	0.61
91	-2.90	0.39	-0.65	30.32	0.47	0.78
92	-0.81	0.18	-0.33	120.33	1.31	0.51
93	-1.09	0.36	-0.40	28.42	2.77	0.24
94	-0.44	0.41	-0.79	27.48	0.61	0.73
95	-0.09	0.16	0.16	112.75	1.05	0.59
96	1.65	0.35	0.16	29.37	0.38	0.82
97	1.03	0.31	0.42	27.48	0.33	0.84
98	-0.07	0.18	-0.09	108.96	0.46	0.79
99	0.85	0.32	0.04	29.37	3.01	0.22
100	0.74	0.37	0.12	18.95	0.05	0.97
101	0.81	0.17	-0.17	96.64	3.65	0.16

Item	Location	SE	Residual	df	Chi Square	Probability
102	-1.51	0.34	0.15	31.27	0.07	0.96
103	0.11	0.17	-0.62	114.64	4.17	0.12
106	-1.09	0.16	-0.82	126.96	4.65	0.09
107	-3.15	0.39	-1.23	31.27	3.72	0.15
108	-2.75	0.39	0.82	30.32	0.29	0.86
109	-2.37	0.18	-0.85	129.80	0.48	0.78
110	-2.65	0.38	-1.22	33.16	6.44	0.03
111	-1.76	0.36	-0.53	31.27	4.48	0.10
112	-1.89	0.18	-1.25	128.86	4.77	0.09
113	-2.57	0.34	-1.31	36.95	1.11	0.57
114	-1.62	0.37	-0.67	29.37	2.12	0.34
115	-1.84	0.18	-0.53	128.86	1.05	0.59
116	0.25	0.32	-0.62	25.58	1.24	0.53
118	-0.74	0.16	-0.45	128.86	3.47	0.17
119	-0.55	0.34	-1.25	26.53	2.00	0.36
120	-2.57	0.34	0.00	36.95	0.17	0.91

Of the 109 items in the analysis, 96 fit the measurement model by meeting the requirements of low residuals ($\leq \pm 2.5$) and maximum Chi Square probability values (≥ 0.05). The 13 items that failed to meet the Rasch Rating Scale model requirements exhibited appropriate residual values but low Chi Square probability values, that is, < 0.05, suggesting responses to the items were more haphazard than expected (Bond & Fox, 2007). These items are identified in Table 6.9 and were removed from the study.

Table 6.9
Items showing poor fit

Item	Residual	ChiSquare	Probability
9.Feedback about teaching is good	1.73	8.94	0.01
13.Students are easy to teach	1.39	14.18	0.00
14.School reports reflect well on students	0.57	6.94	0.03
29.Students work hard	-1.67	6.41	0.04
31.Students are highly motivated to learn	-0.46	7.68	0.02
37.Students get psychological advice	0.94	6.21	0.04
43.Students are considerate of others	0.75	6.77	0.03
55.Staff/student conflict is unheard of	0.92	11.16	0.00
56.We have difficult students	1.39	7.53	0.02
62.Teaching students with special needs is satisfying	1.04	6.76	0.03
64.Teachers consult widely before an IEP is written	0.13	7.05	0.02
74.Psychologists help develop mental health programs	1.96	13.54	0.00
110.School policies facilitate achievement	-1.22	6.44	0.03

These individual item fit data indicate that the 109-item scale shows, in general, excellent fit to the model.

(d) Targeting of items
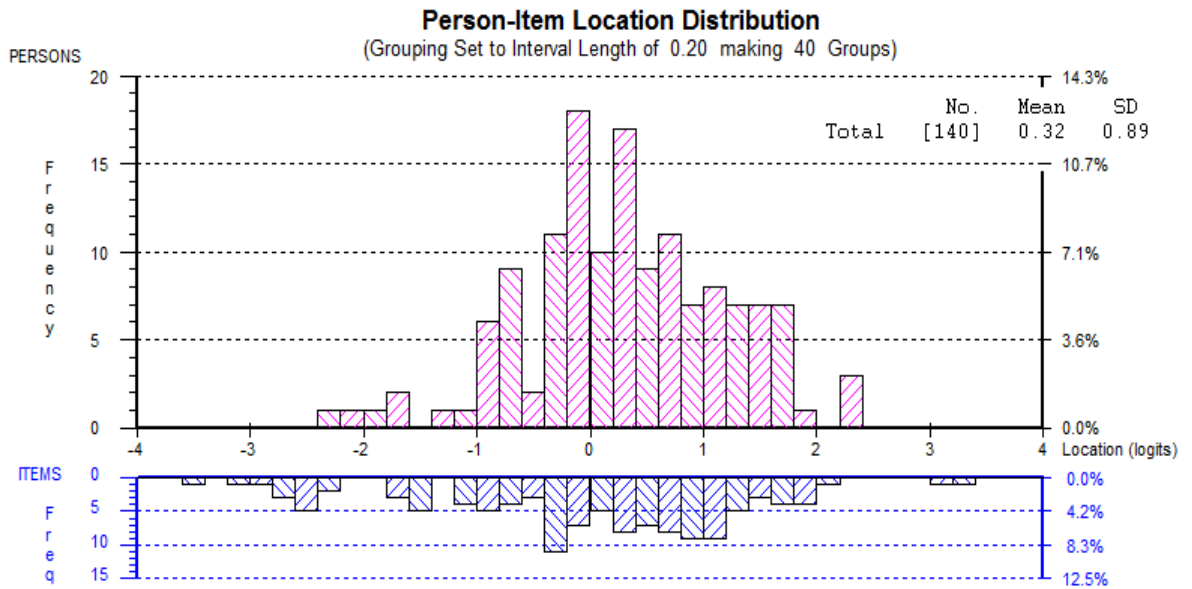
Figure 6.6: Person-Item Location Distribution

The difficulty an item presented to the teachers is represented on the bottom scale in Figure 6.6 and teacher ability to affirm increasingly more difficult items is represented on the top scale. The logarithmic odds scale shows both item difficulty values (from −3.8 logits, easy to affirm to + 3.4 logits, more difficult to affirm) and teacher ability values (from −2.4 logits, lower ability to + 2.4 logits, higher ability). This display indicates a good agreement between the two parameters and, therefore, the persons are well targeted by the scale items with a satisfactory number of easy and difficult items across the scale.

(e) Principal components summary

It is important to demonstrate that the requirements of a unidimensional measurement model are met when a unidimensional trait has been measured by the refined 109-item scale. This can be judged by extracting the principal Rasch measure from the data set and then conducting a Principal Components Factor Analysis of the residuals after the initial Rasch Model scaling. This analysis revealed that none of the items loaded on more than one factor, suggesting the measures conform to the requirements of uni-dimensionality.

Instrument Discrimination among School Need for Psychological Services

The purpose of constructing the 120-item instrument was to test the feasibility of measuring school need for psychological services. The subjects were teachers because teacher characteristics were a major feature of the theoretical framework (see Figure 2.1 p. 35). Teacher responses as direct recipients of school psychological services were therefore critical. The instrument was able to differentiate school need for psychological services among the Phase Two schools. Table 6.10 presents school need expressed as the mean of teacher logits for each school. Decreasing logit values signifies schools' increasing degree of need; SD is the standard deviation which reflects the spread of variation within schools of teacher scores; n is the number of staff in each school who responded to the scale.

Table 6.10
School expression of need for psychological service in terms of logits

School	Mean logit	SD	n
1	0.37	0.61	8
2	0.10	0.85	17
3	0.79	0.78	4
4	1.00	0.89	25
5	-0.24	0.73	8
6	0.00	0.93	14
7	0.12	1.00	21
8	1.30	0.76	3
9	0.01	0.65	6
10	-0.04	1.17	34

A subsequent one-way analysis of variance of these data showed the difference in expressed need for psychological services among Phase Two schools was significant ($p < 0.005$ (F = 3.08, df = 9, p = 0.002).

Phase 3: - Validity Evidence

The Rasch Unidimensional Measurement Model (RUMM2020) computer program (Andrich, et al., 2005) was used to test data-to-model fit for individual items. Then, a stepwise process using individual item-fit-statistics was applied to construct a parsimonious scale of 35 items that complied with the requirements for objective measurement expounded by Wright and Masters (1982). This was achieved by selecting the best items against the following three criteria:

- a sufficient number of items to adequately indicate all seven sub-constructs;

- a range of item difficulties increasing from easy to difficult to affirm; and

- good data-to-model fit (items having lower residual values, the difference between actual performance and that expected by Rasch model analysis).

This set of items was therefore chosen for good data-to-model fit, coverage of the sub-construct domain and a range of presenting difficulties commensurate with person scores (see Table 6.11, Chapter Six).

The final 35-item instrument was then administered in 18 schools across two Department of Education school districts. Staff in seventeen of the eighteen schools completed the scale (n =147). The seven aspects of validity comprising the unified validity framework proposed by Wolfe and Smith (2007a; 2007b) were then used as indicators to judge whether the instrument development activities and reports of results could be accepted as evidence of validity. The aspects of validity evidence identified in the study are explained and presented in order, together with the statistical analyses and graphical displays pertinent to the scale.

The following section is organised with respect to the six aspects of validity evidence identified. It begins with evidence of the content aspect.

Examples of Validity Evidence

1. Evidence of the Content Aspect of Validity

Evidence of the content aspect of validity includes explicit statements of the purpose of the study and the instrument development procedures. Content validity also reflects the relevance and ease of delineation of the construct upon which the items were to be based. For example, the purpose of the current investigation of school need for psychological services was defined as the objective measurement of this construct. The aim was stated explicitly in the formulation of three principal research questions:

1) Can a rating scale instrument be developed to measure school personnel's perceptions of their school's need for psychological services?

2) Is data from a measure of need for school psychological services associated with school demographic variables (e.g. socio-economic index)? and

3) What facets of validity evidence described in the Wolfe and Smith (2007a and 2007b) framework are identifiable in the construction of a measure of school need for psychological services?

Making the *domain of inference* explicit further supports the clarification of *purpose*. For example, Phase One of the instrument development process was predicated on current school psychology theory and practice. The domain of inference was, in addition, criterion-based, since it involved teacher perceptions, attitudes and school-specific behaviours. The type of inferences which may be drawn from the application of the instrument, which is one more condition of purpose, involved individual teachers and groups of teachers based in particular schools. A further example is the Phase Three investigation, in a number of targeted schools, of teacher and principal expression of school need for psychological services. Potential constraints such as the logistics of collecting data, time required to do so and availability of prospective respondents can inhibit the realisation of the purpose. However, appropriate attention to the detail in the research design and the direct one-to-one relationships developed with school principals eliminated potential constraints emerging during the study. These considerations were maintained throughout the instrument development process.

The *test specifications* focus on the procedures used in defining the construct model by describing the domain to be measured. The construct of school need for psychological services was deemed to be latent because it was not directly observable. A theoretical framework was developed that specified the inter-related elements of the construct. This conceptual framework was critical for selecting the content and format of the items that would eventually constitute the final instrument. Test specifications also clarify the scoring model and the scaling model selected. For example, an Expert Review Group (ERG) was selected to examine and assist refinement of the initial theoretical model and to ensure internal consistency between the framework and school psychology practice. The ERG also advised on the clarity of wording of sub-scales, the individual items and the hierarchical arrangement of items within the seven sub-scales. A polytomous scoring model was applied and the Rasch Rating Scale model (Andrich, 1988) provided the scaling.

Item development encompasses decisions to be made regarding the type of scale to be used, the number of response categories and how these response categories were to be labelled. In the case of the present study, a three-point Likert-type scale was used in all three phases. Between three and five categories result in data that shows better fit to the Rasch Rating Scale Model (Wolfe & Smith, 2007a). The scale and item development processes were reported earlier in the chapter.

The content of the theoretical framework was subjected to ERG examination as described earlier. The members were experienced teachers, school principals and managers of school psychologists. All were professionally expert and well versed in school operations, student performance and school psychological services. Suggestions for improving all aspects of the theoretical framework and re-ordering of item hierarchies within the sub-constructs were accepted as evidence of ERG affirmation of the theoretical model to be used in the study.

Evidence of the *technical quality of items* can be obtained by means of pilot studies and item trials. For example, Phase One concerned item development and refinement processes. Phase Two and Phase Three involved survey item trials and subsequent instrument refinement. The quality of items can be examined with precision by means of statistical estimates showing the extent to which the distribution of observed values fits with values predicted by the measurement model. RUMM2020 estimated residuals for each item. A residual is the difference between an observed raw score and the score predicted by the Rasch Rating Scale Model. RUMM2020 also generated an Item Characteristic Curve (ICC) referred to as an ogive. The ogive illustrates the relationship between an item's expected value and person locations measured in logits. Observed scores for class intervals are then plotted along the ICC. For example, Figure 6.7 shows the ICC for Item 5 (*Test results are excellent)* eliciting data on school need for psychological services (n=148). The Rasch model curve increases smoothly as the location of persons increases with respect to the location of the item data as displayed in Figure 6.7.
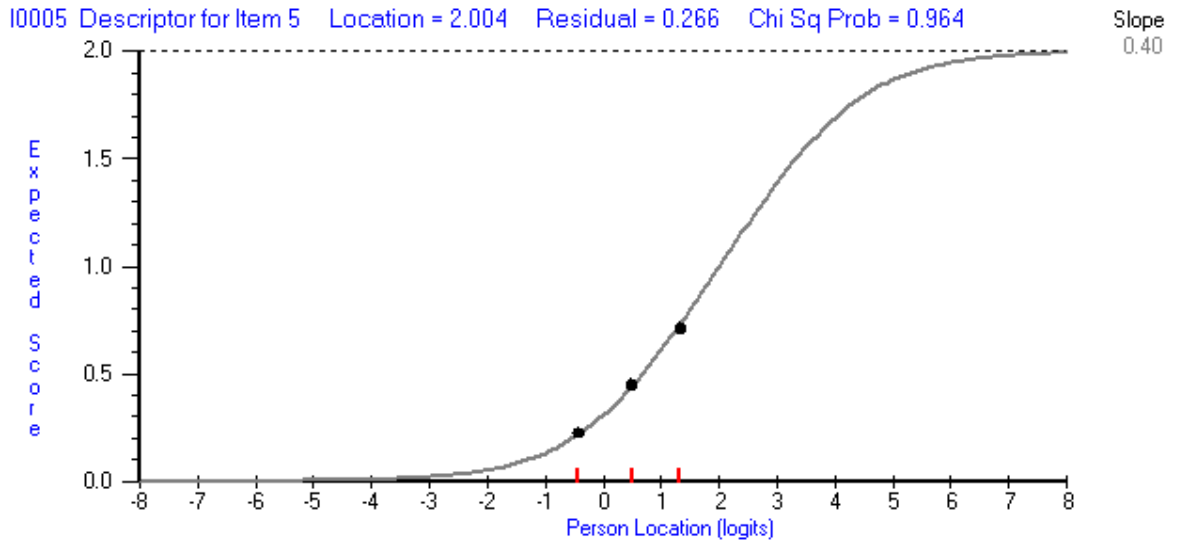
Figure 6.7: Item Characteristic Curve for Item 5 Data

The logits on the horizontal axis are the logarithmetic odds of "need for psychological services" identified by school staff. The plots of the observed scores for three class intervals of school staff are appropriately close to the three values predicted by the model. The fit residual was 0.26 ($\leq \pm 2.5$) because the observed scores were very close to the predicted scores. RUMM2020 regards residuals that exceed ± 2.5 as extreme. Table 6.11 gives the individual item fit statistics for the *Survey of Need for Psychological Services*.

Table 6.11
Individual Item Fit Statistics

Item	Location	SE	Residual	df	Chi Square	Probability
1	-1.01	0.16	-0.49	140.20	3.31	0.19
2	-0.68	0.17	-0.76	140.20	3.04	0.21
3	-0.00	0.15	-0.55	136.39	1.15	0.56
4	0.88	0.15	1.00	137.34	4.07	0.13
5	2.00	0.16	0.24	115.41	0.06	0.96
6	-1.78	0.17	3.39	137.34	23.67	0.00
7	0.06	0.16	0.30	137.34	2.56	0.27
8	0.24	0.18	-0.30	132.57	0.83	0.65
9	1.74	0.17	0.28	136.39	0.05	0.97
10	3.97	0.24	0.14	99.19	2.50	0.28
11	-1.76	0.18	0.04	141.16	1.77	0.41
12	-1.46	0.16	0.71	141.16	3.88	0.14
13	-0.97	0.16	-0.04	140.20	1.99	0.36
14	1.09	0.13	1.15	138.30	7.49	0.02
15	1.88	0.15	2.45	137.34	6.69	0.03
16	-1.23	0.16	1.09	135.43	4.44	0.10
17	-1.68	0.17	-0.06	141.16	0.73	0.69
18	-0.80	0.15	0.81	135.43	0.14	0.93
19	0.77	0.15	0.86	117.31	4.47	0.10

Item	Location	SE	Residual	df	Chi Square	Probability
20	0.76	0.15	-0.45	120.17	2.19	0.33
21	-0.65	0.14	1.70	135.43	5.35	0.06
22	-0.81	0.20	-0.89	120.17	0.87	0.64
23	2.63	0.24	0.42	69.62	1.40	0.49
24	1.58	0.16	0.14	100.14	2.15	0.34
25	1.08	0.19	-0.02	81.07	0.84	0.65
26	-2.86	0.18	-1.96	81.07	0.84	0.65
27	-1.71	0.17	-2.08	140.20	7.42	0.02
28	-0.10	0.17	-0.41	106.82	0.55	0.75
29	0.27	0.13	0.24	126.85	0.37	0.83
30	1.07	0.13	0.78	129.71	3.66	0.15
31	-1.64	0.17	-0.82	140.20	3.75	0.15
32	-0.45	0.15	-1.02	138.30	1.80	0.40
33	-0.26	0.14	-0.37	137.34	0.68	0.70
34	0.06	0.15	-0.29	131.62	1.69	0.42
35	-0.22	0.16	0.12	117.31	1.12	0.56

Location is the item difficulty expressed in logits; SE is the standard error; the residual value is the difference between the observed value and the value expected according to the model; and probability is the Chi Square value. Of the total thirty-five items, thirty-one fit the model due to satisfying the specified criteria of having residuals $\leq \pm 2.50$ and Chi Square probability values ≥ 0.05. This indicates an excellent fit to the model and further demonstrates the technical quality contribution of the item to the content aspect of validity.

2. Evidence of the substantive aspect of validity

The substantive aspect of validity is predicated on the extent to which the theoretical framework or *a priori* rationale can explain any observed consistencies among item responses. An example is confirming hypothesised item hierarchies within the sub-constructs that comprise the instrument. With respect to the present study, the theoretical model informing the study suggests that school need for psychological services not only subsumes a number of sub-constructs but that the items within each sub-construct have a hierarchical arrangement from easy to affirm to difficult to affirm. Although the conceptual model indicates a particular sequence of items in ascending order of difficulty, the order is subjective, rather than empirically determined. Item fit statistics illustrating sub-scale item sequence and item difficulty are provided in Table 6.12.

Scrutiny of the RUMM2020 estimates of item difficulty reveals that the order of measured item difficulty shows a close correspondence with the order of items as they were originally presented in the conceptual model. In other words, the order of

difficulty of items, in general, is as initially hypothesised. Although the seven sub-constructs were not arranged in *a priori* hierarchical order, the items contained within the sub-constructs were. This relationship, therefore, constitutes evidence for the substantive aspect of validity.

Table 6.12
Item sequence and level of difficulty

Item	Sub-construct item sequence in the model	Location	SE
Teaching T			
1	Teachers cater for individual differences	-1.01	0.16
2	Student progress is documented regularly	-0.68	0.17
3	Teachers know what each student needs	-0.00	0.15
4	Teaching and learning produces high achievement	0.88	0.15
5	Test results are excellent	2.00	0.16
Development of academic skills DAC			
6	Students need extra help	-1.78	0.17
7	Students like to learn	0.06	0.16
8	Students respond well	0.24	0.18
9	Students are attentive	1.74	0.17
10	Students access study skills training	3.97	0.24
School development of socialization/life skills SDSLS			
11	Student attitudes are important	-1.76	0.18
12	The school rewards appropriate behaviour	-1.46	0.16
13	Behavioural issues are well managed	-0.97	0.16
14	There are few discipline problems	1.09	0.13
15	Students quickly resolve conflict	1.88	0.15
Inclusion in learning and development ILD			
16	All classes have students with learning difficulties	-1.23	0.16
17	We welcome students from diverse backgrounds	-1.68	0.17
18	Teachers celebrate the school's diversity	-0.80	0.15
19	New students can be seen by the psychologist	0.77	0.15
20	We use the psychologist's ideas for our programs	0.76	0.15
Prevention services and wellness promotion PSWP			
21	There is a need for child protection training	-0.65	0.14
22	Programs have improved student well-being	-0.81	0.20
23	The school has suicide prevention strategies	2.63	0.24
24	Parents utilise healthy eating programs	1.58	0.16
25	The school coordinates mental health services	1.08	0.19
Home/school/community collaboration HSCC			
26	Parents are welcomed into the school	-2.86	0.18
27	The school keeps the community informed	-1.71	0.17
28	The community helped develop the school ethos	-0.10	0.17
29	Parents are active in the School Council	0.27	0.13
30	Teachers find parents easy to engage	1.07	0.13
School Climate SC			
31	Teachers strive for school improvement	-1.64	0.17
32	Teachers provide agenda items for staff meetings	-0.45	0.15
33	Leadership is shared among teachers	-0.26	0.14
34	Teacher/psychological consultation is in place	0.06	0.15
35	Psychological services improve school climate	-0.22	0.16

A clearer picture of item order of difficulty is shown in Table 6.13. These data show that degree of item difficulty is distributed across and within all seven sub-scales.

This is further supporting evidence for the validity of the original hypothesised arrangement of items within the final version of the scale.

Table 6.13
Item difficulties in ascending order

Item		Location	SE
HSCC26	Parents are welcomed into the school	-2.86	0.16
D6	Students need extra help	-1.78	0.17
SD11	Student attitudes are important	-1.76	0.18
HSCC27	The school keeps the community informed	-1.71	0.17
ILD17	We welcome students from diverse backgrounds	-1.68	0.17
SC31	Teachers strive for school improvement	-1.64	0.17
SDSLS12	The school rewards appropriate behaviour	-1.46	0.16
ILD16	All classes have students with learning difficulties	-1.23	0.16
T1	Teachers cater for individual differences	-1.01	0.16
SDSLS13	Behavioural issues are well managed	-0.97	0.16
PSWP22	Programs have improved student well-being	-0.81	0.20
ILD18	Teachers celebrate the school's diversity	-0.80	0.15
T2	Student progress is documented regularly	-0.68	0.17
PSWP21	There is a need for child protection training	-0.65	0.14
SC32	Teachers provide agenda items for staff meetings	-0.45	0.15
SC33	Leadership is shared among teachers	-0.26	0.14
SC35	Psychological services improve school climate	-0.22	0.16
HSCC28	The community helped develop the school ethos	-0.10	0.17
T3	Teachers know what each student needs	-0.00	0.15
D7	Students like to learn	0.06	0.16
SC34	Teacher/psychologist consultation is in place	0.06	0.15
D8	Students respond well	0.24	0.18
HSCC29	Parents are active in the School Council	0.27	0.13
ILD20	We use the psychologist's ideas for our programs	0.76	0.15
ILD19	New students can be seen by the psychologist	0.77	0.15
T4	Teaching and learning produces high achievement	0.88	0.15
HSCC30	Teachers find parents easy to engage	1.07	0.13
PSWP25	The school coordinates mental health services	1.08	0.19
SDSLS14	There are few discipline problems	1.09	0.13
PSWP24	Parents utilise healthy eating programs	1.58	0.16
D9	Students are attentive	1.74	0.17
SDSLS15	Students quickly resolve conflict	1.88	0.15
T5	Test results are excellent	2.00	0.16
PSWP23	The school has suicide prevention strategies	2.63	0.24
D10	Students access study skills training	3.97	0.24

Items enabled school staff members to be scored on a three-point rating scale. Scores ranged from zero to two, with zero indicating disagree, one indicating agree and two indicating strongly agree. The functioning of this polytomous scale for each sub-scale item in Phase Three was investigated by RUMM2020, producing a Category Probability Curve for each of the items. Figure 6.8 below shows the Category Probability Curve for Item 3 data (*Teachers know what each student needs*).
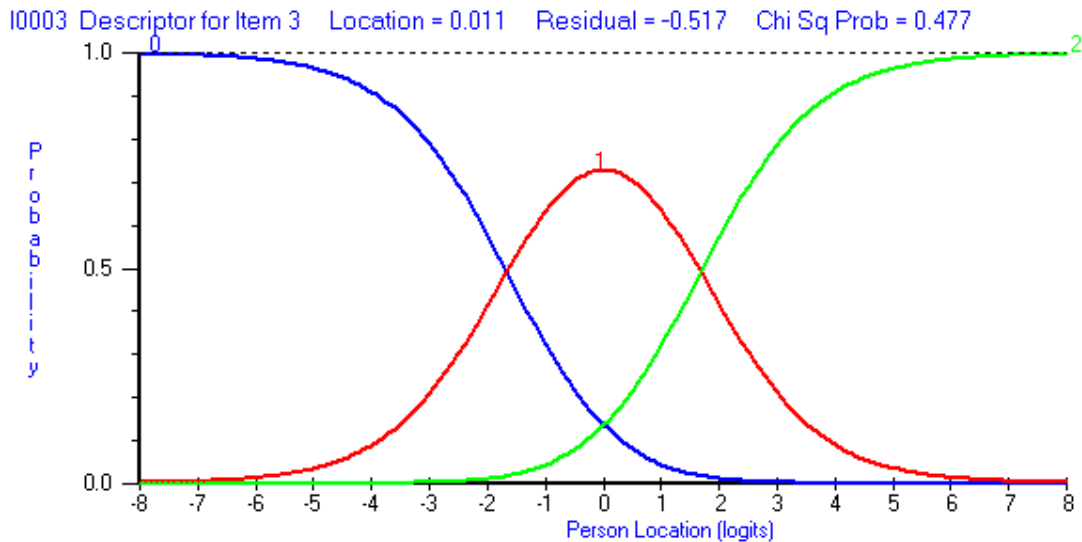
Figure 6.8: Category Probability Curve for Ordered Thresholds

The probability of a category being chosen is plotted on the vertical axis and person location (school need for psychological services measured in logits) is plotted on the horizontal axis. Persons with ability to affirm more difficult items are located to the right of the horizontal axis and those with less ability lie to the left. Curve 0 (disagree) shows that the probability of a person located 8 logits below the mean selecting category 0 is 1.0. The probability of selecting this category decreases to zero for persons located +2.3 logits above the mean. For Curve 1 (agree) the probability increases from 0.00 for a person located 6 logits below the mean to a maximum of approximately 0.75 for persons located at the mid-point of the person location scale. The probability then decreases to zero for persons located + 6.0 logits above the mean. This means that persons with higher ability are likely to choose the strongly agree category.

Item thresholds were estimated to identify the person ability measure at which an equal probability existed for persons to select either one of two contiguous response categories. The intersection of Curve 0 and Curve 1 is the threshold for disagree and agree categories with a value of −1.66 logits. The other threshold (agree and strongly agree) for Curve 1 and Curve 2 is + 1.68 logits. A unique feature of the model is that "it can reveal if the ordering of the categories is not working as intended" (Andrich & Styles, 2004, p. 9). For any particular item the probability of choosing response categories should be ordered in line with the person ability values

expressed in logits. Figure 6.8 shows that the thresholds are appropriately ordered. An item has disordered thresholds if the categories are not working as desired, resulting in the thresholds not appearing in their natural order, as pointed out by Andrich and Styles (2004). All 35 items were characterised by ordered thresholds, as exemplified by the data shown in Table 6.14, indicative of response categories selected in a logical and consistent manner by school personnel. The agreement between theoretically-based expectations and observed item functioning is additional evidence for the substantive aspect of validity.

Table 6.14
Item thresholds for *Survey of Need for Psychological Services* Instrument

Item	Location mean	Threshold 1	Threshold 2
1	-1.01	-2.88	0.85
2	-0.66	-2.79	1.46
3	0.01	-1.66	1.68
4	0.88	-0.60	2.38
5	2.00	0.91	3.09
6	-1.78	-3.54	-0.03
7	0.06	-1.70	1.82
8	0.24	-1.79	2.29
9	1.74	-0.38	3.88
10	4.81	2.03	7.58
11	-1.76	-2.44	-1.08
12	-1.47	-3.25	0.33
13	-0.97	-3.04	1.09
14	1.09	0.21	1.97
15	1.87	0.62	3.13
16	-1.24	-2.32	-0.16
17	-1.69	-2.90	-0.49
18	-0.92	-2.60	0.75
19	0.77	-0.38	1.92
20	0.80	0.64	2.25
21	-0.64	-1.70	0.41
22	-0.79	-3.44	1.85
23	2.64	1.33	3.95
24	1.58	1.30	1.85
25	1.09	-0.25	2.43
26	-3.74	-7.13	-0.35
27	-1.71	-3.63	0.20
28	-0.08	-1.68	1.51
29	0.29	-0.62	1.22
30	1.07	0.19	1.94
31	-1.64	-3.15	-0.13
32	-0.45	-2.15	1.24
33	-0.24	-1.68	1.18
34	0.08	-1.30	1.47
35	-0.20	-1.62	1.20

A further example of the substantive aspect of validity is provided in Table 6.15, the measures obtained by the *Survey of Need for Psychological Services*; that

is, the data demonstrates a differential need across schools for psychological services. The premises embedded in the theoretical framework posit that school need for psychological services is a function of the characteristics of students, schools and teachers. Implicit in this view is that schools, as unique environments, differ in terms of needed psychological services. Rasch analysis produces mean logit values for each of the respondent schools, enabling these to be plotted on the linear interval scale.

Table 6.15
Descending order of schools' need for psychological services

School logit	Standard Deviation	School code
-0.14	0.81	16
-0.11	0.58	12
-0.07	1.17	23
0.02	4.73	18
0.17	0.66	11
0.23	0.92	22
0.24	0.86	14
0.47	0.59	27
0.47	1.18	24
0.64	0.67	17
0.68	0.54	21
0.71	0.88	25
0.71	0.29	26
0.81	0.39	19
0.83	0.67	13
0.87	0.54	15
1.05	1.12	20

The increasing size of the logit values signifies decreasing level of need for psychological services in Phase Three schools. A subsequent one-way analysis of variance shows that the differences among schools is statistically significant ($p < 0.05$ ($F = 2.00$, $df = 16$, $p = 0.01$).

The expressed need for psychological services of individual staff members within each of the Phase Three schools is shown in Table 6.16. The data indicates variability among teachers within schools, but that teacher scores within schools are relatively consistent. Examination of the SD values indicates that variability within schools with less need for services is in general less than in those schools with greater need.

Table 6.16
Teacher logits in descending order of school need for psychological services

School	Individual teacher logits									
16	0.96	-0.03	-0.34	-1.32	-0.03					
12	0.36	-0.73	-0.71	0.39	0.56	0.07	-1.08	0.37	0.10	-0.54
23	-0.48	-0.12	0.41	0.77	0.97	-2.70	0.17	1.12	-0.81	
18	-1.13	0.40	0.27	0.18	0.05	0.04	-0.98	1.06	-0.12	
11	0.89	0.52	-0.65	-0.23	0.12	1.06				
22	-1.29	0.72	-0.16	1.83	-0.10	0.82	0.24	-0.23		
14	-0.73	0.06	-1.06	-0.43	-0.33	1.00	0.99	1.11	0.38	1.39
27	0.80	-0.10	0.28	0.06	0.25	1.52				
24	0.48	2.54	-0.89	-0.33	0.83	0.22				
17	1.29	0.76	1.14	0.97	-0.34	0.07	0.37	-0.35	0.79	1.66
21	2.03	0.81	0.55	0.36	0.47	0.26	0.09	0.88	0.86	0.49
25	0.63	0.28	0.80	0.82	-1.14	2.03	1.06	0.40	1.49	
26	0.32	0.71	0.91	0.65	0.96	0.42	0.88	0.54	0.71	0.00
19	0.72	0.71	0.43	1.04	1.54	0.54	1.51	1.27	0.97	-0.68
13	-1.07	1.91	0.27	1.69	0.03	0.91	1.35	1.80	0.57	
15	0.72	0.34	0.67	0.18	1.08	1.73	0.51	0.46	1.37	1.62
20	0.47	1.69	0.54	1.58	1.04	1.37	3.50	1.09	-0.33	-0.43

3. Evidence of the structural aspect of validity

The structural aspect of validity is concerned with the construct domain and the adopted scoring model; for example, by confirming that the demands of a unidimensional measurement model are realised when a unidimensional trait is measured. As far as unidimensionality is concerned, RUMM2020 achieves this by first extracting the linear measure component from the data set, assuming that all items are equally weighted on the first component. Then a Principal Components Factor Analysis is performed on the standardised residuals after the initial Rasch scaling. Finally, eigen values from the Rasch-scaled measures and the principal component analysis of the residuals are placed on a common scale. This process was applied to the Phase 3 data.

Table 6.17 shows the percentage of the total variance accounted for by each of the principal components (eigen values). For example, for the first item, 4.63/35 = 0.1324 or 13.24%. One component accounted for 13.24% of the total variance, which clearly indicates multidimensionality within the data. In addition, the Summary test of fit Statistics (Chi-Square value = 113.60, df = 70.00, p. = 0.00) does not support a uni-dimensional structure. This would require a very high item-trait Chi-Square well in excess of 0.05.

Table 6.17
Principal Components Summary

Principal Component	Eigen value	Percentage	Cumulative percent	Standard error
PC001	4.63	13.24%	13.24%	0.65
PC002	2.73	7.82%	21.06%	0.38
PC003	2.48	7.11%	28.17%	0.34
PC004	2.01	5.75%	33.92%	0.27
PC005	1.95	5.58%	39.50%	0.27
PC006	1.68	4.82%	44.32%	0.23
PC007	1.50	4.30%	48.62%	0.20
PC008	1.36	3.90%	52.52%	0.18
PC009	1.29	3.70%	56.21%	0.17
PC010	1.22	3.50%	59.71%	0.17
PC011	1.19	3.40%	63.11%	0.16
PC012	1.06	3.04%	66.15%	0.14
PC013	1.01	2.91%	69.06%	0.13
PC014	0.93	2.68%	71.74%	0.13
PC015	0.89	2.55%	74.28%	0.12
PC016	0.85	2.44%	76.72%	0.11
PC017	0.78	2.24%	78.96%	0.10
PC018	0.76	2.19%	81.15%	0.10
PC019	0.70	2.01%	83.16%	0.09
PC020	0.67	1.94%	85.10%	0.09
PC021	0.65	1.86%	86.96%	0.09
PC022	0.60	1.72%	88.68%	0.08
PC023	0.54	1.56%	90.23%	0.08
PC024	0.49	1.41%	91.64%	0.07
PC025	0.47	1.36%	93.00%	0.07
PC026	0.42	1.22%	94.22%	0.06
PC027	0.39	1.13%	95.35%	0.06
PC028	0.33	0.96%	96.31%	0.05
PC029	0.31	0.90%	97.21%	0.05
PC030	0.28	0.82%	98.03%	0.05
PC031	0.25	0.73%	98.76%	0.05
PC032	0.24	0.71%	99.47%	0.05
PC033	0.19	0.56%	100.03%	0.04
PC034	0.10	0.30%	100.33%	0.05
PC035	-0.11	-0.33%	100.00%	0.03

4. Evidence of the external aspect of validity

The external component of validity may be the most important (Wolf & Smith, 2007a), as it examines the extent to which the interval scale measure (dependent variable) is related to external or independent measures of the same or similar constructs. In the case of the present research, the external measures utilised were: *student suspensions*; *student absenteeism*; *school socio-economic index* and *students with individual behaviour plans*.

Publicly available school-level data were collected. Quotients were calculated for absenteeism, suspensions and students with individual behaviour plans by dividing the raw data obtained from the Department of Education by the student

population of each school. This effectively removed the extraneous variable of school student population size from the analyses. These indices were treated as independent variables and the linear measure of school need for psychological services was treated as the dependent variable. Initially, correlations between variables were calculated.

The first result from the correlational analyses is the presence of a number of inverse and positive associations between the five variables (see Tables 6.18 and 6.19).

Table 6.18
Correlation between independent variables (n =147)

Independent variable	Correlation coefficient			
	1	2	3	4
1.School socio-economic index decile	1.00			
2.School absenteeism quotient	-0.55*	1.00		
3.School suspensions quotient	-0.29*	0.10	1.00	
4.Students with individual behaviour plans	-0.41*	0.00	0.25*	1.00

Note: $p < 0.01$

These statistically significant inverse correlations show that as *school socio-economic index* increases, *school absenteeism, school suspensions* and *number of students with individual behaviour plans* decrease. The positive correlation (+0.25) indicates that as *school suspensions* increase, the *number of students with individual behaviour plans* also increases.

Table 6.19
*Correlation between independent variables and the dependent variable (*n=147)

Independent variable	Dependent variable
	Measure of school need for psychological services
1.School socio-economic index decile	0.02
2.School absenteeism quotient	-0.09
3.School suspensions quotient	-0.30*
4.Students with individual behaviour plans	-0.08

Note: $p < 0.01$

Three of the four independent variables were not related to the dependent variable. However, there was a statistically significant inverse relation between *school suspensions* and the measure of *school need for psychological services*. This relation indicates that as *school suspensions* increase the *school need for psychological services* measure also increases.

Then, a multiple regression analysis with school need for psychological services and school demographic data being treated as the dependent and independent variables, respectively, was executed. Hypothesised relationships between the linear measure and the four school-level variables were then investigated by multiple regression. Confirmation of a relationship required a probability level of less than 0.01 that the relationship was not attributable to random variations in the data. The direction of the relationship (direct or inverse) was indicated by the positive or negative value of the slope coefficient (b). The effect of variation in the independent variables on variation in the dependent variable (the strength of association) was computed for each relationship. The beta weight (β) was calculated to provide a standardised measure of the strength of association between each of the four independent variables and the dependent variable. The cumulative effect of variation in the independent variables on the dependent variable was measured by computing R^2.

It is necessary to examine associations between the dependent variable and multiple independent variables as a group, since this could produce different effects. Multiple regression analysis was applied to test for a relationship between the dependent variable and the four independent variables. The independent variables were step-wise regressed against the dependent variable. The four independent variables accounted for 11% ($R^2 = 0.11$) of the variance in *School need for Psychological Services* (dependent variable), as shown in Table 6.20.

Table 6.20
Regression analysis (n =147)

Independent variables	b	Std error of b	β	t	p
1.School socio-economic index decile	0.03	0.03	-0.13	-1.25	0.21
2.School absenteeism quotient	-0.02	0.01	-0.14	-1.41	0.16
3.School suspensions quotient	-1.39	0.34	-0.33	-4.04	0.00*
4.Students with individual behaviour plans	-0.14	0.70	-0.19	0.21	0.83
Constant	1.02	0.27		3.77	0.00

R = 0.33
$R^2 = 0.11$
F = 4.52 p < 0.01

The measure of school need for psychological services was confirmed to have a strong inverse relationship with *school suspensions* ($β = -0.33$, p < 0.01). That is, when there is a unit positive change in *school suspensions* then there is a decrease of

0.33 in the measure of *school need for psychological services*. In simple terms, an increase in student suspensions leads to an increase in the need for psychological services or vice versa when the other independent variables are mutually controlled. The small inverse relationships between the dependent variable and the other three independent variables (*school socio-economic index decile; school absenteeism quotient; students with individual behaviour plans*) were not statistically significant. These results show one strong independent association between the *school need for psychological services* measure and the school demographic variable of *school suspensions*. This finding provides partial support for possible associations between the school demographic data and the measure of school need for psychological services.

School student population data is applied to school funding formulae and is also considered by the Department of Education to be an important parameter in allocating psychological services. It is possible that student numbers *per se* may be related to school need for psychological services. Spearman product moment correlations between the Department of Education official data (independent variables) and school logits (dependent variable) were computed to ascertain possible relations between each of the four independent variables and the dependent variable. The obtained associations are shown in Table 6.21.

Table 6.21
Measures of association between Dependent and Independent variables

Relationship	Spearman Product Moment r	Significance level
Suspensions/school logits	-0.52	$p < 0.05$
Absences/school logits	-0.22	NS
SEI/school logits	-0.41	NS
IBPs/school logits	-0.49	$p < 0.05$

The first correlation between student suspensions and school logits (-0.52) is statistically significant ($p < 0.05$). In addition, the correlation between students with individual behaviour plans and school logits, -0.49 is also significant ($p < 0.05$). That is, schools with lower need for school psychological services (higher logit values) reported lower numbers of students with individual behaviour plans and lower student suspensions. This is further evidence of the external aspect of validity. Correlations between student absences and school logits (-0.22), school socio-

economic indices and school logits (− 0.41) were not significant, indicating little association between these independent variables and the dependent variable.

5. Evidence of the consequential aspect of validity

The consequential aspect of validity focuses on consideration of the ways in which interpretations of scores may be of consequence; for example, the consequences of specifying individual school logit scores on the linear scale to principals. When results of the study were reported to Department of Education officers and client principals, tables, graphical displays and textual data were used to qualify the characteristics of their individual school and staff position among the sample of schools. This categorisation was used to exemplify the attributes of schools with high need and low need for psychological services.

A further consequence was the risk of this data becoming publicly identifiable, particularly if detrimental to any school. Steps were therefore taken to avoid this by allocating a code to each school and maintaining the anonymity of participating staff (see Tables 6.15 and 6.16).

6. Evidence of the interpretability aspect of validity

The interpretability aspect of validity is defined as "the degree to which qualitative meaning can be assigned to quantitative measures" (Wolfe & Smith, 2007a, p. 100). This has, of course, implications for the quality of the communicative method chosen. One method of interpreting Rasch generated data is the use of graphical displays, such as the Person-Item Threshold distribution shown in Figure 6.9.
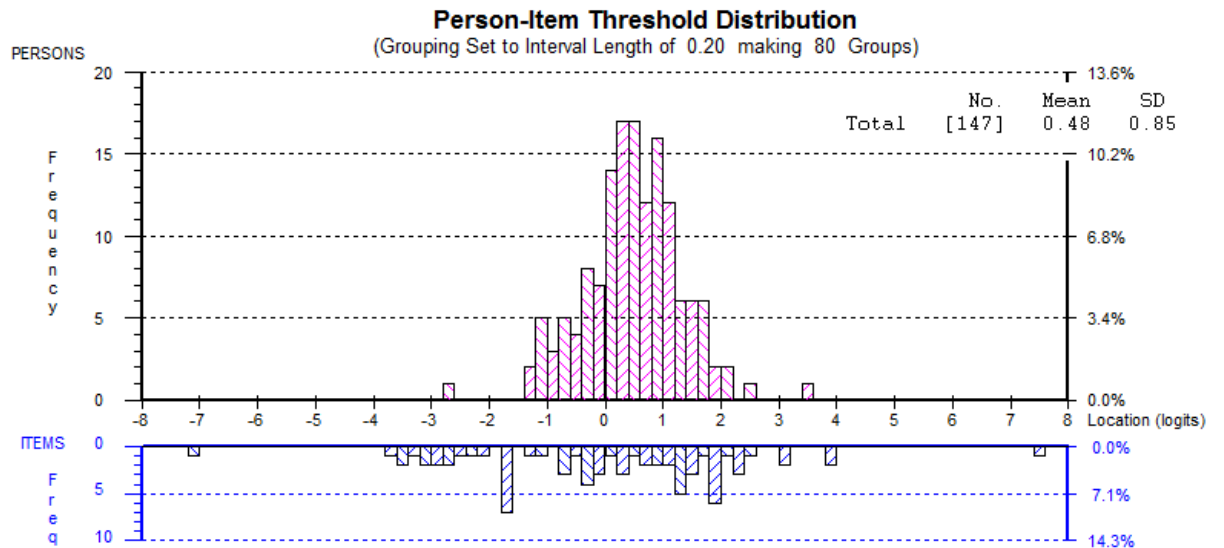
Figure 6.9: Person-Item Threshold Distribution for 35-Item Scale

The display represents degree of difficulty each item presented to teachers on the bottom scale and teacher ability to affirm increasingly more difficult items on the top scale. The logarithmic odds scale shows both item difficulty values from -7.2 logits (easy to affirm) to $+7.4$ logits (more difficult to affirm) and teacher ability measures from -2.8 logits (lower ability) to $+3.4$ logits, (higher ability). The display facilitates comparison of individual respondent scores with the difficulties of items. In addition, it demonstrates the extent to which the item difficulties targeted or matched the abilities of the respondents. There were no obvious gaps in the range of item difficulty within the teacher ability continuum. The relationship between these two metrics demonstrates that the items and person abilities are well matched and, therefore, the persons are well targeted by the scale items with a satisfactory number of easy and hard items across the scale. The ease of reading the data presented above is evidence of the interpretability aspect of validity.

Summary

This chapter provides the results of the study for each of the three instrument development phases in sequence, together with descriptions of the Rasch diagnostic estimations of data-to-model fit. The consequent actions taken to progress instrument development are described. Then the Wolfe and Smith (2007a; 2007b) validity framework is applied to judge the instrument development activities and research

findings as examples of validity evidence. The next chapter discusses the results presented in Chapter Six.

Chapter Seven

Discussion

Overview

The research literature revealed a lack of empirical studies that objectively measure school need for psychological services. Consequently, in practice the mechanisms by which school psychologists have been allocated to schools have utilised demographic data, the socio-economic status of the school locality and a subjective notion of *school difficulty*. Application of these criteria across the West Australian government school system, of course, raises questions about efficacy, equity, and consistency. The current investigation focussed on creating an objective measure of school need for psychological services, whereby school psychologists could be allocated to schools, commensurate with a measure of school need for such services.

The research investigated school personnel (teachers and principals) perceptions of school need for psychological services. Raw ordinal data obtained from the administration of a Likert-type survey was transformed into interval data using the Rasch Rating Scale model. Data were analysed by the RUMM2020 computer program (Andrich et al., 2005). The results were presented in tables, diagrams and RUMM2020 displays which illustrated, in detail, how data obtained from the research complied with the Rasch model. This chapter is organised in accordance with the three phases of empirical research. The chapter then examines the value of the theoretical framework and the measurement model in developing the linear measure. This is followed by a more general discussion of the results with respect to the literature and also suggests how these could be interpreted as an indirect measure of school effectiveness. The chapter concludes with an examination of the current methods by which school psychologists are deployed to government schools in Western Australia.

Phase One: - Item Writing

Wilson (2005) asserted that efforts to construct a new instrument must examine the theoretical elements upon which the construct is grounded. In addition, any reported attempts to measure the content of the construct need to be thoroughly investigated. Wolfe and Smith (2007a) argued that for newly developed measures to be useful, they must be valid. Furthermore, the instrument development activities employed in the study ought to enhance the collection of evidence that is identified to support subsequent arguments for the validity of the instrument construction process. The construction of a new instrument should proceed through a series of sequential stages (Wolfe & Smith). The preliminary instrument development activities in this study were, therefore, informed by these considerations. Particularly, careful documentation of all the instrument development activities was an important and necessary step in collecting validity evidence. A strong claim for the validity of the present study can therefore be argued. Furthermore, this process has crucial implications for the credibility of any inferences that may be drawn from applying the instrument as a measure.

Following the Expert Review Group's positive appraisal of the preliminary conceptual framework, the ERG was asked to comment on the hierarchical arrangement of items within sub-constructs, ambiguity of item wording and item appropriateness within each of the seven sub-constructs. Consequently, the Phase One results provided a measure of external legitimacy to the preliminary conceptual framework. In addition, the quality of written items and the internal consistency between items and the seven sub-constructs of the theoretical framework were improved. The Phase One outcomes ensured that Phase Two of the investigation could proceed as intended.

Phase Two: - The 120-Item Instrument

A 120-item instrument was then trialled with a sample of teachers from ten primary, secondary and education support schools across two Department of Education districts. Data analysis indicated that of the 120 items, 11 had elicited data with poor fit to the model (due to either disordered thresholds, residuals $>\pm2.5$, or unacceptably low Chi Square probability statistics, $p <0.05$). These items were

removed for further analysis. The subsequent analysis of the remaining 109 items revealed that 96 items complied with the requirements of the Rasch Rating Scale model. Their low Chi Square probability values suggested that responses to these items were more haphazard than expected. It is possible that capable persons failed to endorse easier items and less capable persons endorsed more difficult items unexpectedly "where items are ordered easiest to most difficult" (Bond & Fox, 2007, p. 239). In addition, the items may have posed problems to respondents in terms of ambiguity or simply a failure to understand the intent of the 13 items showing poor item-fit-statistics.

One-way Analysis of Variance confirmed that the refined instrument, now consisting of 96 items, differentiated measured need for services among the 10 schools. The aggregated teachers' responses to the refined instrument were dependent on school-level variables. A parsimonious scale was constructed by selecting from the 96-item instrument the best 35 items that: exhibited good data-to-model fit; represented the construct domain; and had a range of difficulties commensurate with the person scores. The resulting scale ensured that Phase Three of the study could continue with confidence.

Phase Three: - Validity Evidence

The resulting *Survey of Need for Psychological Services* (see Appendix L) was administered to principals and teachers in 18 schools from two Department of Education districts. The results showed excellent data-to-model fit (see Tables 6.11 and 6.14, Chapter Six) thus confirming that the scale constructed was a linear measure.

The validity of the measurement construction process was an important issue, for a number of reasons. First is the relationship between the research design and validity evidence. This was illustrated by the adoption of an *a priori* approach to the instrument construction process, predicated upon use of the Wolfe and Smith (2007a; 2007 b) validity framework. Research design decisions, such as the development of a preliminary theoretical framework, and choosing a measurement model and writing items, were therefore influenced at the outset by validity considerations. Secondly, Messick's (1995) unified theory of validity, underpinning the Wolfe and Smith framework, was applied *post hoc* to identify the presence of evidence for the purpose

of the study and to determine if theoretical propositions were reflected in regularities or trends in the data. This application was also to establish if the methods of communicating results to school personnel were appropriate. All of these reflections aimed to ensure that interpretations of the obtained measures could be made with confidence. Thirdly, it was important to establish the connection between the measurement model and the research objectives. Evidence is required to verify that research objectives have been attained. The first two reasons illustrate how the research approach was a critical determinant of the connections between validity theory, research design, measurement theory and the measurement model. In particular, the chosen research approach: (a) enabled a comprehensive specification of the construct under enquiry; (b) influenced the research design and execution, hence providing more validity evidence; and (c) influenced the choice of a measurement model to test that the data correspond to theoretical expectations. These matters will be exemplified in detail in the discussion of responses to the research questions in the following chapter.

Theoretical Framework

The study demonstrated that the interactive elements of Characteristics of Students, Characteristics of Schools and Characteristics of Teachers, presented in the theoretical framework, were necessary factors in measuring schools' needs for psychological services. This contention was vindicated by the acceptable range of responses to the linear scale items across the seven sub-constructs. The characteristics of students, schools and teachers were informed by the major dimensions of psychological practice in schools, described in the research literature by Ysseldyke et al. (2006). The scale items were written to sample school-based behaviours across the seven sub-constructs that reflected the major dimensions noted above. In addition, the items were shown to be closely aligned to specific activities in which school psychologists are likely to participate. Examples and associated items were:

- School consultation and psychological advice (Boyle & MacKay, 2007). (*Psychological services improve school climate*; *We use the psychologist's ideas for our programs*);

- Prevention services and wellness promotion (Nastasi, 2004; Bernard, 2006; Wood & Daly, 2007). (*There is a need for child protection training*; *The school has suicide prevention strategies*; *The school coordinates mental health services*);

- Evidence based services (Ward & Erchul, 2006). (*Student progress is documented regularly*; *Teaching and learning produce high achievement*);

- Social and emotional skill development (Ross, Powell & Elias, 2002). (*Students quickly resolve conflict*; *Student attitudes are important*);

- Management of disruptive behaviours (Hunter, 2003; Gresham, 2004). (*The school rewards appropriate behaviour*; *Behavioural issues are well managed*) and

- Inclusive practices (Schools Plus: Resourcing Informed Practice Handbook 2006; Disability Action and Inclusion Plan 2007-2008). (*Teachers celebrate the school's diversity*; *All classes have students with learning difficulties*).

The instrument items were well distributed along the logit scale of difficulty, with no obvious gaps due to "missing" items. In addition, item difficulties were shown to be closely matched with person measures (see Figure 6.9, Chapter Six). Associations between external measures of student and school characteristics and the linear measures of schools' need for services add support for the efficacy of the linear measure. The results strongly support the value of the theoretical framework as a means to develop the linear measure of school need for psychological services.

The Measurement Model

Objective research into school need for psychological services is an unexplored area. Consequently, the lack of a suitable metric to measure this particular need necessitated the construction of an appropriate measurement instrument. A measurement model that overcomes the shortcomings of Classical Test Theory and True Score Theory (see Chapter Four) is necessary to create such a measure. The literature revealed that fundamental measures for application in the human sciences, such as education research and applied psychology, could be achieved by Rasch model measurement and analysis. In this model, raw scores are converted into interval data, items are ordered with respect to difficulty, and person responses to items are ordered, indicating persons responded in a logical and

consistent way. Also, person measures and item difficulties are calibrated on the same scale. The construct of interest in the present study is referred to as a latent trait since it is not directly observable but is assumed to underpin, and influences responses to, items on the scale developed to measure the trait. The Rasch model satisfies the requirements for measurement stipulated by Thurstone (cited in Wright, 1997).

These are:

- Measures must be linear, so that arithmetic can be done with them;
- Item calibrations must not depend on whose responses they were estimated from – must be sample-free;
- Person measures must not depend on which items they were estimated from – must be test-free;
- Missing data must not matter; and
- The method must be easy to apply (p. 12).

The Rasch Rating Scale model (Andrich, 1998; Andrich, Sheridan, Lyne, & Luo, 2005) was therefore selected for this study. This enabled the researcher to successfully develop linear scales and achieve an objective measure of school need for psychological services. Successful application of the Rasch model in the current investigation demonstrates its value in creating a measure in educational psychology. This adds to the considerable Rasch research literature in the human sciences such as children with disabilities (Chien & Brown, 2012); health science (Hagquist & Andrich, 2004; Tennant & Conaghan, 2007); intelligence testing (Styles & Andrich, 1993); attitudes and behaviours related to studying and learning among university students (Waugh, 2003); early childhood development (Andrich & Styles, 2004); mathematics achievement (Van Wyke & Andrich, 2005); and student engagement in learning (Asano-Cavanagh & Cavanagh, 2009; Cavanagh, Kennish & Sturgess, 2008; Kennish & Cavanagh, 2009). In addition, Cavanagh and Waugh (2011) provide a comprehensive account of Rasch measurement applications in learning environments research.

The Survey of Need for Psychological Services

The results obtained by administration of the 120-item instrument developed to test the feasibility of measuring school need for psychological services

demonstrated convincingly that it is possible to construct a linear scale for this purpose. These data are shown in Tables 6.6, 6.7, 6.8 and Figure 6.6, respectively, in Chapter Six. Collectively they add weight to inferences that can be made from measurements obtained from applying the scale to school personnel.

The final version of the linear scale, reduced from an initial 120 items to 109 and then to the parsimonious 35 item-scale, contained those empirically-determined items exhibiting best fit-to-model characteristics (see Chapter Six). This developmental process helped avoid a source of invalidity known as "construct underrepresentation" (Messick, 1995, p. 742). Item difficulties were arranged hierarchically by the ERG from easy to more difficult-to-affirm. As expected, the measured item difficulty values, which ranged from -2.86 logits to $+3.97$ logits (see Table 6.13, Chapter Six), were closely aligned to the hypothesised hierarchies within the seven sub-scales. A possible theoretical explanation for the obtained order of item difficulties might be that the ERG conceptualised items as fitting along an easy to difficult continuum by which items represented attitudes/opinions, intended actions and finally behaviours. This attitude to behaviour continuum of items may then have been judged easy or more difficult contingent upon their relative position within each sub-scale. The construct model would then elicit judgements and data consistent with the Rasch model. In addition, Figure 6.9 (Chapter Six) shows the items were well spread along the continuum of the linear scale, with no major gaps that might suggest theoretically "missing" items. The seven sub-scales sampled a wide range of school-based behaviours that contributed to the measured school need for services.

Participants took an average of fifteen minutes to complete the survey and found it easy to use, since very few incomplete surveys were returned. A full set of data was therefore obtained from 17 schools and successfully generated a measure for each of these schools, expressed in logits. The school logit values formed a continuum from -0.14 (the school with the greatest need for psychological services) to $+1.05$ (the school with the least need for psychological services). These data are presented in Table 6.15 (see Chapter Six). One-way Analysis of Variance was used to test whether the parsimonious scale of 35 items was capable of differentiating between need for school psychological services among the seventeen target schools.

The F statistic was statistically significant ($p < 0.05$) as shown in Table 6.15 (see Chapter Six). The measures of school need for services produced a range of low to high logit values. Inferences drawn from interval measures of differential need obtained by the application of the Rasch model can therefore be made with greater confidence than would otherwise be the case.

School Effectiveness and the Measure of Need for Services

The obtained measure of school need for psychological services, based on the sub-constructs of Characteristics of Students, Schools and Teachers is, arguably, an indirect measure of school effectiveness. This proposition is now explored further. An indirect measure of school effectiveness could be extrapolated from their logit values on theoretical grounds, since management of the three major Theoretical Framework sub-constructs of student, school and teacher characteristics all contribute to the task of effectively managing schools. Of the nine characteristics of effective schools (Office of the Superintendent of Public Instruction, 2003) the *Survey of Need for Psychological Services* items refers to seven of these characteristics. These were:

- A clear and shared focus;
- High standards and expectations for all students;
- Effective school leadership;
- High levels of collaboration and communication;
- Frequent monitoring of learning and teaching;
- A supportive learning environment; and
- High levels of family and community involvement.

Based on the "logic of order" inherent in the Rasch model (Bond & Fox, 2007, p. 37) the schools with the highest logit values would be expected to have affirmed the more difficult items compared with low logit schools. The most difficult to affirm items in the seven sub-constructs comprising the *Survey of Need for Psychological Services* were:

- Teaching (*Teaching and learning produces high academic achievement*; *Test results are excellent*);

- Development of academic skills (*Students are attentive*; *Students access study skills training*);

- School development of socialisation and life skills (*There are few discipline problems*; *Students quickly resolve problems*);

- Inclusion in learning and development (*New students can be seen by the psychologist*; *We use the psychologist's ideas for our programs*);

- Prevention services and wellness promotion (*Parents utilise healthy eating programs*; *The school coordinates mental health services*);

- Home/school/community collaboration (*Parents are active in the School Council*; *Teachers find parents easy to engage*); and

- School Climate (*Teacher/psychological consultation is in place*; *Psychological services improve school climate*).

This list of more difficult to affirm items clearly illustrates aspects of a school which is self-sufficient in terms of managing teaching and learning, encouraging positive student behaviour and utilising parents as partners within the school community. Less self-sufficient schools are likely to be comparatively less effective and so have a greater need for psychological services. In addition, the more self-sufficient schools have greater consistency among teacher logit scores, as shown in Tables 6.15 and 6.16 (see Chapter Six), even though the range of scores (from low to high) varies across the range of high-need to low-need schools. Schools with high need are also less likely to have a clear strategy of how to bring about change (Rutter & Maughan, 2002), for example, moving toward expansive models of psychological services.

Deployment of School Psychologists in Government Schools

Research examining how school psychologists are deployed to schools is a new area of study and consequently there are no reported studies in the relevant literature. Moreover, there have been no calls for research into the process, despite the adoption in Western Australia of a variety of mechanisms based on school demographic factors and the socio-economic status of the school environment (Skivinis, 1991; Lazari, 2011). Effective school psychological services have been shown to deliver beneficial outcomes to school communities (Braden, DiMartino-Linen & Good, 2001; Gilman & Gabriel, 2004; Boyle & MacKay, 2007). In addition,

Reschly (2000) claimed that favourable school psychologist-to-student ratios determined the quality and expansiveness of psychological services.

Arguably a necessary precursor of providing psychological services to schools is to ascertain what schools actually want. Physical and human resources that are provided to schools have routinely been preceded by some kind of needs analysis. For example, in the case of staffing schools with teachers, a considerable ongoing research and fact-finding process involving census data and enrolment patterns is utilised. The process generates timely information, leading to appropriate levels of teacher appointments across schools for the beginning of each academic year. However, although the school psychology literature is replete with studies of models of service delivery, accountability processes and professional development needs of school psychologists (Bradley-Johnson & Dean, 2000; Nelson et al., 2006), there is little information about what schools say they actually need, in terms of psychological services (Albers, Glover & Kratochwill, 2007). This omission provided the initial incentive for the study. Application of the linear measure to determine individual school needs for psychological is discussed in Chapter Eight.

Summary

The chapter commenced with an overview of the relationships that existed between the research approach, research methodology and the data analyses by which the results were generated. Then the importance of the results obtained in Phases One, Two and Three were considered in turn, together with their implications as the study evolved.

The importance of validity is emphasised, as this criterion has informed the elements of the research methodology and the critical nature of these inter-relationships. The chapter continued with a discussion of the research findings and connections with findings reported in the relevant literature.

The final chapter focuses on the three principal research questions and ten subsidiary questions. These are used in Chapter Eight to extend discussion of the results of the investigation presented in Chapter Six.

Chapter Eight

The Research Questions and Implications

Overview

The research involves two distinct but related frameworks. First is the theoretical framework informing the construction of a linear scale to measure school need for psychological services. Second is the validity framework (Wolfe & Smith 2007a; 2007b) to identify examples of validity evidence in the instrument construction process. These frameworks are explained further in the responses to the three Principal Research Questions. Development of the measure was underpinned by Modern Measurement Theory and achieved by Rasch model analysis. The next section summarises measurement requirements critical for this research.

Modern Measurement

The development of scientific measurement was initiated by the theoretical principles first put forward by Thurstone (1927, 1931). These measurement principles were integrated into a set of measurement requirements for rating scale instruments by Wright and Masters (1982). These can be paraphrased as:

- Uni-dimensionality: The data measures a single or dominant trait. Whether we are dealing with physical objects or human characteristics, one attribute at a time is considered for measurement (see Bond & Fox, 2007). The Rasch model represents the ideal of measurement of a single attribute at a time.

- Qualification: Data can be compared, provided the latent trait of interest leads to different responses to the items among respondents. If items are hierarchically arranged in order of difficulty within the scale it is expected that a person who affirms a more difficult item will endorse all other less difficult items. If this criterion is attained the items are said to constitute a scale.

- Quantification: Variables are measured in common units. A unit of measurement must be capable of providing repeated iterations, all of which are equal and concatenate, along the length of the measurement continuum.

Wright (1997, p. 5) concluded that a unit of measurement is therefore not a thing but a process.

- Linearity: Data can be positioned on a line or scale. Measurement implies a linear continuum of some sort such as length, price, volume, weight, or age (Wright, 1997).

As shown in Chapter Five, application of these criteria determined essential elements of the research, such as specification of the theoretical model, the writing of items and the choice of instrument response categories. The extent to which the items reflected the latent trait of interest (that is, school need for psychological services) was appraised by analysing the data to test for data-to-model fit (see Chapter Six).

Validity Considerations

Questions concerning validity need to be considered independently of questions concerning the instrument development process, although these are inter-related in the present study. Bond and Fox (2007) refer to Fisher's (1994) view that the Rasch model is an instrument of construct validation. This supports the inference that the measured behaviours are expressions of the underlying construct of interest and emphasises the critical importance of identifying any existing validity evidence in the instrument construction activities.

As noted previously, Messick (1995) asserts that test result interpretations can only be justified by means of rigorous argument. For Messick, validity is a unified concept related to the test development process rather than the test *per se*. The unifying dynamic is the meaningfulness or trust that can be placed upon test score interpretations and subsequent decisions based on those interpretations. A thorough consideration of the methodology of the investigation is therefore, in part, informed by Messick's approach to validity as expressed in the Wolfe and Smith (2007a; 2007b) validity framework. The Rasch outputs resulting from the instrument construction process provided the opportunity to identify acceptable examples of evidence for six of the seven aspects of validity described by Wolfe and Smith. The results discussed in Chapter Six are discussed with respect to the individual research questions.

Responses to the Research Questions

Principal Research Question 1

Can a rating scale instrument be developed to measure school personnel perceptions of their school's need for psychological services? Specifically, in terms of measurement theory (Wright & Masters 1982), *can the following be determined:*

    (a) *Was there uni-dimensionality?*
    (b) *Was there qualification?*
    (c) *Was there quantification? and*
    (d) *Was there linearity?*

Data presented in tables 6.6 and 6.8 in Chapter Six confirm that a rating scale instrument to measure school personnel perceptions of their school's need for psychological services was developed. That is, the data showed good global and person fit to the model, good individual item fit to the model and a Person Separation Index of 0.92, which indicated that person measures were well separated along the measurement continuum. Item difficulty and person ability values were plotted on the same logarithmic scale, as shown in Figure 6.9 (Chapter Six).

Figure 6.7 (Chapter Six), the Item Characteristic Curve for Item 5 Data, illustrates the extent to which the observed score values agreed with those predicted by the model. The scores closely approximated theoretically expected values. The residuals (the difference between the observed and predicted scores) were within the limits of ± 2.5 with a Chi Square probability value of ≥ 0.05. Thirty-one of the thirty-five items fitted the model according to these criteria (see Table 6.11, Chapter Six).

In addition, the hypothesised order of item difficulties was substantiated by the measured item difficulties. Table 6.12 (Chapter Six) shows the item sequence and corresponding measured difficulty values, expressed in logits. There is an acceptable level of agreement between the hypothesised order and the measured order of item difficulty. The *a priori* ordering of items within the sub-scales is also confirmed. The order of difficulty is as expected, with the exception of Items 23, 24 and 25 which should have been in reverse order, according to the data.

Finally, the data demonstrate agreement between observed and hypothesised item functioning as shown by item thresholds. All thirty five items of the *Survey of Need for Psychological Services* exhibited ordered thresholds, as shown in Table 6.14 (Chapter Six). The threshold is the person measure at which an equal probability exists for a person to choose either one of two adjacent response categories. For example, in Figure 6.8 of Chapter Six, the curve intersection values for *disagree/agree* and *agree/strongly agree* response categories increase in line with the increasing person abilities, which are expressed in logits. This indicates that respondents selected response categories in a logical and consistent way. This part of the first principal research question is therefore answered in the affirmative.

Question 1(a). *Was there uni-dimensionality?*

The RUMM2020 computer program tests the extent to which the data fitted the Rasch model, especially the requirement that items designate a common construct. Rasch measurement requires the trait of interest to be unidimensional with most of the within-data variance attributed to a single factor. This is investigated in Rasch analysis by an item-trait interaction Chi Square test whose probability value ought to be $p > 0.05$. The item-trait interaction summarises the Chi Square statistics associated with the items and shows the consistency of agreement of item difficulties across person ability measures on the scale. The person parameter enables prediction of each person's response to each item in the scale. The total Chi Square probability obtained in this study ($p = 0.00$) was less than the required minimum value of 0.05 (see Table 6.6, Chapter Six), indicating multi-dimensionality in the data.

Alternatively, RUMM2020 can be applied to confirm if the requirements of a unidimensional measurement model are attained when a unidimensional trait is measured. This is realised by initially extracting the linear measure component from the data. A Principal Components factor analysis was then performed on the standardised residuals. Unidimensionality can be assumed if there is negligible structure in the residuals. This was applied to the Phase Three data. Table 6.17 (Chapter Six) shows the percentage of the total variance accounted for by each of the principal components. The variance is not distributed evenly across the 35 principal components, suggesting the presence of a structure in the residuals. One component

accounted for 13.24% of the total variance, indicating multidimensionality in the data. It is unlikely that variables in educational psychology are strictly unidimensional, due to the complex interactions of human attributes involved in responding to scale items. A complex variable such as School Need for Psychological Services incorporates person attitudes, cognitions and behaviours which in turn are predicated on brain states that are not necessarily well understood. In this context the variable under enquiry is not uni-dimensional as it involves multiple factors.

Question 1(b). *Was there qualification*?

The construct of interest *School Need for Psychological Services* was exemplified by the construct model (theoretical framework) introduced in Chapter Two. The model's internal structure comprises sub-constructs extracted from the school psychology literature, and are used to specify the nature and quality of the items written, the selection of scale response categories and the nomination of a measurement model for data analysis. The meaning of the seven sub-constructs was qualified by the items in the corresponding sub-scales. The response category alternatives enabled teachers to select a category for each item that expressed a level of affirmation consistent with their perception of their school's need for psychological services. The qualification requirement also specifies that obtained data can be compared. Tables 6.15 and 6.16 (Chapter Six) respectively, show individual school scores and individual teacher scores by school. One-way analysis of variance demonstrated that the *Survey of Need for Psychological Services* differentiated need for psychological services among the target schools. The F statistic was statistically significant ($p < 0.05$), as shown in Table 6.15 (Chapter Six). There is sufficient evidence to answer Question 1(b) in the affirmative.

Question 1(c). *Was there quantification*?

The main focus of Rasch measurement is to develop measurement units, initially arbitrary, that can be repeated along a particular scale so that unit values remain the same (Bond & Fox, 2007). The instrument developed in the study featured ordinal data obtained from the administration of Likert-type surveys. It is well accepted in Rasch research that of the observations obtained from surveys,

persons with greater ability are more likely to affirm all of the items. A corollary to this is that easier items are more likely to be affirmed by all persons. Based on this "logic of order, as an initial approximation" (Bond & Fox, p. 37), Rasch analyses executed a logarithmic transformation of ordinal data into interval data utilising the Rasch Rating Scale model (Andrich et al., 2005). The Rasch outputs include graphs of person abilities and item difficulties plotted on the same scale, which is calibrated in logits, the common unit of quantification as shown in Figure 6.9 (Chapter Six). There is unequivocal evidence that the scale items quantify teachers' perceptions of school need for psychological services, thus satisfying the requirement for quantification. Question 1(c) can be answered in the affirmative.

Question 1(d). *Was there linearity*?

The results showed excellent data-to-model fit (see Tables 6.11 and 6.14, Chapter Six), indicating that the scale constructed was a linear measure. Fit is the diagnostic process predicated on the principle of quality control, which assists in deciding if the person and item data are near enough to the Rasch requirements to be considered as linear interval scale measures (Bond & Fox, 2007). The data fit-to-model was shown to be good, thus confirming the criteria for interval scaling. Each sub-construct constituted a measure of one of the aspects of school need for psychological services.

The interval properties of the scale are illustrated in Figure 6.9 (Chapter Six), in which the difficulties of scale items and the abilities of respondents to affirm increasingly more difficult items are shown. In addition, the scale not only shows which items are more or less difficult but also the magnitude of the differences. Similarly, person ability differences are also quantified. Both measures are calibrated on the same logarithmic odds scale, in equivalent logit units which is a requirement for linearity.
Principal Research Question 1 can therefore be answered in the affirmative.

Principal Research Question 2

The second of the three major research questions was: *Is data from a measure of school need for psychological services associated with school demographic variables* (*e.g. socio-economic index*)?

Publicly available school-level data (*student suspensions, student absenteeism, students with individual behaviour plans* and *school socio-economic status*) were treated as independent variables (IVs). The measure of *school need for psychological services* was treated as the dependent variable (DV). Parametric statistical techniques were applied to test whether or not an association existed between the IVs and DV. School population numbers were controlled by calculating quotients for school absenteeism, school suspensions and students with individual behaviour plans. Several inverse and positive associations among the five variables are shown in Table 6.19. The inverse correlation between school need for school psychological services (DV) and school suspensions quotient (IV) is shown to be significant ($p < 0.01$). This relation shows that as school suspensions increase, the participants' rating of need for psychological services tended to increase.

Relations between the DV and the four IVs when the school populations are not controlled are shown in Table 6.21 (Chapter Six). The Spearman Product Moment correlations between suspensions and students with individual behaviour plans respectively, and the measure of school need for psychological services are significant ($p < 0.05$). These data are acceptable evidence for an association between the measure of school need for psychological services and school demographic variables, thus partially answering Principal Research Question 2 in the affirmative.

Principal Research Question 3

The third of the major research questions was: *What facets of validity evidence described in the Wolfe and Smith (2007b) framework are identifiable in the construction of a measure of school need for psychological services*? Specifically:

(a) Evidence of the content aspect;

(b) Evidence of the substantive aspect;

(c) Evidence of the structural aspect;

(d) Evidence of the generalisability aspect;

(e) Evidence of the interpretability aspect;

(f) Evidence of the external aspect; and

(g) Evidence of the consequential aspect.

The aspects of validity evidence that were exemplified in the current investigation lend support to the integrity of the instrument construction process. Furthermore, confidence in drawing inferences from the interpretation of the test results is enhanced. The employment of the Rasch model generated outputs of substantial and easily interpretable evidence for validity arguments in the construction of the linear scale. This is exemplified in responses to the following subsidiary questions.

Question 3(a). *Was there evidence of the content aspect of validity*?

The content aspect of validity includes an unambiguous statement of the purpose of the study: to construct a linear interval scale to measure school need for psychological services. This aspect was further explicated in the three principal research questions. The *domain of inference* was made explicit, since the instrument development process was informed and underpinned by contemporary school psychology theory and practice. Furthermore, it was criterion-based, because teacher attitudes, perceptions and school-specific behaviours were featured. In addition, *test specifications* and *item development* were crucial in explaining the domain and its measurement (see Chapter Six, p. 119).

Evidence of the *technical quality of items* is shown in Figure 6.7, the Item Characteristic Curve for Item 5 Data, and Table 6.11 which shows Individual Item Fit Statistics (see Chapter Six). These Rasch outputs illustrate excellent data-to-model fit and, together with the descriptive information above, constitute evidence for the content aspect of validity.

Question 3(b). *Was there evidence of the substantive aspect of validity*?

Evidence of the substantive aspect of validity is concerned with demonstrating that the *a priori* rationale embedded in the construct framework can account for consistencies or trends among item responses. It was hypothesised that the order of items within the seven sub-scales conformed to a hierarchy from easy-to-affirm to difficult-to-affirm. The order of measured item difficulty shown in Tables 6.12 and 6.13 (Chapter Six) confirm close correspondence between the obtained item measures and the order of items initially presented in the scale. This is evidence of the substantive aspect of validity.

Additionally, the available response categories (strongly agree; agree; or disagree) ought to enable teachers to select item response categories logically and consistently. Such ideal person response patterns are illustrated by ordered item thresholds (see Chapter 4, p. 80). Figure 6.8 (Chapter Six) shows a Category Probability Curve for ordered thresholds. All 35 items exhibited ordered thresholds confirming respondents selected response options in a logical and consistent manner. This is shown in Table 6.14 (Chapter Six), providing further evidence for the substantive aspect of validity.

Finally, the data demonstrated that perceptions of need for psychological services differed across the 17 target schools. The F statistic was significant ($p < 0.05$). The hypothesised differential need for psychological services was predicated upon the unique characteristics of students, teachers and individual schools. Logit values for each school and individual staff members were calculated and are shown in Tables 6.15 and 6.16 respectively.

These observed consistencies in the data are clear examples of evidence of the substantive aspect of validity.

Question 3(c). *Was there evidence of the structural aspect of validity*?

The structural aspect of validity is concerned with the construct domain and the applied scoring model. For example, is it possible to confirm whether or not the requirements of a unidimensional measurement model are satisfied when a unidimensional trait is measured? This was achieved by performing a Principal Components Factor analysis on the standardised residuals after the initial Rasch scaling. Table 6.17 (Chapter Six) shows the percentage of total variance accounted for by each of the principal components. One component accounted for 13.24% of the total variance, indicating multidimensionality in the data. However, although the overall fit (total Chi Square probability value, p. = 0.00) is unsatisfactory, it is useful to examine the tests of fit for the items individually in order to establish the status of the scale as a whole, as a few misfitting items may be interfering unduly with the fit of the majority of items (see Andrich & Styles, 2004, p.31).

The construct domain encompasses aspects of school psychological services that a school may require. The domain is exemplified by the construct model that

was based on information drawn in part from the pertinent literature and expert viewpoints about the construct of interest which is a latent trait as it is not directly observable. A scoring model (that is, a Likert scale with four response categories known as the measurement dimension) was then selected to convert qualitatively different responses about the latent trait into numerical codes. A scaling model (Rasch Rating Scale) was selected to place the ordinal codes onto a continuum which represents measurable amounts of the latent trait. The rationale for choosing the measurement dimension and related activities in developing the *Survey of Need for Psychological Services* was documented and discussed in detail in Chapters Two and Four and provides additional evidence for the structural aspect of validity (Wolfe & Smith 2007a, p.114).

Question 3(d). *Was there evidence of the generalisability aspect of validity*?

Wolfe and Smith (2007b, p. 215) indicated that "The generalisability aspect of validity addresses the degree to which measures maintain their meaning across measurement contexts." The present study was unable to demonstrate that item difficulty factors did not vary for example, between male and female teacher participants or across different types of school. Generalisability can also be considered as the degree of consistency across items. This can be judged by estimating the person separation index (the internal consistency reliability coefficient) which is the proportion of variance deemed true in the calibrated person scores. RUMM2020 estimated this coefficient (referred to as the Person Separation Index) for the data from *Phase 2* and *Phase 3* and obtained acceptable Person Separation Indexes of 0.92 and 0.84 respectively. This is evidence of the generalisability aspect of validity.

Question 3(e). *Was there evidence of the interpretability aspect of validity*?

As defined by Wolfe and Smith (2007a), the interpretability aspect is concerned with the extent to which qualitative meaning can be attributed to quantitative measures. Rasch measurement and analysis generates a number of statistical and graphical outputs that provide objective data that are both clear and easy to understand. Examples include displays showing the technical quality of individual items (Figure 6.7), individual item fit statistics (Table 6.11) and item

thresholds (Table 6.14) in Chapter Six. Together these displays provide a clear explanation of the excellent data-to-model fit, confirming the interpretability of the *Survey of Need for Psychological Services.*

The graphical display shown as Figure 6.9 (Chapter Six) demonstrates the close matching of teacher abilities and item difficulties. The graphs facilitate comparison of teacher ability with the difficulty of items. Additionally, they show there were satisfactory numbers of easy and more difficult items across the scale, with no obvious gaps within the item difficulty range across the person ability spectrum.

School personnel were naturally interested in the results for their own school. Table 6.15 (Chapter Six) shows, in descending order, school need for psychological services expressed in logit values. High need is illustrated by negative values. The ease of reading the data presented in these Rasch outputs is evidence of the interpretability aspect of validity. Question 3(e) can therefore be answered in the affirmative.

Question 3(f).*Was there evidence of the external aspect of validity*?

The external aspect of validity considers the extent to which the linear scale measure of school need for psychological services (DV) is associated with independent measures of the same or similar constructs. The external aspect of validity is viewed by Wolf and Smith (2007a) as possibly the most important. In addition, Messick (1995) states that correlations between test scores and criterion measures contribute jointly to the construct validity of both predictor and criterion.

Independent, publicly available school-level data such as: student suspensions; student absenteeism; school socio-economic index; and students with individual behaviour plans (IVs) were selected to test whether or not a relationship with the DV exists. Chapter Six described the results obtained after two separate procedures were performed. First, the extraneous variable of school population was controlled by using quotients for student data and then calculating correlations between the four IVs. Next, correlations between the DV and the four IVs were calculated. These are shown in Tables 6.18 and 6.19, respectively. Although it can be extrapolated that since school suspensions quotient is significantly correlated with other demographic variables, there might be a relation between external measures

and the measure of school need for psychological services. This is now presented in detail. Findings are:

- As the school socio-economic status index increased, school absenteeism, school suspensions, and students with individual behaviour plans decreased ($p < 0.01$);
- As school suspensions increased, students with individual behaviour plans also increased ($p < 0.01$); and
- As school suspensions increased, school need for psychological services also increased ($p < 0.01$).

It is necessary to test for association between the DV and multiple IVs as a group because this may produce a different effect. This was achieved by applying Multiple Regression Analysis. Table 6.20 (Chapter Six) shows the regression analysis, which confirmed a statistically significant inverse relationship between school suspensions (IV) and the DV ($\beta = -0.33$, $p < 0.01$). A unit positive change in school suspensions was associated with a decrease of 0.33 logits in the measure of school need for psychological services. That is, higher suspensions are associated with greater school need for services.

Second, Spearman Product Moment correlations between the DV and the IVs (without controlling for school student populations) for each participating school are shown in Table 6.21 (Chapter Six). Findings are:

- A statistically significant correlation between school suspensions and school need for psychological services ($r = -0.52$, $p < 0.05$); and
- A statistically significant correlation between students with individual behaviour plans and school need for services ($r = -0.49$, $p < 0.05$).

Schools with lower need for services (higher logit values) reported lower numbers of students with individual behaviour plans and lower student suspensions. Correlations between school need for services and student absences and school socio-economic indices were not statistically significant. The data demonstrates support for theorised associations between the linear measure (DV) and external school-level demographic data. This constitutes evidence for the external aspect of validity, enabling the research question 3(f) to be answered in the affirmative.

Question 3(g).*Was there evidence of the consequential aspect of validity*?

The consequential aspect of validity focuses on considerations about the ways in which interpretations of scores and their application may have consequences for schools and providers of psychological services. These include considerations of fairness, how the results are explained in the first instance by the researcher, the accuracy of interpretations of the survey results by education administrators, and actions taken based on these interpretations.

The researcher agreed to provide results of the investigation to all participating schools, as a condition of the Department of Education granting permission to conduct research in government schools. The Rasch statistical tables and graphical displays were used to report findings to interested individual schools. Due to changes of Principals and retirements, not all schools exercised their right to have this information. Despite this, the Rasch outputs proved to be an excellent means of specifying differential school needs data to individual principals and comparing data with schools of differing socio-economic status. The data did not permit identification of participating schools or groups of teachers. School codes, as required by research ethics negated unintentional ethical consequences. Explanation of results was achieved through interviews using the data shown in Table 6.12 (the scale item sequence and difficulty) and Table 6.15 (the descending order of schools' need for psychological services). These classifying data were used to illustrate the qualities of schools at the lower and higher ends of the needs continuum by referring to items within the seven sub-scales which were easy or difficult to affirm. These qualities were also related to inferences of school-level effectiveness. Some principals whose schools showed a low need for psychological services may have initially voiced concern for fear that loss of any existing psychological resources would have a negative impact on their schools. However, this perception was balanced by the inference that their scores suggested a higher degree of effectiveness in managing school-based issues. High needs schools, on the other hand, which may gain comparatively more psychological resources, were arguably less effective in dealing with those issues.

The interpretability aspect of validity is a further dimension of consequence and has implications for the quality of the method chosen to inform schools. The

obtained measures of school need must be seen to be fair and without bias to any school, particularly as different sizes and types of schools comprised the target group of schools. This subsumes equity issues such as fairness of test use, freedom from bias in scoring and interpretation of scores. Scores at the extreme ends of the continuum, more likely to invite perceptions of bias, should, however, be seen in the context of the instrument development process. The final 35-item scale comprised those items that exhibited best data-to-model fit statistics as well as meeting additional criteria such as an adequate number of items to indicate all seven sub-constructs, and a sufficient range of item difficulties increasing from easy to difficult to affirm. This process ensured the final scale would provide the best opportunity for respondents to objectively register their perceptions of their school's need for psychological services. Scoring across all respondents and schools was uniform and consistent. Computerised data analysis guaranteed that obtained scores were not biased, since respondent and school identity were protected by the application of numerical codes. These considerations illustrate the potential consequences of interpreting scale scores and the actions taken as a result of the scores across schools. The evidence discussed above contributed to the researcher's desire to demonstrate the positive consequences of applying the measure to schools and minimise unintended consequences by careful attention to the scale development activities. Question 3(g) can therefore be answered in the affirmative.

The next section discusses the implications of the results and recommendations. This is followed by examining the limitations of the current investigation and suggestions for further research into aspects and delivery of school psychology services.

Implications of the Findings and Recommendations for Educational Administrators

The successful construction of the linear scale gives school administrators the capacity to determine individual school need for their services and so provide services commensurate with this metric. The differential need for psychological services among schools has been demonstrated in this study. One-way Analysis of Variance (ANOVA) was used to test whether the final version of the instrument, consisting of 35 items, was capable of differentiating between the need for psychological services among the 17 schools. The F statistic was statistically

significant (F = 2.00; p < 0.05), as shown in Table 6.15, Chapter Six. This result demonstrated that the linear scale was capable of discriminating the level of need for services across schools. In principle, the findings of the research are applicable to school psychology services internationally, if their organisational structures are comparable with the sample of target schools. That is, a finite number of school psychologists in an education district, area or state provide services to a large number of schools. Whilst a favourable ratio of school psychologist to students is known to positively influence the nature of services (Reschly, 2000), many schools in Western Australia and overseas public school systems share the services of a single psychologist. In the absence of current published data, the detail of existing mechanisms to ascertain school need for services is largely unclear, as evidenced, for example, in: England by Ashton and Roberts (2006); Scotland by Boyle and MacKay (2007); Western Australia by Lazari (2011) and in an international survey by Jimerson et al., (2008).

At a local level, the *Survey of Need for Psychological Services* is of use in determining appropriate psychological resources for schools, in the first instance, by the West Australian Department of Education's School Psychology Service. The research, if extended, is significant at a number of managerial levels within the Department of Education. First, the measure developed has the potential to provide central administrators with objective data about school needs across the system that will inform decisions about resourcing the Department's education regions. Second, Regional Executive Directors have contemporary information describing the roles and functions of school psychologists for accountability purposes. In addition, they will be able to allocate school psychologists to schools commensurate with the psychological needs of students and their families. Third, school principals can be assured that the level of psychological services provided is appropriate, having been determined by a linear measure of needs. Fourth, school psychologists, as a result of the research, will be able to establish priority for psychological services among their designated schools, as each one will be located on the calibrated scale. If this finding was applied to resourcing decisions for schools, those schools which might appear demographically equivalent would receive different allocations of school psychological services commensurate with their measured need. As a result, an objective measure of school need for psychological services might very well

determine a differential resourcing process, one that transcends the conventional perceptions of high and low need schools that are based primarily on considerations of socio-economic indices and the categorical status of enrolled students.

When student enrolments across schools are controlled, the statistically significant inverse correlations discussed in Chapter Six illustrate that as school socio-economic indices increase, school absenteeism, school suspensions and number of students with individual behaviour plans decrease. Equally, as socio-economic index decreases, the incidence of these student characteristics will correspondingly increase. This finding provides a degree of support for the Department of Education's decision to continue incorporating the socio-economic index as a weighting to increase the allocation of school psychologists in schools which have low socio-economic indices (Lazari, 2011). However, if student enrolments are not controlled, there is no relation between school need for psychological services and student numbers. This raises doubts about utilising student numbers to calculate the *base student number* as the starting point in the formula for allocating school psychologists to schools.

Furthermore, although an *adjusted student number* is applied to each school to determine the appropriate school psychologist allocation in accordance with current practice (Lazari, 2011), the calculated psychologist full time equivalents (FTEs) are aggregated to give a composite allocation to each education region. This is then distributed across schools by the Executive Regional Director. That is, the individual school allocation determined by the formula is not actually given to each school. It appears that an *ad hoc* process may still be applied, at the education region level, to generate each school's allocated level of school psychological services. The usefulness of this recently launched Department of Education allocative mechanism to deploy school psychologists to schools (Lazari, 2011) would be improved by incorporating the objective measure of school need for services, developed in the current investigation, as recommended above.

Examination of the school logit values across type of school, student population and socio-economic status revealed a number of anomalies. For example, school logits for two Education Support Centres (ESC) with similar populations of students with disabilities and SEIs were + 0.87 and + 0.02 respectively. School logits

for the two Primary Schools (PS) with similar SEIs, co-located with ESCs but with no students with disabilities, were ─ 0.14 and + 0.71 respectively. Furthermore, two PSs with similar student numbers, no students with disabilities and SEIs of 116.10 and 105.13 respectively, had school logit values of + 0.47 and + 1.05 respectively. Finally, two Senior High Schools (SHS) with similar student numbers, no students with disabilities but with different SEIs of 105.36 and 93.7 respectively, had surprisingly similar school logit values of ─ 0.07 and ─ 0.11 respectively.

These anomalous findings suggest that the predictors adopted by the Department of Education (SEI, student numbers and students with disabilities) as weightings to determine an *adjusted student number*, leading to a psychologist full-time equivalent allocation to each school, are inconsistent and possibly of limited use. It is possible that other factors such as school and/or teacher characteristics have a greater influence on the school logit value, and hence the need for psychological services. Neither of these factors, which are integral in determining the logit values of schools, are included in the current allocative formula (Lazari, 2011).

Limitations and Suggestions for Future Research

The study would have been more comprehensive if it had included an investigation of important areas of school psychology in Western Australia identified by Leach (1989). As identified by Gilman and Gabriel (2004) in the USA, there is no research data published to date concerning education personnel and teacher and parent perceptions of school psychological services. However, the prime purpose of this study was to establish the feasibility of developing a linear measure of school need for psychological services, and if successful then to demonstrate that such a linear scale discriminates levels of need among schools. These aims were achieved, albeit at the cost of a wider ranging study.

It is acknowledged that the present quantitative study has a number of limitations, and these are now discussed. The first limitation is that the school sample was taken exclusively from metropolitan government schools. Application of the findings to schools across the state is therefore questionable even though different categories of school such as education support, primary and secondary were included in the samples for Phases Two and Three of the study. In addition, Phase One

participating staff was drawn from a similar range of schools. School psychologists were also included in Phase One item writing activities and refinement of the theoretical framework.

A second limitation concerns the teacher and principal participants. Participant characteristics such as gender were not controlled. This may have important implications for the generalisability of scale items in measures that are invariant. Such measures do not demonstrate bias or behave differentially due to person factors such as gender. Gender of participants could have been controlled at the outset providing the opportunity to show whether or not items exhibited *differential item functioning*. This omission relates to the generalisability aspect of validity and could have provided evidence of the seventh aspect of validity of the instrument development process. A third limitation is the omission of categories of teachers and principals with respect to length of service, promotional positions held, length of experience of direct involvement with psychologists, and whether or not they line managed psychologists on behalf of their schools.

Addressing limitations such as these could have enriched the study and provided stronger evidence of validity inherent in the course of the developmental stages of the scale construction. In particular, the generalisability aspect of validity must be explored by demonstrating that the obtained measures are invariant across different settings and school populations. With respect to the constructed measure there is an expectation that items would produce the same scores despite different categories of personal experiences, different groups of people and different types of school. A study showing the absence of differential item functioning would add greater confidence when interpreting obtained scores and any actions taken as a result of these scores.

The theoretical framework itself is worthy of testing in terms of identifying which of the three major sub-construct characteristics of students, schools and teachers exerts the greatest measurable influence on school need for services. Although the current investigation successfully constructed and applied a linear interval scale to measure school need for psychological services, inherent limitations prevent generalising the findings beyond metropolitan government schools. This indicates that extended work on instrument development using much larger

representative school samples is necessary before the findings could be extended to schools across Western Australia. In addition, the relationship between school effectiveness and need for psychological services alluded to in Chapter Seven may point to a more general association between school effectiveness and need for services in general. This point is predicated on the suggestion that effective schools are more likely to manage and resolve internal issues and difficulties (Rutter & Maughan, 2002) and an investigation of possible causal effects is worthwhile.

Leach (1989) reported data showing that applied psychologists working in Western Australian schools at that time were mainly seen as "closet" psychologists rarely working in open school settings (p. 369). They were also perceived as referral-driven and child-centred rather than preventive and systemic in terms of services delivered. Since then, there has been a shortage of published research on school psychologists' current roles and functions, their preferred roles and functions, and their current involvement with administrators at school and regional level in determining the range of services delivered to schools and collaboration with inter-agency stake holders. In addition, contemporary local information is needed about teachers' and principals' knowledge of school psychology, their satisfaction with services; the efficacy of current services; and what teachers and principals expect from school psychologists.

Empirical data resulting from these areas of research will lead to earlier discussions of student difficulties and better planning for systemic level interventions in learning, behaviour and mental health. In addition, schools' understanding of the range of potential services that psychologists can deliver competently will be improved. This research is likely to establish stable beneficial working alliances. Finally, school psychologists will be in a better position to reduce reported school perceptions (Leach, 1989) of their insular professional practice activities.

Conclusion

The Department of Education's School Psychology Service continues to retreat from the Medical Model and move towards a more comprehensive service, similar to that illustrated in the range of items comprising the *Survey of Need for Psychologi*cal *Service* (see Appendix L). This is evidenced by the introduction of a

new competency framework at the start of the 2011 academic year, which aligns well with the model for school psychology practice in Western Australia introduced in Chapter Three. School Psychology Service administrators intend to use the competency framework to provide managers of the service with quality assurance documentation, and also to identify professional development requirements of the School Psychology Service (F. Lazari, personal communication, April, 15, 2011). The competency framework document is accompanied by a new allocative formula, based on school-level parameters and student demographic data, to deploy school psychologists to schools (see Chapter Two).

The current investigation is important as a contribution to the current knowledge of school psychology service provision in Western Australia. This is particularly so because it introduces objectivity into the process of allocating school psychologists' services to school administrative regions and government schools.

The Department of Education's recent introduction of a new allocative mechanism to deploy school psychologists remains tied to school demographic factors. Furthermore, the development of a linear measure of school need for such services provides a crucial dimension that is lacking in the present system for determining the allocation of school psychologists to government schools in Western Australia. The instrument developed in the present study provides an objective measure of school need for psychological services. As such, it would be a useful tool for central administrators, regional executive directors and managers of the School Psychology Service in the task of allocating psychological services to individual schools commensurate with measured need.

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APPENDIX A

Department of Education and Training Ethics Clearance

Department of Education and Training
Government of Western Australia

Your ref:
Our ref: D08/0015720
Enquiries:

Mr Adrian Young
21 Davallia Road
SOUTH DUNCRAIG   WA   6023

Dear Mr Young

Thank you for your completed application received 5 June 2008 to conduct research on Department of Education and Training sites.

The focus and outcomes of your research project titled, *Deploying school psychologists within an educational system,* are of interest to the Department, and I give permission for you to approach site managers to invite their participation. However, it is a condition of approval that the results of this study are forwarded to the Department upon conclusion.

Consistent with Department policy, participation in your research project will be the decision of the particular schools invited to participate and the individual staff members.

Responsibility for quality control of ethics and methodology of the proposed research resides with the institution supervising the research. The Department notes a copy of a letter confirming that you have received ethical approval of your research protocol from the Curtin University Human Research Ethics Committee.

Any proposed changes to the research project will need to be submitted for Department approval prior to implementation.

Please contact Emily Caruana, Policy and Planning Graduate, on (08) 9264 5279 or researchandpolicy@det.wa.edu.au if you have further enquiries.

Very best wishes for the successful completion of your project.

Yours sincerely

NORMA JEFFERY
EXECUTIVE DIRECTOR
POLICY, PLANNING AND ACCOUNTABILITY

5 June 2008

151 Royal Street, East Perth, Western Australia 6004

APPENDIX B

Curtin University Human Research Ethics Committee Clearance

memorandum

To	Adrian Young	
From	Samantha Hornby	
Subject	Protocol Approval FELSSW-150-08	
Date	30 April 2008	
Copy		

Curtin
University of Technology

Division of Humanities
Tel: 9266 2158
Fax: 9266 2547

Faculty of Education, Language
Studies & Social Work
Email: s.hornby@curtin.edu.au

Dear Adrian

Thank you for your "Form B Application for Renewal for the project titled: *"Deploying school psychologists within an education system."* On behalf of the Human Research Ethics Committee I am authorised to inform you that the renewal for this project is approved.

Approval of this project is for a period of 20 months from 30 April, 2008 to 31 December, 2009.

If at any time during this time changes/amendments occur, or if a serious or unexpected adverse event occurs, please advise me immediately. The approval number for your project is FELSSW-150-08. Please quote this number in any future correspondence.

Ms Samantha Hornby
Coordinator for Human Research Ethics
FELSSW

Please note: The following standard statement must be included in the information sheet you provide to participants:
This study has been approved by the Curtin University Human Research Ethics Committee. If needed, verification of approval can be obtained by writing to the Curtin University Human Research Ethics Committee, C/-Office of Research and Development, Curtin University of Technology, GPO Box U1987, Perth, 6845, or by telephoning 9266 2784.

Letter to School Psychologists, Principals and Teachers (ERG)

Dear

A Rasch Modelling Approach to Measuring School Need for Psychological Services

My name is Adrian Young and I am writing to you on behalf of Curtin University of Technology. I am conducting a research project that aims to develop a calibrated instrument by which school psychologists can be deployed to schools. The project is to fulfil the requirements of the Doctor of Philosophy degree of Curtin University of Technology.

The project will proceed through three empirical phases. Phase One will refine the hypothesised theoretical model by seeking feedback about a proposed questionnaire from a small sample of principals (3), teachers (6) and school psychologists (4). Phase Two involves the construction, piloting and trialling of a rating scale instrument to elicit school personnel's perceptions of the need for psychological services. Phase Three administers the final parsimonious linear scale and examines associations between school staff perceptual data and school-level variables such as student truancy, suspensions, students with individual behaviour plans and community socio-economic status. In addition, consideration is given to identifying evidence for the validity of the instrument development process throughout the study phases. I wish to invite you to take part in Phase One of the project on behalf of your school and the School Psychology Service. Your perceptions of school need for psychological services are a vital element in service determination.

What does participation in the research project involve?

You are invited to consider the theoretical framework, its major sub-constructs and the quality of relationships among these and the items of a draft questionnaire. This will be achieved by written feedback on the questionnaire and your verbal suggestions for improvement at a follow-up session with me.

Do I have to take part?

No. Participation in this research project is entirely voluntary. If you do not wish to take part in the project then simply do not complete the consent form. This decision should always be made completely freely, and any and all decisions are respected by members of the research team without question.

What if I wanted to change my initial decision?

If you wish to participate, the decision will need to be made within the next week for you to be included in the project.

Once a decision is made to participate, you can change your mind at any time within the minimum 5-year storage period of the research data (see below). All contributions made to the project will be destroyed unless explicitly agreed to by you.

If the project has already been published at the time a participant decides to withdraw, their contribution that was used in reporting the project cannot be removed from the publication. There will be no consequences relating to a decision by an individual or the school to participate or not, or to participate and then withdraw, other than those already described in this letter. These decisions will not affect your relationship with the researcher or Curtin University of Technology.

What will happen to the information I give, and is privacy and confidentiality ensured?

Information that identifies anyone will be removed from the data collected. The data is then stored securely in a locked cabinet at Curtin University and can only be accessed by myself and A/Professor R F Cavanagh. This data will be stored for a minimum period of 5 years, after which it will be destroyed by shredding.

The data will be maintained in a way that enables us to re-identify an individual's data and destroy it if participation is withdrawn. This is done by a system of individual codes known only to the researcher and his supervisor, which is used to link each individual's consent form to all their data.

The identity of you or your school will not be disclosed at any time except in circumstances where the researcher is legally required to disclose that information. Participation privacy, and the confidentiality of information disclosed by participants, is assured at all other times.

It is intended that the findings of this study will be written up in a Doctoral dissertation submitted to Curtin University of Technology. A summary of the research findings will be made available upon completion of the project. You can expect this to be available after December 2009.

What are the educational benefits of this research for my role?

There are indirect benefits for principals as psychological services will be allocated to individual schools commensurate with the psychological needs of students. The research will provide an evidence-based method of deployment of school psychologists to schools. The research is also significant at a number of Department managerial levels and for school psychology staff. Central administrators will have objective data about school needs across the system; District Directors and Managers of School Psychologists will be able to allocate psychological resources across districts and school Psychologists will be able to establish service priority among their designated schools.

Are there any risks associated with participation?

No. The only risks have to do with breaches of confidentiality and/or privacy already discussed above.

Is this research approved?

The research has been approved by the Human Research Ethics Committee of Curtin University under Protocol Approval FELSSW-150-08 dated 30 April 2008. The research has met the policy requirements of the Department of Education and Training.

Who do I contact if I wish to discuss the project further?

If you would like to discuss any aspect of this study please contact me on the number provided below. If you wish to speak with an independent person about the conduct of the project, please contact Ms Samantha Hornby, Coordinator for Human Research Ethics on 9266 2158.

How do I become involved?

If you had all questions about the project answered to your satisfaction, and are willing to become involved, please complete the **Consent Form** on the next page. This information letter is for you to keep.

Adrian Young
Doctoral student 12731842
Curtin University of Technology
9448 4451 (h) 0437 561 243 (m)

Letter to Principals #1

Dear

A Rasch Modelling Approach to Measuring School Need for Psychological Services

My name is Adrian Young and I am writing to you on behalf of Curtin University of Technology. I am conducting a research project that aims to develop a calibrated instrument by which school psychologists can be deployed to schools. The project is to fulfil the requirements of the Doctor of Philosophy degree of Curtin University of Technology.

The project will proceed through three empirical phases. Phase One will refine the hypothesised theoretical model by seeking feedback about a proposed questionnaire from a small sample of principals (3), teachers (6) and school psychologists (4). Phase Two involves the construction, piloting and trialling of a rating scale instrument to elicit school personnel perceptions of need for psychological services. Phase Three administers the final parsimonious linear scale and examines associations between school staff perceptual data and school-level variables such as student truancy, suspensions, students with individual behaviour plans and community socio-economic status. In addition, consideration is given to identifying evidence for the validity of the instrument development process throughout the study phases.

I wish to invite your school to take part in Phase Two of the project. This is because teachers' perceptions of school need for psychological services are necessary for the research. Your school is one of 15 to 20 randomly selected schools in metropolitan Perth approached for their participation.

What does participation in the research project involve?
I seek access to 20 teachers in your school for Phase Two of the project. They will be invited to complete a 60-item Likert-type scale. This will take about twenty to thirty minutes at most but in all likelihood much less. I will keep the school's involvement in the administration of the research procedures to a minimum. However it will be necessary to distribute the research scale and consent forms to teachers after I outline the project and deliver these to the school. When completed I will return to the school for collection.

Do I have to take part?
No. Participation in this research project is entirely voluntary. If you do not wish to take part in the project then simply do not complete the consent form. This decision should always be made completely freely, and any and all decisions are respected by members of the research team without question.

What if I wanted to change my initial decision?
If you wish to participate, the decision will need be made within the next week for you to be included in the project.
Once a decision is made to participate, you can change your mind at any time within the minimum 5-year storage period of the research data (see below). All

contributions made to the project will be destroyed unless explicitly agreed to by you.

If the project has already been published at the time a participant decides to withdraw, their contribution that was used in reporting the project cannot be removed from the publication.
There will be no consequences relating to a decision by an individual or the school to participate or not, or to participate and then withdraw, other than those already described in this letter. These decisions will not affect your relationship with the researcher or Curtin University of Technology.

What will happen to the information I give, and is privacy and confidentiality ensured?
Information that identifies anyone will be removed from the data collected. The data is then stored securely in a locked cabinet at Curtin University and can only be accessed by myself and A/Professor R F Cavanagh. This data will be stored for a minimum period of 5 years, after which it will be destroyed by shredding.
The data will be maintained in a way that enables us to re-identify an individual's data and destroy it if participation is withdrawn. This is done by a system of individual codes known only to the researcher and his supervisor, which is used to link each individual's consent form to all their data.

The identity of you or your school will not be disclosed at any time except in circumstances where the researcher is legally required to disclose that information. Participation privacy, and the confidentiality of information disclosed by participants, is assured at all other times.

It is intended that the findings of this study will be written up in a Doctoral dissertation submitted to Curtin University of Technology. A summary of the research findings will be made available upon completion of the project. You can expect this to be available after December 2009.

What are the educational benefits of this research for my role?
There are indirect benefits for principals as psychological services will be allocated to individual schools commensurate with the psychological needs of students. The research will provide an evidence-based method of deployment of school psychologists to schools. The research is also significant at a number of Department managerial levels and for school psychology staff. Central administrators will have objective data about school needs across the system; District Directors and Managers of School Psychologists will be able to allocate psychological resources across districts and school Psychologists will be able to establish service priority among their designated schools.

Are there any risks associated with participation?
No. The only risks have to do with breaches of confidentiality and/or privacy already discussed above.

Is this research approved?
The research has been approved by the Human Research Ethics Committee of Curtin University under Protocol Approval FELSSW-150-08 dated 30 April 2008. The

research has met the policy requirements of the Department of Education and Training.

Who do I contact if I wish to discuss the project further?
If you would like to discuss any aspect of this study please contact me on the number provided below. If you wish to speak with an independent person about the conduct of the project, please contact Ms Samantha Hornby, Coordinator for Human Research Ethics on 9266 2158.

How do I become involved?
If you had all questions about the project answered to your satisfaction, and are willing to become involved, please complete the **Consent Form** on the next page. This information letter is for you to keep.

Adrian Young
Doctoral student 12731842
Curtin University of Technology
9448 4451 (h)
0437 561 243 (m)

Letter to Teachers #1

Dear

A Rasch Modelling Approach to Measuring School Need for Psychological Services

My name is Adrian Young and I am writing to you on behalf of Curtin University of Technology. I am conducting a research project that aims to develop a calibrated instrument by which school psychologists can be deployed to schools. The project is to fulfil the requirements of the Doctor of Philosophy degree of Curtin University of Technology.

The project will proceed through three empirical phases. Phase One will refine the hypothesised theoretical model by seeking feedback about a proposed questionnaire from a small sample of principals (3), teachers (6) and school psychologists (4). Phase Two involves the construction, piloting and trialling of a rating scale instrument to elicit school personnel perceptions of need for psychological services. Phase Three administers the final parsimonious linear scale and examines associations between school staff perceptual data and school-level variables such as student truancy, suspensions, students with individual behaviour plans and community socio-economic status. In addition, consideration is given to identifying evidence for the validity of the instrument development process throughout the study phases.

I wish to invite you to take part in Phase Two of the project. This is because principals' and teachers' perceptions of school need for psychological services are necessary for the research. Your school is one of 15 to 20 randomly selected schools in metropolitan Perth approached for their participation.

What does participation in the research project involve?
You are invited to complete a 60-item Likert-type scale. This will take about twenty five minutes at most but in all likelihood much less.

Do I have to take part?
No. Participation in this research project is entirely voluntary. If you do not wish to take part in the project then simply do not complete the consent form. This decision should always be made completely freely, and any and all decisions are respected by members of the research team without question.

What if I wanted to change my initial decision?
If you wish to participate, the decision will need to be made within the next week for you to be included in the project.
Once a decision is made to participate, you can change your mind at any time within the minimum 5-year storage period of the research data (see below). All contributions made to the project will be destroyed unless explicitly agreed to by you.

If the project has already been published at the time a participant decides to withdraw, their contribution that was used in reporting the project cannot be removed from the publication.

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What will happen to the information I give, and is privacy and confidentiality ensured?
Information that identifies anyone will be removed from the data collected. The data is then stored securely in a locked cabinet at Curtin University and can only be accessed by myself and A/Professor R F Cavanagh. This data will be stored for a minimum period of 5 years, after which it will be destroyed by shredding.
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It is intended that the findings of this study will be written up in a Doctoral dissertation submitted to Curtin University of Technology. A summary of the research findings will be made available upon completion of the project. You can expect this to be available after December 2009.

What are the educational benefits of this research for my role?
There are indirect benefits for principals and teachers as psychological services will be allocated to individual schools commensurate with the psychological needs of students. The research will provide an evidence-based method of deployment of school psychologists to schools. The research is also significant at a number of Department managerial levels and for school psychology staff. Central administrators will have objective data about school needs across the system; District Directors and Managers of School Psychologists will be able to allocate psychological resources across districts and school Psychologists will be able to establish service priority among their designated schools.

Are there any risks associated with participation?
No. The only risks have to do with breaches of confidentiality and/or privacy already discussed above.

Is this research approved?
The research has been approved by the Human Research Ethics Committee of Curtin University under Protocol Approval FELSSW-150-08 dated 30 April 2008. The research has met the policy requirements of the Department of Education and Training.

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How do I become involved?
If you had all questions about the project answered to your satisfaction, and are willing to become involved, please complete the **Consent Form** on the next page. This information letter is for you to keep.

Adrian Young
Doctoral student 12731842
Curtin University of Technology
9448 4451 (h)
0437 561 243 (m)

Letter to Principals and Teachers #2

Dear

A Rasch Modelling Approach to Measuring School Need for Psychological Services

My name is Adrian Young and I am writing to you on behalf of Curtin University of Technology. I am conducting a research project that aims to develop a calibrated instrument by which school psychologists can be deployed to schools. The project is to fulfil the requirements of the Doctor of Philosophy degree of Curtin University of Technology.

The project will proceed through three empirical phases. Phase One will refine the hypothesised theoretical model by seeking feedback about a proposed questionnaire from a small sample of principals (3), teachers (6) and school psychologists (4). Phase Two involves the construction, piloting and trialling of a rating scale instrument to elicit school personnel perceptions of need for psychological services. Phase Three administers the final parsimonious linear scale and examines associations between school staff perceptual data and school-level variables such as student truancy, suspensions, students with individual behaviour plans and community socio-economic status. In addition, consideration is given to identifying evidence for the validity of the instrument development process throughout the study phases.

I wish to invite you to take part in Phase Three of the project. This is because principals' and teachers' perceptions of school need for psychological services are necessary for the research. Your school is one of 15 to 20 randomly selected schools in metropolitan Perth approached for their participation.

What does participation in the research project involve?
You are invited to complete a 35-item Likert-type scale. This will take about twenty minutes at most but in all likelihood much less.

Do I have to take part?
No. Participation in this research project is entirely voluntary. If you do not wish to take part in the project then simply do not complete the consent form. This decision should always be made completely freely, and any and all decisions are respected by members of the research team without question.

What if I wanted to change my initial decision?
If you wish to participate, the decision will need to be made within the next week for you to be included in the project.

Once a decision is made to participate, you can change your mind at any time within the minimum 5-year storage period of the research data (see below). All contributions made to the project will be destroyed unless explicitly agreed to by you.

If the project has already been published at the time a participant decides to withdraw, their contribution that was used in reporting the project cannot be removed from the publication.

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What will happen to the information I give, and is privacy and confidentiality ensured?

Information that identifies anyone will be removed from the data collected. The data is then stored securely in a locked cabinet at Curtin University and can only be accessed by myself and A/Professor R F Cavanagh. This data will be stored for a minimum period of 5 years, after which it will be destroyed by shredding.

The data will be maintained in a way that enables us to re-identify an individual's data and destroy it if participation is withdrawn. This is done by a system of individual codes known only to the researcher and his supervisor, which is used to link each individual's consent form to all their data.

The identity of you or your school will not be disclosed at any time except in circumstances where the researcher is legally required to disclose that information. Participation privacy, and the confidentiality of information disclosed by participants, is assured at all other times.

It is intended that the findings of this study will be written up in a Doctoral dissertation submitted to Curtin University of Technology. A summary of the research findings will be made available upon completion of the project. You can expect this to be available after December 2009.

What are the educational benefits of this research for my role?

There are indirect benefits for principals and teachers as psychological services will be allocated to individual schools commensurate with the psychological needs of students. The research will provide an evidence-based method of deployment of school psychologists to schools. The research is also significant at a number of Department managerial levels and for school psychology staff. Central administrators will have objective data about school needs across the system; District Directors and Managers of School Psychologists will be able to allocate psychological resources across districts and school Psychologists will be able to establish service priority among their designated schools.

Are there any risks associated with participation?

No. The only risks have to do with breaches of confidentiality and/or privacy already discussed above.

Is this research approved?

The research has been approved by the Human Research Ethics Committee of Curtin University under Protocol Approval FELSSW-150-08 dated 30 April 2008. The research has met the policy requirements of the Department of Education and Training.

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If you had all questions about the project answered to your satisfaction, and are willing to become involved, please complete the **Consent Form** on the next page. This information letter is for you to keep.

Adrian Young
Doctoral student 12731842
Curtin University of Technology
9448 4451 (h)
0437 561 243 (m)

APPENDIX G

Informed Consent Form

- I have read this document, or have had this document explained to me in a language I understand, and I understand the aims, procedures, and risks of this project, as described within it.

- For any question I may have had, I have taken up the invitation to ask those questions, and I am satisfied with the answers I received.

- I understand that participation in the project is entirely voluntary.

- I am willing to become involved in the project as described.

- I understand I am free to withdraw that participation at any time within 5 years from project completion, without affecting my or the school's relationship with the researcher or Curtin University of Technology.

- I give my permission for the contribution I make to this research to be written up in a Doctoral dissertation or published in a journal provided that I or the school is not identified in any way.

- I understand that a summary of findings from the research will be made available to me upon its completion.

Name of Participant (printed):
Signature of Participant: Date: /   /

The 123-Item Draft Survey

Effective teaching

1. All students are catered for.

2. School reports show good student progress.

3. Test results are excellent.

4. The teaching and learning program ensures high achievement.

5. Staff are very committed to student learning.

6. Feedback about teaching is always good.

7. Students like what is taught.

8. Classes are attentive.

9. Student progress is checked regularly.

10. Students do not respond well.

11. Some students are not interested.

12. Teachers rely on psychological services for special needs students.

13. Teachers request psychological assessments for students who are struggling academically.

14. Teachers don't use the school psychologist's recommendations in planning.

Development of academic skills

15. Student learning is excellent.

16. My students are easy to teach.

17. Some of my students need extra help.

18. The school psychologist is busy with my students.

19. It's difficult to cater for individual students.

20. Our students work hard.

21. School psychologist help is needed with IEPs.

22. Many students find learning a slow process.

23. Some students struggle to learn.

24. Students want to learn.

25. Teachers know what each student needs.

26. Students are highly motivated to learn.

27. School psychologists frequently conduct student assessments for teachers.

28. Teachers need the student information provided by school psychologists.

29. Teachers need school psychologists to work with individual students.

30. Failing students are referred to the school psychologist.

31. The school psychologist runs great study skills training for students.

Development of socialisation and life skills

32. Students respect staff.

33. Students get on well together.

34. The BMIS policy works well.

35. Teachers are good at behaviour management.

36. Students value their education.

37. Student independence is encouraged.

38. We don't have bullies.

39. Bullying is dealt with quickly by teachers.

40. We have few discipline problems.

41. School attendance is excellent.

42. Truanting is not a big issue.

43. Students are well mannered.

44. Students are keen to do the right thing.

45. Behavioural problems are dealt with by the school psychologist.

46. We canvas student attitudes and views.

47. Students are considerate of others.

48. Students are very co-operative.

49. The school psychologist designs direct student interventions on request.

50. Complex cases need school psychologist advice.

51. The school psychologist designs all the behavioural interventions.

52. The school refers a lot of students to the school psychologist.

53. We rarely have to suspend students.

54. Student exclusion is unknown here.

Student diversity in learning and development

55. The ethnic mix in school causes real problems.

56. Teachers just can't manage without school psychologist input.

57. We have more difficult students than other schools.

58. All students are important here.

59. We rely on the school psychologist's ideas for planning student programs.

60. The recent arrival of refugee students has made more work for the school psychologist.

61. School psychologist advice is vital before an IEP is developed.

62. All difficult cases are referred to the school psychologist.

63. The school psychologist provides social skills training for individual students.

64. Individual student counselling is a big part of our school psychologist's role.

65. The school psychologist does a lot of assessments for education support.

66. ADHD appears on the increase in the school.

67. More and more students are being diagnosed with Autism Spectrum Disorder.

68. There are increasing numbers of students supported by Schools Plus funding in our classes.

69. Student in conflict with teachers is a problem now.

70. Some students who have been diagnosed with Conduct Disorder need more resources.

71. The school psychologist counsels victims of bullying.

72. The school has a lot of students with disabilities.

Prevention services and wellness promotion

73. There is a good mental health and well-being program here.

74. Our prevention procedures are proactive and effective.

75. We need to develop good preventive programs.

76. Teachers should have a whole school preventive focus.

77. We need the school psychologist to help good mental health programs.

78. Our school bullying strategy works well.

79. Teachers need a lot of school psychology help.

80. School psychologists co-ordinate mental services with other agencies.

81. The whole-school social skills program is a big success.

82. The school psychologist provides drug abuse prevention training for all students.

83. We have programs to reduce student depression.

84. Recently there have been a number of suicides in the area involving young people.

85. Our family support programs help to reduce student abuse.

86. There is a need for domestic violence awareness and training.

87. The conflict resolution programs are reducing student violence.

Home/school/community collaboration

88. Parents are active partners.

89. Parents are keen to support us to help their kids.

90. The school council works really well.

91. The school community is kept fully informed.

92. Teachers find parents easy to engage.

93. Difficult parents are an ongoing problem.

94. The P&C is well attended.

95. Teachers appreciate all the parent and community volunteers who help in class.

96. Community support maintains a happy school ethos.

97. School psychologists consult other agencies in assisting students.

98. We need the expertise of school psychologists in getting help and resources for students.

99. School psychologists are necessary to organise and chair case conferences.

100. School psychologists are best placed to link school with parents and the community.

101. The school psychologist delivers great parent skills training.

School structure, organisation and climate

102. We provide a positive supportive environment for students and staff.

103. Teachers and admin. solve problems as they arise.

104. School policies support teachers to promote high student achievement.

105. Staff here are not collaborative.

106. It would be good for teachers to share ideas and resources.

107. School psychologists are involved in team building.

108. The school psychologist attends staff meetings.

109. The school psychologist is involved in student data analysis.

110. The school psychologist is a key figure in school improvement planning.

111. We rely on the school psychologist for liaising with the community.

112. The school psychologist provides good interagency links for us.

113. We don't need help with student learning issues.

114. Programs run by the school psychologist maintain our school climate.

115. The school psychologist is on school committees planning educational programs.

116. The school psychologist is on the BMIS committee.

117. The school psychologist evaluates programs to help with school planning.

118. Critical incidents are always managed by the school psychologist.

119. The school has frequent crises involving students.

120. The school attempts to resolve issues prior to school psychologist involvement.

121. Teacher-school psychologist consultation is a major feature of this school.

122. The principal and a nominated teacher brief the school psychologist on impending issues.

123. Some teachers don't make use of psychological services.

The 120-Item Draft Survey

Teaching

1. Teachers identify student needs.

2. School psychologist help is needed.

3. Teachers use psychological services.

4. Teachers request assessments for students.

5. Teachers work with the psychologist to plan IEPs.

6. Teachers are committed to student learning.

7. Teachers cater for individual differences.

8. Student progress is documented regularly.

9. Feedback about teaching is good.

10. Students are well catered for.

11. Teachers use psychologist's recommendations.

12. Teachers know what each student needs.

13. Students are easy to teach.

14. School reports reflect well on students.

15. Teachers ensure all students succeed.

16. Test results are excellent.

17. Teaching and learning produce high achievement.

Development of academic skills

18. Students need extra help.

19. Students struggle to learn.

20. Students find learning difficult.

21. Students can be seen by the psychologist.

22. The psychologist is busy with students.

23. Psychologists assist learning.

24. Teachers and psychologists work with students.

25. Students respond well.

26. Students are attentive.

27. Students like to learn.

28. Students access study-skills training.

29. Students work hard.

30. Students want to learn.

31. Students are highly motivated to learn.

32. Student achievement is excellent.

School development of socialisation and life skills

33. The school refers students to the psychologist.

34. Student attitudes are important.

35. Students get on well together.

36. The school rewards appropriate behaviour.

37. Students get psychological advice.

38. The school encourages student independence.

39. Bullying is quickly dealt with.

40. The school implements student interventions.

41. The psychologist provides social skills training.

42. The BMIS policy works.

43. Students are considerate of others.

44. Students are keen to do the right thing.

45. Students are co-operative.

46. Students respect staff.

47. There are few discipline problems.

48. Behavioural issues are well managed.

49. Students are safe at school.

50. The school has a low incidence of bullying.

51. Students quickly resolve conflict.

52. Student attendance is excellent.

53. Student suspension rates are low.

54. Exclusion is rare.

55. Staff/student conflict is unheard of.

Inclusion in learning and development

56. We have difficult students.

57. New students can be seen by the psychologist.

58. Students have individual counselling.

59. We use the psychologist's ideas for our programs.

60. The school has a diverse student population.

61. We welcome students from diverse backgrounds.

62. Teaching students with special needs is satisfying.

63. Teachers are skilled in meeting student needs.

64. Teachers consult widely before an IEP is written.

65. All classes have students with learning difficulties.

66. All ability levels are provided for.

67. Students with disabilities achieve excellent results.

68. Teachers need minimal psychologist input.

69. We practice inclusive schooling.

70. Teachers celebrate the school's diversity.

71. Our school is totally inclusive.

Prevention services and wellness promotion

72. Prevention programs are needed.

73. There is a need for child protection training.

74. Psychologists help develop mental health programs.

75. Teachers support one another.

76. The school coordinates mental health services.

77. Students access social skills programs.

78. The school provides drug abuse education.

79. The school has suicide prevention strategies.

80. Mental health and well-being is a priority.

81. School has a range of prevention measures.

82. Students adopt bullying prevention strategies.

83. Students use conflict resolution strategies.

84. Programs have improved student well-being.

85. Parents utilise healthy eating programs.

86. Teachers update prevention and wellness plans.

Home/school/community collaboration

87. The P&C needs more parents.

88. The school has a psychologist.

89. The psychologist consults agencies about students.

90. We use the expertise of psychologists.

91. Parents are welcomed into the school.

92. Teachers welcome community volunteers.

93. The school keeps the community informed.

94. Teachers encourage parental participation.

95. Parents serve on school committees.

96. Teachers find parents easy to engage.

97. Parents access school programs.

98. The community helped develop the school ethos.

99. Parents are active in the School Council.

100. Parents contribute to school policy development.

101. Parents participate in school development planning.

102. Teachers provide agenda items for staff meetings.

103. Teacher-psychologist consultation is in place.

104. The school psychologist provides team building.

105. Teachers enjoy working here.

106. I like the school atmosphere.

107. Teachers are student centred.

108. Teachers share ideas and resources.

109. Teachers take responsibility.

110. School policies facilitate achievement.

111. Teachers resolve urgent classroom issues.

112. The school environment is supportive and safe.

113. Critical incidents are managed effectively.

114. Teachers analyse student performance data.

115. Performance management is positive.

116. Psychological services improve school climate.

117. School programs sustain the positive school climate.

118. Leadership is shared among teachers.

119. Teachers participate in decision-making.

120. Teachers strive for school improvement.

APPENDIX J

The 120-Item Survey Parallel Forms

FORM ONE

Please do not write your name on this form. Just make a note of the number in the top right hand corner.

INSTRUCTIONS

If you **strongly agree** with a statement, circle the **4**
If you **agree** with a statement, circle the **3**
If you **disagree** with a statement, circle the **2**
If you **cannot judge**, circle the **1**

	Teaching	**Strongly Agree**	**Agree**	**Disagree**	**Cannot Judge**
1	Teachers identify student needs.	4	3	2	1
2	Teachers use psychological services.	4	3	2	1
3	Teachers work with the psychologist to plan IEPs.	4	3	2	1
4	Teachers cater for individual differences.	4	3	2	1
5	Feedback about teaching is good.	4	3	2	1
6	Teachers use psychologist's recommendations.	4	3	2	1
7	Teachers know what each student needs.	4	3	2	1
8	Students are easy to teach.	4	3	2	1
9	Teachers ensure all students succeed.	4	3	2	1

	Development of academic skills	**Strongly Agree**	**Agree**	**Disagree**	**Cannot Judge**
10	Students need extra help.	4	3	2	1
11	Students struggle to learn.	4	3	2	1
12	Students can be seen by the psychologist.	4	3	2	1
13	Teachers and psychologists work with students.	4	3	2	1
14	Students are attentive.	4	3	2	1
15	Students like to learn.	4	3	2	1
16	Students want to learn.	4	3	2	1
17	Student achievement is excellent.	4	3	2	1

	School development of socialisation and life skills	**Strongly Agree**	**Agree**	**Disagree**	**Cannot Judge**
18	The school refers students to the psychologist.	4	3	2	1
19	Students get psychological advice.	4	3	2	1
20	The school encourages student independence.	4	3	2	1
21	The school implements student interventions.	4	3	2	1
22	Students are keen to do the right thing.	4	3	2	1
23	There are few discipline problems.	4	3	2	1
24	Behavioural issues are well managed.	4	3	2	1
25	The school has a low incidence of bullying.	4	3	2	1
26	Student attendance is excellent.	4	3	2	1
27	Exclusion is rare.	4	3	2	1
28	Staff/student conflict is unheard of.	4	3	2	1

	Inclusion in learning and development	**Strongly Agree**	**Agree**	**Disagree**	**Cannot Judge**
29	New students can be seen by the psychologist.	4	3	2	1
30	The school has a diverse student population.	4	3	2	1
31	We welcome students from diverse backgrounds.	4	3	2	1
32	Teachers are skilled in meeting student needs.	4	3	2	1
33	All ability levels are provided for.	4	3	2	1
34	Teachers need minimal psychologist input.	4	3	2	1
35	We practice inclusive schooling.	4	3	2	1

	Prevention services and wellness promotion	**Strongly Agree**	**Agree**	**Disagree**	**Cannot Judge**
36	Prevention programs are needed.	4	3	2	1
37	Psychologists help develop mental health programs.	4	3	2	1
38	The school coordinates mental health services.	4	3	2	1
39	The school has suicide prevention strategies.	4	3	2	1
40	Mental health and well-being is a priority.	4	3	2	1
41	Students adopt bullying prevention strategies.	4	3	2	1
42	Programs have improved student well-being.	4	3	2	1
43	Parents adopt healthy eating programs.	4	3	2	1

	Home/ school/community collaboration	**Strongly Agree**	**Agree**	**Disagree**	**Cannot Judge**
44	The P&C needs more parents.	4	3	2	1
45	The psychologist consults agencies about students.	4	3	2	1
46	Teachers welcome community volunteers.	4	3	2	1
47	Parents serve on school committees.	4	3	2	1
48	Parents access school programs.	4	3	2	1
49	The community helped develop the school ethos	4	3	2	1
50	Parents are active in the School Council.	4	3	2	1
51	Parents participate in school improvement planning.	4	3	2	1

	School climate	**Strongly Agree**	**Agree**	**Disagree**	**Cannot Judge**
52	Teacher-psychologist consultation is in place.	4	3	2	1
53	I like the school atmosphere.	4	3	2	1
54	Teachers take responsibility.	4	3	2	1
55	The school environment is supportive and safe.	4	3	2	1
56	Critical incidents are managed effectively.	4	3	2	1
57	Performance management is positive.	4	3	2	1
58	School programs sustain the positive school climate.	4	3	2	1
59	Leadership is shared among teachers.	4	3	2	1
60	Teachers strive for school improvement.	4	3	2	1

THANK YOU VERY MUCH FOR TAKING THE TIME
TO COMPLETE THIS SURVEY

APPPENDIX J (continued)

<u>The 120-Item Survey Parallel Forms</u>

FORM TWO

Please do NOT write your name on this form. Just make a note of the number in the top right hand corner.

INSTRUCTIONS

If you **strongly agree** with a statement, circle the **4**
If you **agree** with a statement, circle the **3**
If you **disagree** with a statement, circle the **2**
If you **cannot judge**, circle the **1**

	Teaching	Strongly Agree	Agree	Disagree	Cannot Judge
1	Teachers identify student needs.	4	3	2	1
2	Teachers use psychological services.	4	3	2	1
3	Teachers request assessments for students.	4	3	2	1
4	Teachers work with the psychologist to plan IEPs.	4	3	2	1
5	Student progress is documented regularly.	4	3	2	1
6	Feedback about teaching is good.	4	3	2	1
7	Teachers use psychologist's recommendations.	4	3	2	1
8	Students are easy to teach.	4	3	2	1
9	Teachers ensure all students succeed.	4	3	2	1

	Development of academic skills	Strongly Agree	Agree	Disagree	Cannot Judge
10	Students struggle to learn.	4	3	2	1
11	Students can be seen by the psychologist.	4	3	2	1
12	The psychologist is busy with students.	4	3	2	1
13	Teachers and psychologists work with students.	4	3	2	1
14	Students like to learn.	4	3	2	1
15	Students access study-skills training.	4	3	2	1
16	Students want to learn.	4	3	2	1
17	Students are highly motivated to learn.	4	3	2	1
18	Student achievement is excellent.	4	3	2	1

	School development of socialisation and life skills	Strongly Agree	Agree	Disagree	Cannot Judge
19	Student attitudes are important.	4	3	2	1
20	Students get psychological advice.	4	3	2	1
21	Bullying is quickly dealt with.	4	3	2	1
22	The school implements student interventions.	4	3	2	1
23	Students are considerate of others.	4	3	2	1
24	Students are keen to do the right thing.	4	3	2	1
25	Behavioural issues are well managed.	4	3	2	1
26	Students and staff are safe at school.	4	3	2	1
27	Student attendance is excellent.	4	3	2	1
28	Staff/student conflict is unheard of.	4	3	2	1

	Inclusion in learning and development	Strongly Agree	Agree	Disagree	Cannot Judge
29	We have difficult students like other schools.	4	3	2	1
30	New students can be seen by the psychologist.	4	3	2	1
31	The school has a diverse student population.	4	3	2	1
32	Teaching students with special needs is satisfying.	4	3	2	1
33	Teachers are skilled in meeting student needs.	4	3	2	1
34	Teachers consult widely before an IEP is written.	4	3	2	1
35	All ability levels are provided for.	4	3	2	1

36	We practice inclusive schooling.	4	3	2	1

Prevention services and wellness promotion	**Strongly Agree**	**Agree**	**Disagree**	**Cannot Judge**
37 Prevention programs are needed.	4	3	2	1
38 Psychologists help develop mental health programs.	4	3	2	1
39 The school coordinates mental health services.	4	3	2	1
40 Students access social skills programs.	4	3	2	1
41 School has a range of prevention measures.	4	3	2	1
42 Students adopt bullying prevention strategies.	4	3	2	1
43 Programs have improved student well-being.	4	3	2	1

Home/school/community collaboration	**Strongly Agree**	**Agree**	**Disagree**	**Cannot Judge**
44 The school has a psychologist.	4	3	2	1
45 The psychologist consults agencies about students.	4	3	2	1
46 Teachers welcome community volunteers.	4	3	2	1
47 The school keeps the community informed.	4	3	2	1
48 Parents serve on school committees.	4	3	2	1
49 The community helped develop the school ethos.	4	3	2	1
50 Parents participate in school improvement planning.	4	3	2	1

School climate	**Strongly Agree**	**Agree**	**Disagree**	**Cannot Judge**
51 Teachers provide agenda items for staff meetings.	4	3	2	1
52 Teacher-psychologist consultation is in place.	4	3	2	1
53 I like the school atmosphere.	4	3	2	1
54 Teachers are student centred.	4	3	2	1
55 Teachers take responsibility.	4	3	2	1
56 Teachers resolve urgent classroom issues.	4	3	2	1
57 The school environment is supportive and safe.	4	3	2	1
58 Performance management is positive.	4	3	2	1
59 Leadership is shared among teachers.	4	3	2	1
60 Teachers participate in decision-making.	4	3	2	1

THANK YOU VERY MUCH FOR TAKING THE TIME
TO COMPLETE THIS SURVEY

The 120-Item Survey Parallel Forms

FORM THREE

Please do NOT write your name on this form. Just make a note of the number in the top right hand corner.
INSTRUCTIONS
If you **strongly agree** with a statement, circle the **4**
If you **agree** with a statement, circle the **3**
If you **disagree** with a statement, circle the **2**
If you **cannot judge**, circle the **1**

	Teaching	**Strongly Agree**	**Agree**	**Disagree**	**Cannot Judge**
1	Teachers identify student needs.	4	3	2	1
2	Teachers use psychological services.	4	3	2	1
3	Teachers work with the psychologist to plan IEPs.	4	3	2	1
4	Teachers are committed to student learning.	4	3	2	1
5	Feedback about teaching is good.	4	3	2	1
6	Students are well catered for.	4	3	2	1
7	Teachers use psychologist's recommendations.	4	3	2	1
8	Students are easy to teach.	4	3	2	1
9	Teachers ensure all students succeed.	4	3	2	1
10	Teaching and learning produces high achievement.	4	3	2	1

	Development of academic skills	**Strongly Agree**	**Agree**	**Disagree**	**Cannot Judge**
11	Students struggle to learn.	4	3	2	1
12	Students can be seen by the psychologist.	4	3	2	1
13	Psychologists assist learning.	4	3	2	1
14	Teachers and psychologists work with students.	4	3	2	1
15	Students like to learn.	4	3	2	1
16	Students work hard.	4	3	2	1
17	Students want to learn.	4	3	2	1
18	Student achievement is excellent.	4	3	2	1

	School development of socialisation and life skills	**Strongly Agree**	**Agree**	**Disagree**	**Cannot Judge**
19	Students get on well together.	4	3	2	1
20	Students get psychological advice.	4	3	2	1
21	The school implements student interventions.	4	3	2	1
22	The BMIS policy works.	4	3	2	1
23	Students are keen to do the right thing.	4	3	2	1
24	Students respect staff.	4	3	2	1
25	Behavioural issues are well managed.	4	3	2	1
26	Student attendance is excellent.	4	3	2	1
27	Student suspension rates are low.	4	3	2	1
28	Staff/student conflict is unheard of.	4	3	2	1

	Inclusion in learning and development	**Strongly Agree**	**Agree**	**Disagree**	**Cannot Judge**
29	New students can be seen by the psychologist.	4	3	2	1
30	Students have individual counselling.	4	3	2	1
31	The school has a diverse student population.	4	3	2	1
32	Teachers are skilled in meeting student needs.	4	3	2	1
33	All classes have students with learning difficulties.	4	3	2	1
34	All ability levels are provided for.	4	3	2	1

| 35 | We practice inclusive schooling. | 4 | 3 | 2 | 1 |
| 36 | Our school is totally inclusive. | 4 | 3 | 2 | 1 |

	Prevention services and wellness promotion	**Strongly Agree**	**Agree**	**Disagree**	**Cannot Judge**
37	Prevention programs are needed.	4	3	2	1
38	Psychologists help develop mental health programs.	4	3	2	1
39	Teachers support one another.	4	3	2	1
40	The school coordinates mental health services.	4	3	2	1
41	Students adopt bullying prevention strategies.	4	3	2	1
42	Programs have improved student well-being.	4	3	2	1
43	Teachers update prevention and wellness plans.	4	3	2	1

	Home/school/community collaboration	**Strongly Agree**	**Agree**	**Disagree**	**Cannot Judge**
44	The psychologist consults agencies about students.	4	3	2	1
45	We use the expertise of psychologists.	4	3	2	1
46	Teachers welcome community volunteers.	4	3	2	1
47	Teachers encourage parental participation.	4	3	2	1
48	Parents serve on school committees.	4	3	2	1
49	The community helped develop the school ethos.	4	3	2	1
50	Parents contribute to school policy development.	4	3	2	1
51	Parents participate in school improvement planning.	4	3	2	1

	School climate	**Strongly Agree**	**Agree**	**Disagree**	**Cannot Judge**
52	Teacher-psychologist consultation is in place.	4	3	2	1
53	The school psychologist provides team building.	4	3	2	1
54	I like the school atmosphere.	4	3	2	1
55	Teachers share ideas and resources.	4	3	2	1
56	Teachers take responsibility.	4	3	2	1
57	The school environment is supportive and safe.	4	3	2	1
58	Teachers analyse student performance data.	4	3	2	1
59	Performance management is positive.	4	3	2	1
60	Leadership is shared among teachers.	4	3	2	1

THANK YOU VERY MUCH FOR TAKING THE TIME
TO COMPLETE THIS SURVEY

<u>The 120-Item Survey Parallel Forms</u>

FORM FOUR

Please do NOT write your name on this form. Just make a note of the number in the top right hand corner.
INSTRUCTIONS
If you **strongly agree** with a statement, circle the **4**
If you **agree** with a statement, circle the **3**
If you **disagree** with a statement, circle the **2**
If you **cannot judge**, circle the **1**

	Teaching	Strongly Agree	Agree	Disagree	Cannot Judge
1	Teachers identify student needs.	4	3	2	1
2	School psychologist help is needed.	4	3	2	1
3	Teachers use psychological services.	4	3	2	1
4	Teachers work with the psychologist to plan IEPs.	4	3	2	1
5	Feedback about teaching is good.	4	3	2	1
6	Teachers use psychologist's recommendations.	4	3	2	1
7	Students are easy to teach.	4	3	2	1
8	School reports reflect well on students.	4	3	2	1
9	Teachers ensure all students succeed.	4	3	2	1
10	Test results are excellent.	4	3	2	1

	Development of academic skills	Strongly Agree	Agree	Disagree	Cannot Judge
11	Students struggle to learn.	4	3	2	1
12	Students find learning difficult.	4	3	2	1
13	Students can be seen by the psychologist.	4	3	2	1
14	Teachers and psychologists work with students.	4	3	2	1
15	Students respond well.	4	3	2	1
16	Students like to learn.	4	3	2	1
17	Students want to learn.	4	3	2	1
18	Student achievement is excellent.	4	3	2	1

	School development of socialisation and life skills	Strongly Agree	Agree	Disagree	Cannot Judge
19	The school rewards appropriate behaviour.	4	3	2	1
20	Students get psychological advice.	4	3	2	1
21	The school implements student interventions.	4	3	2	1
22	The psychologist provides social skills training.	4	3	2	1
23	Students are keen to do the right thing.	4	3	2	1
24	Students are co-operative.	4	3	2	1
25	Behavioural issues are well managed.	4	3	2	1
26	Students quickly resolve conflict.	4	3	2	1
27	Student attendance is excellent.	4	3	2	1
28	Staff/student conflict is unheard of.	4	3	2	1

	Inclusion in learning and development	Strongly Agree	Agree	Disagree	Cannot Judge
29	New students can be seen by the psychologist.	4	3	2	1
30	We use the psychologist's ideas for our programs.	4	3	2	1
31	The school has a diverse student population.	4	3	2	1
32	Teachers are skilled in meeting student needs.	4	3	2	1
33	All ability levels are provided for.	4	3	2	1
34	Students with disabilities achieve excellent results.	4	3	2	1

| 35 | We practice inclusive schooling. | 4 | 3 | 2 | 1 |
| 36 | Teachers celebrate the school's diversity. | 4 | 3 | 2 | 1 |

	Prevention services and wellness promotion	**Strongly Agree**	**Agree**	**Disagree**	**Cannot Judge**
37	Prevention programs are needed.	4	3	2	1
38	There is a need for child protection training.	4	3	2	1
39	Psychologists help develop mental health programs.	4	3	2	1
40	The school coordinates mental health services.	4	3	2	1
41	The school provides drug abuse education.	4	3	2	1
42	Students adopt bullying prevention strategies.	4	3	2	1
43	Students use conflict resolution strategies.	4	3	2	1
44	Programs have improved student well-being.	4	3	2	1

	Home/school/community collaboration	**Strongly Agree**	**Agree**	**Disagree**	**Cannot Judge**
45	The psychologist consults agencies about students.	4	3	2	1
46	Parents are welcomed into the school.	4	3	2	1
47	Teachers welcome community volunteers.	4	3	2	1
48	Parents serve on school committees.	4	3	2	1
49	Teachers find parents easy to engage.	4	3	2	1
50	The community helped develop the school ethos.	4	3	2	1
51	Parents participate in school improvement planning.	4	3	2	1

	School climate	**Strongly Agree**	**Agree**	**Disagree**	**Cannot Judge**
52	Teacher-psychologist consultation is in place.	4	3	2	1
53	Teachers enjoy working here.	4	3	2	1
54	I like the school atmosphere.	4	3	2	1
55	Teachers take responsibility.	4	3	2	1
56	School policies facilitate achievement.	4	3	2	1
57	The school environment is supportive and safe.	4	3	2	1
58	Performance management is positive.	4	3	2	1
59	Psychological services improve school climate.	4	3	2	1
60	Leadership is shared among teachers.	4	3	2	1

THANK YOU VERY MUCH FOR TAKING THE TIME
TO COMPLETE THIS SURVEY

The 109-Item Scale, where * indicates the eleven deleted items

Teaching

1. Teachers identify student needs.

2. School psychologist help is needed.

3. Teachers use psychological services.

4. Teachers request assessments for students.

5. Teachers work with the psychologist to plan IEPs.

6. Teachers are committed to student learning. *

7. Teachers cater for individual differences.

8. Student progress is documented regularly.

9. Feedback about teaching is good.

10. Students are well catered for.

11. Teachers use psychologist's recommendations.

12. Teachers know what each student needs.

13. Students are easy to teach.

14. School reports reflect well on students.

15. Teachers ensure all students succeed.

16. Test results are excellent.

17. Teaching and learning produce high achievement.

Development of academic skills

18. Students need extra help.

19. Students struggle to learn. *

20. Students find learning difficult. *

21. Students can be seen by the psychologist.

22. The psychologist is busy with students.

23. Psychologists assist learning.

24. Teachers and psychologists work with students.

25. Students respond well.

26. Students are attentive.

27. Students like to learn.

28. Students access study-skills training.

29. Students work hard.

30. Students want to learn.

31. Students are highly motivated to learn.

32. Student achievement is excellent.

School development of socialisation and life skills

33. The school refers students to the psychologist.

34. Student attitudes are important.

35. Students get on well together.

36. The school rewards appropriate behaviour.

37. Students get psychological advice.

38. The school encourages student independence.

39. Bullying is quickly dealt with.

40. The school implements student interventions.

41. The psychologist provides social skills training.

42. The BMIS policy works.

43. Students are considerate of others.

44. Students are keen to do the right thing.

45. Students are co-operative.

46. Students respect staff.

47. There are few discipline problems.

48. Behavioural issues are well managed.

49. Students are safe at school.

50. The school has a low incidence of bullying.

51. Students quickly resolve conflict.

52. Student attendance is excellent. *

53. Student suspension rates are low.

54. Exclusion is rare.

55. Staff/student conflict is unheard of.

Inclusion in learning and development

56. We have difficult students.

57. New students can be seen by the psychologist.

58. Students have individual counselling.

59. We use the psychologist's ideas for our programs.

60. The school has a diverse student population. *

61. We welcome students from diverse backgrounds.

62. Teaching students with special needs is satisfying.

63. Teachers are skilled in meeting student needs.

64. Teachers consult widely before an IEP is written.

65. All classes have students with learning difficulties.

66. All ability levels are provided for.

67. Students with disabilities achieve excellent results.

68. Teachers need minimal psychologist input.

69. We practice inclusive schooling.

70. Teachers celebrate the school's diversity.

71. Our school is totally inclusive.

Prevention services and wellness promotion

72. Prevention programs are needed. *

73. There is a need for child protection training.

74. Psychologists help develop mental health programs.

75. Teachers support one another. *

76. The school coordinates mental health services.

77. Students access social skills programs.

78. The school provides drug abuse education.

79. The school has suicide prevention strategies.

80. Mental health and well-being is a priority.

81. School has a range of prevention measures.

82. Students adopt bullying prevention strategies.

83. Students use conflict resolution strategies.

84. Programs have improved student well-being.

85. Parents utilise healthy eating programs.

86. Teachers update prevention and wellness plans.

Home/school/community collaboration

87. The P&C needs more parents. *

88. The school has a psychologist.

89. The psychologist consults agencies about students.

90. We use the expertise of psychologists.

91. Parents are welcomed into the school.

92. Teachers welcome community volunteers.

93. The school keeps the community informed.

94. Teachers encourage parental participation.

95. Parents serve on school committees.

96. Teachers find parents easy to engage.

97. Parents access school programs.

98. The community helped develop the school ethos.

99. Parents are active in the School Council.

100. Parents contribute to school policy development.

101. Parents participate in school development planning.

102. Teachers provide agenda items for staff meetings.

103. Teacher-psychologist consultation is in place.

104. The school psychologist provides team building. *

105. Teachers enjoy working here. *

106. I like the school atmosphere.

107. Teachers are student centred.

108. Teachers share ideas and resources.

109. Teachers take responsibility.

110. School policies facilitate achievement.

111. Teachers resolve urgent classroom issues.

112. The school environment is supportive and safe.

113. Critical incidents are managed effectively.

114. Teachers analyse student performance data.

115. Performance management is positive.

116. Psychological services improve school climate.

117. School programs sustain the positive school climate. *

118. Leadership is shared among teachers.

119. Teachers participate in decision-making.

120. Teachers strive for school improvement.

The 35-Item Scale

INSTRUCTIONS:
Please do **NOT** write your name just remember the number in the top right corner.
If you **strongly agree** with the statement, please circle **4**
If you **agree** with the statement, circle **3**
If you **disagree** with the statement, circle **2**
If you **can't judge**, circle **1**

Teaching

	Strongly agree	Agree	Disagree	Can't Judge
1.Teachers cater for individual differences	4	3	2	1
2.Student progress is documented regularly	4	3	2	1
3.Teachers know what each student needs	4	3	2	1
4.Teaching and learning produces high achievement	4	3	2	1
5.Test results are excellent	4	3	2	1

Development of academic skills

	Strongly agree	Agree	Disagree	Can't Judge
6.Students need extra help	4	3	2	1
7.Students like to learn	4	3	2	1
8.Students respond well	4	3	2	1
9.Students are attentive	4	3	2	1
10.Students access study skills training	4	3	2	1

School development of socialisation and life skills

	Strongly agree	Agree	Disagree	Can't Judge
11.Student attitudes are important	4	3	2	1
12.The school awards appropriate behaviour	4	3	2	1
13.Behavioural issues are well managed	4	3	2	1
14.There are few discipline problems	4	3	2	1
15.Students quickly resolve conflict	4	3	2	1

Inclusion in learning and development

	Strongly agree	Agree	Disagree	Can't Judge
16.All classes have students with learning difficulties	4	3	2	1
17.We welcome students from diverse backgrounds	4	3	2	1
18.Teachers celebrate the school's diversity	4	3	2	1
19.New students can be seen by the psychologist	4	3	2	1
20.We use the psychologist's ideas for our programs	4	3	2	1

Prevention services and wellness promotion

	Strongly agree	Agree	Disagree	Can't Judge
21.There is a need for child protection training	4	3	2	1
22.Programs have improved student well-being	4	3	2	1
23.The school has suicide prevention strategies	4	3	2	1
24.Parents utilise healthy eating programs	4	3	2	1
25.The school coordinates mental health services	4	3	2	1

Home/school/community collaboration

	Strongly agree	Agree	Disagree	Can't Judge
26.Parents are welcomed into the school	4	3	2	1
27.The school keeps the community informed	4	3	2	1
28.The community helped develop the school ethos	4	3	2	1
29.Parents are active in the School Council	4	3	2	1
30.Teachers find parents easy to engage	4	3	2	1

School climate	Strongly agree	Agree	Disagree	Can't Judge
31. Teachers strive for school improvement	4	3	2	1
32. Teachers provide agenda items for staff meetings	4	3	2	1
33. Leadership is shared among teachers	4	3	2	1
34. Teacher/psychologist consultation is in place	4	3	2	1
35. Psychological services improve school climate	4	3	2	1

THANK YOU VERY MUCH FOR TAKING THE TIME TO COMPLETE THIS SURVEY

APPENDIX M

A Framework for School Psychology Practice in Western Australia

Adopted from Ysseldyke et al. (2006)