INVESTIGATING THE INITIAL PSYCHOMETRIC PROPERTIES OF BRUNEI DARUSSALAM'S TEACHER RATING SCALE FOR IDENTIFYING GIFTED STUDENTS

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By

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Abstract

Validity and reliability are psychometric elements indicating an instrument's effectiveness at being able to measure what it purports to measure and its stability across different settings and populations. Brunei Darussalam's Teacher Referral Form (TRF), an adapted checklist, was examined to determine whether the items reflect Brunei's definition of gifted and talented, if the hypothesized factor structure of the original checklist is empirically valid, whether the TRF exhibited sufficient internal consistency across its items, and if the pattern of factor convergence could explain the observed outcomes. An analysis of the TRF for its content-related validity, a factor analysis of teachers' ratings on students using the TRF, and an estimate of the TRF's reliability were used to answer those questions. The analyses indicated that the TRF and accompanying data did not provide evidence that the items in the checklist reflect Brunei's definition and the hypothesized factor structure was not verified by the existing data, suggesting that the TRF has weak psychometric properties.

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APPROVAL OF DISSERTATION

The dissertation, ("Investigating the Initial Psychometric properties of Brunei Darussalam's Teacher Rating Scale for Identifying Gifted Students"), has been approved by the graduate faculty of the Curry School of Education in partial fulfillment of the requirements for the degree of the Doctor of Philosophy.

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Chapter 1: Introduction

Human capital is considered an important asset in today's economy driven society in both developed and developing nations, and it "refers to the knowledge, information, ideas, skills, and health of an individual" (Becker, 2002). As a specialized branch in education, gifted education is believed to impact human capital through purposefully planned programs focused on developing talent (Becker, 2002; Clinkenbeard, 2007; Psacharopoulos & Patrinos, 2004). By developing talent and realizing potential through appropriately challenging educational programs, an individual can both enhance and acquire new skills, competencies, knowledge, and information, all of which contribute to the development of individual human capital. Through individuals, gifted education could have an impact on the national economic level.

Gifted education can also be considered in terms of its impact on the individual (Reis, 2008). Addressing the learning and development of the highly capable student is just as important as addressing the learning and development of any other student (Reis, 2008). Researchers (Moon, Callahan, Brighton, & Tomlinson, 2002) have shown that gifted students are often bored or unchallenged because their prior learning is repeated in current classroom lessons or because they learn at a more rapid pace and must wait while other students engage in activities which are not necessary for the learning of the gifted student at that time. As a result, gifted students are often unchallenged or not even learning during significant portions of a school day (Moon et al., 2002). When gifted

students are not challenged, they may underachieve, their potential may be unrealized, and they may drop out of school (Reis & McCoach, 2000). Conversely, when they are engaged in meaningful, challenging learning, they are generally more satisfied and more likely to stay in school (Renzulli & Park, 2002). If the curriculum and instruction of gifted students are adjusted to their level of achievement and aptitude, they are more likely to participate, to be engaged, to be challenged, and to be excited about school (Renzulli & Park, 2002). Tying the argument back to human potential, these students whose potential is nurtured in school are believed to have a greater chance of becoming major contributors to their society (Ministry of Education, 2012).

Countries around the world have increasingly embraced the development of gifted education programs in their education systems (Alamer, 2010; McCann, 2005; Moltzen, 2004; Ngara & Porath, 2007; Special Education Unit, 2007; Yassin, Ishak, Yunus, & Majid, 2012). In Australia, the gifted individual is referred to as the "nation's greatest resource" (McCann, 2005, p. 90). Gifted students in Russia are identified and their talents developed for the "society's common good" (Jeltova & Grigorenko 2005). Singapore initiated gifted education to catalyze and build the nation's economic growth (Lim, 2001). Even countries where gifted education was previously viewed as the mechanism to perpetuate elitism have embraced a renewed interest in the field (Persson, Joswig, & Balogh, 2000).

The Role of Gifted Education in Brunei

In Brunei Darussalam (hereafter referred to as Brunei), the context of this study, gifted education programs were introduced with the intention of developing human capital (Special Education Unit, 2007). In recent years, since the time Brunei became

independent (was no longer a British protectorate), the country has considered ways to increase human capital (Brunei Economic Development Board, 2008; Prime Minister's Office, 2008). Gifted education is relevant to Brunei's economic landscape because it has the promise of developing talent, which could aid the expansion of human capital and the diversification of the economy (Special Education Unit, 2009a). Brunei has an estimated population of 422,675 living on a landmass equivalent to the state of Delaware. Though Brunei is larger in size than Singapore (2,200 vs. 267 sq. miles), Singapore's population is ten times that of Brunei's. This means that compared to a country with a diverse economy and a dynamic industrial environment like Singapore, Brunei does not have similar human resources which could help explain why Brunei has limited human capital to stimulate diversification of its economy and sustain industrial activities.

Brunei's economy is heavily reliant on non-renewable natural resources (i.e., natural gas), with sporadic and minimal industrial activities, such as manufacturing, as its alternative revenue (Brunei Economic Development Board, 2008; Prime Minister's Office, 2008). This leaves Brunei highly vulnerable to global market changes. With limited human resources, an unpredictable global market for its natural assets, and a limited local industry, Brunei's government has emphasized the need to diversify the economy and increase its human capital (His Majesty The Sultan, 2015; Prime Minister's Office, 2008). Gifted education as the platform for nurturing human capital may be the key to facilitate the diversification of the economy (Clinkenbeard, 2007). Investments in human capital guarantees greater economic stability because human capital is not affected by global market changes and does not depreciate, making it an ideal sustainable investment (Becker, 2002; Clinkenbeard, 2007; Lazear, 2002).

Gifted education may address the issue of the small human capital pool by recognizing and nurturing talents in school age children in Brunei. Through gifted education, talents may be identified and developed towards making a contribution to Brunei's economic needs. Therefore, nurturing talents and identifying gifted students when they are still developing the necessary skills at school is a first step towards achieving the broader goal of increasing human capital.

The Identification Process

The identification process is an important first step in determining those students who would benefit from services provided through gifted education programs (McBee, 2006; McClain & Pfeiffer, 2012; Siegle & Powell, 2004). The identification process determines those students who will have exposure to opportunities to develop advanced skills and knowledge in an environment and at a pace that meets and challenges their intellectual and educational abilities. Without a valid and defensible identification process, it is possible that students who could benefit from the exposure, training, and nurturing offered in a gifted education program will not be recognized, and thus, may be denied the opportunity to maximize and to develop their talents. In addition, if the identification process is not valid and defensible it may also identify students for whom a gifted education program may be unsuitable. Thus, it is crucial that the identification process is able to identify those students for whom the program was designed (Callahan & Hertberg-Davis, 2013).

A defensible identification process is guided by the definition that describes the target gifted student population (Callahan & Hertberg-Davis, 2013). A definition reflecting the local educational values of a particular setting (Leung, 1981) should guide

decision makers in identifying the key attributes or characteristics of giftedness. These specifications then provide a roadmap for the selection of the most appropriate instruments for identifying gifted students in that setting. In Brunei, gifted and talented students are those "who by virtue of outstanding abilities are capable of exceptional performance in general or specific ability areas" (Special Education Unit, 2007, p. 14). More specifically, based on an interpretation of Brunei's education system and the broader aims of the curriculum, there is an emphasis on literacy, numeracy, and science (Ministry of Education, 2008).

Instruments used in the identification process. Many different types of instruments are used in the process of identifying gifted students. However, teacher-completed rating scales are among the instruments most commonly included in the collection of data to make decisions about who will be identified as gifted (McClain & Pfeiffer, 2012; Moon, 2013; National Association of Gifted Children, 2013). Teacher rating scales are assessment instruments "designed to obtain the perception or judgments of a subject's behavior in a standardized format" (Walrath, 2011). In educational settings, teachers often complete rating scales as a means of assessing the degree to which students demonstrate certain target behaviors or attributes for purposes of program evaluation, assessment of progress, or nomination for a program (Shapiro & Kratochwill, 2000).

Psychometric Properties

Psychometric properties of an instrument describe the instrument's utility. Validity of rating scales in gifted education for identifying students with potential can be defined as the extent to which the outcomes of the scales may be interpreted to provide information that is meaningful and useful towards the identification of the student and the

degree to which the items of the scale reflect the constructs of a particular chosen definition (Agresti & Finlay, 2009). Reliability of rating scales refers to the consistency of the outcomes from the scales regarding the relationship among items of similar factors and consistency of scores over several replications which vary in testing conditions and over time (Agresti & Finlay, 2009). An updated understanding of validity and reliability is described in the most recent edition of the Standards for Educational and Psychological Testing (henceforth the Standards) published jointly by the American Educational Research Association (AERA), American Psychological Association (APA), and National Council for Measurement in Education (NCME) (AERA, APA, & NCME, 2014). The Standards have adopted Messick's (1989, 1995) view that "validity becomes a unified concept and the unifying force is the meaningfulness or trustworthy interpretation of the test scores and their action implications, namely, construct validity" (Messick, 1995, p. 744). What was previously referred to separately as content, criterion-related, and construct validity are now referred to as construct validity.

Developers of existing teacher rating scales (e.g., Gifted Rating Scales, Pfeiffer & Jarosewich, 2003) have performed multiple investigations to determine evidence of validity and reliability as outlined in the Standards. Evidence of validity and reliability provide users of the teacher rating scale the confidence and assurance that the outcomes from the rating scale are trustworthy and meaningful. An instrument's trustworthiness reflects the extent to which evidence of the validity and reliability is able to convince users "that the findings of an inquiry are worth paying attention to, or worth taking account of" (Siegle, n.d.). Furthermore, this evidence also assures users that the scale measures what it purports to measure and that the items on the scale are consistent within

the specifications of the construct. Without evidence of validity and reliability, the trustworthiness and meaningfulness of the content, interpretations of scores, and consequences of decisions based on scores become questionable, inappropriate, irrelevant, and/or inconclusive (Messick, 1995). Therefore, it is imperative that the results of a teacher rating scale are investigated for evidence of validity and reliability, especially if the outcomes are used to grant or deny opportunities to students to participate in a gifted education program.

The accumulation of validity evidence in developing an instrument is an iterative and cumulative process (Furr, 2011). Ideally, instrument developers apply various methods to determine each of the six types of validity evidences for their instrument (Li et al., 2009; Renzulli, Siegle, Reis, Gavin, & Sytsma Reed, 2009; Rosado, 2008; Schönrock-Adema, Heijne-Penninga, Van Hell, & Cohen-Schotanus, 2009). For instance, when adding new content-related items to an existing behavior rating scale, Renzulli et al. (2009) consulted experts in the subject area to assess for evidence of content-related validity. The developers also assessed the instrument for evidence regarding its internal structure by conducting a confirmatory factor analysis to assess whether the new items fit well with the theory and the pre-existing structure of the theory behind the scale (Renzulli et al., 2009). However, in new instruments, such as the Asian Values Scales (Kim, Atkinson, & Yang, 1999), the developers subjected the scales to an exploratory factor analysis to investigate the latent variables in the scale. Similarly, Worrell and Shaefer (2004), in developing the Learning Behaviors Scale (LBS) for academically talented students and Peters, Gentry, Gates, Peterson, and Mann (2008), in developing the Having

Opportunities Promotes Excellence (HOPE) Scale, conducted exploratory factor analyses in the initial stages of instrument development to explore the factor structure of the scale.

The Teacher Rating Scale Used in Brunei's Identification Process

In Brunei, the Teacher Referral Form (henceforth, TRF) is the teacher rating scale used to nominate Year 6 (5^{th} Grade) students for a gifted education program. The TRF is a 31-item scale completed by teachers to indicate the frequency of certain behaviors. Items on the scale and the structure of the scale were adapted from Rogers's Teacher's Inventory of Learning Strengths (TILS; Rogers, 2002). Several items on Rogers's scale were modified to reflect the language and vocabulary used by Brunei teachers (Special Education Unit, 2009b). Despite being used since 2009, the data collected have not yet been used to evaluate and examine the reliability and validity evidence of the TRF. No investigations have been undertaken to determine the degree to which the items on the scale appear to measure what they purport to measure, the degree of variability and stability of scores, the number of factors present in the scale, or the factors that could be responsible for the variance among the items. Lack of evidence for the validity and reliability of scores from the TRF affects the extent to which the scores can be inferred to be reliable and interpreted for their trustworthiness (Messick, 1995). To be confident with the outcomes from the scale, it is vital that an investigation looking into the evidence of the validity and reliability of the scale be conducted. Therefore this study seeks to examine evidence for the psychometric properties of the TRF, specifically evidence of validity and reliability.

This study will focus on collecting two types of validity evidence: content and structural validity, along with one aspect of reliability, i.e., internal consistency. The

validity evidence will be used to determine whether the scores represent the fundamental information that a scale user would need in order to demonstrate that the scale measures giftedness as defined by Brunei's definition and whether the outcomes are trustworthy. For the examination of content validity, data will be collected from experts to determine their views on whether the items on the scale match Brunei's definition of giftedness and the general understanding of giftedness. This ensures that the basis for the identification utilizes information from the agreed definition of giftedness for Brunei. For this investigation, several experts in gifted education along with several teachers in Brunei will review the items on the scale against the definition of giftedness using a set of criteria focusing on (a) representativeness of content domain, (b) relevance of the item towards the general understanding of giftedness, (c) clarity of the items, (d) the possible factors in which the items may be grouped or clustered, (e) the expert's confidence on factor assignment, and (f) the comprehensiveness of the items on the scale (Haynes, Richard, & Kubany, 1995; Rubio, Bergweger, Tebb, Lee, & Rauch, 2003). Both detailed feedback from the raters as well as the Item Content Validity Index (I-CVI) will be used to evaluate the extent to which experts agreed on the given criteria. A confirmatory factor analysis of the data collected from teachers will be used to examine the structural validity of the TRF to determine whether the items on the scale converge to match the hypothesized factor structure of the TILS and to examine the relationship among the factors. Further, the confirmatory factor analysis will be used to also examine the internal consistency of the scale, one common index of reliability. Finally, a comparison of the factors determined by the raters and those identified in the factor analysis will be conducted.

Research Questions

The focus of the study will be to analyze existing data to demonstrate the TRF's construct validity (specifically content validity and structural validity) and its reliability (its internal consistency). To answer the overarching question "Does the evidence for reliability as well as content and structural validity support the interpretation of the rating scale scores on the TRF in the identification of gifted students in Brunei," four specific questions will be asked.

1) Do the items on the scale reflect the explicit and implied factors in the accepted definition of giftedness in Brunei?
2) How many factors are present in Brunei's TRF? Do they reflect the hypothesized factor structure of the TILS? Do those factors reflect Brunei's definition of giftedness?
3) What is the consistency in the relationship among items and among factors on the scale? Does the relationship among items and among factors reflect the factor structure in question 2?
4) Which factor(s) is/are responsible for the greatest variance among the items?

Definition of Terms

- **Identification**: The process whereby students are selected to participate in a gifted education program. The identification process can be divided into four stages: the nomination and/or referral stage, the screening stage, and the selection/identification stage (review for determination of giftedness) for an appropriate service option, placement (determining the best educational setting).

In cases where students are being selected for one particular service, selection and placement become one stage.

- **Nomination and/or referral**: The process of information gathering directly from students or indirectly from teachers, parents, other adults, and/or peers familiar with the student. This process is guided by certain criteria for the inclusion of students' names in the pool of students to be reviewed for selection for participation in the gifted education program. Students in some cases may self-nominate.
- **Screening**: The process used to gather and evaluate students' performance on assessments and select those who were included in a pool for further consideration.
- **Selection:** The process of making a determination on whether the student meets the criteria for being labeled gifted after sufficient information has been gathered on the student's ability, achievement and/or other characteristics is available.
- **Placement:** Matching selected students to the most appropriate service option.
- **Giftedness in Brunei**: Brunei's definition for gifted and talented "are those who by virtue of outstanding abilities are capable of exceptional performance in general or specific ability areas" (Special Education Unit, 2007, p. 14).
- **Construct validity**: The unified concept and the unifying force in the meaningfulness or trustworthy interpretation of the test scores and their action implications" (Messick, 1994). Construct validity evidence is used to judge the degree to which decision-making based on the scores derived from the scale is warranted.

Chapter 2: Review of the Literature

This chapter describes the theoretical and foundational premise of a study investigating the initial psychometric properties of Brunei's Teacher Referral Form (TRF). Two themes, the definition of giftedness and the identification process, lead to the penultimate theme of psychometric properties of teacher rating scales.

The Role of the Definition of Giftedness in the Identification Process

The identification process in gifted education is the procedure used to determine potentially gifted students for participation in gifted education programs (McBee, 2006; McClain & Pfeiffer, 2012; Siegle & Powell, 2004). A defensible identification process hinges on the definition of giftedness (Borland, 2014). Identification processes developed without reference to a definition may suffer from lack of clarity as to who may be identified, how information will be collected, and what instruments will be used (Callahan & Hertberg-Davis, 2013; McClain & Pfeiffer, 2012); consequently, resulting in identification outcomes that are not defensible. A definition that is comprehensive and one that captures all the facets of giftedness could ensure that the identified students represent those who would benefit the most from the program. At its roots, a definition "assigns a meaning to a word by suggesting a theory that gives a certain characterization to the entities that the term denotes" (Hurley, 2006, p. 655). In gifted education, the definition refers to the conceptual explanation of behaviors, attributes, traits, or factors associated with excellence, talent, innovation, and development of potential (Kaufman &

Sternberg, 2008; Missett & McCormick, 2014; Sternberg & Davidson, 2005), including the theorist's descriptions of the directionality[1] for identifying giftedness (Renzulli, 1978; Tannenbaum, 2003). For instance, Renzulli's (1978) definition clearly illustrates both the conceptual explanation and directionality, where the first part of the definition ("giftedness consists of an interaction among three basic clusters of human traits, above average general ability, high levels of tasks commitment, and high levels of creativity" (p. 261)) explains the conceptual explanation of giftedness, and the second part of the definition ("gifted and talented children are those possessing or capable of developing this composite set of traits and applying them to any potentially valuable area of human performance" (p. 261)) describes the directionality. Renzulli has also recommended an identification process that matches his definition. A comprehensive description and directionality in the definition provides guidance to practitioners as they plan the identification process including such factors as who to identify, how information will be collected, and what instruments will be used (Callahan & Hertberg-Davis, 2013; McClain & Pfeiffer, 2012).

The descriptions of giftedness from different theorists, if combined, give a rich explanation of the construct, but there is still no consensus on a specific definition of giftedness (Dai, Swanson, & Cheng, 2011; Ngara & Porath, 2007; Persson, 2012; Pfeiffer, 2002; Worrell, 2009). There is however, consensus that giftedness is best represented by a multi-dimensional construct encompassing both cognitive and psychosocial domains that span throughout human development (Sternberg & Davidson, 2005; Subotnik, Olszewski-Kubilius, & Worrell, 2011). Scholars (e.g., Milner & Ford,

[1] Directionality refers to the perceived intention or purpose of developing gift and/or talent.
[2] Effectiveness is represented by the ratio of confirmed students nominated by the teacher in the classroom

2007) would argue that there are differences in the definition of giftedness when viewed from different contextual lenses. Researchers (e.g. Leung, 1981; Frasier, 1987) suggests a solution that views giftedness from two perspectives, where the first perspective suggests a set of underlying traits of giftedness that transcends historical time and cultural contexts, and the second perspective views the behavioral manifestations of giftedness which may vary in different contexts and relates to how the definition may be operationalized. In the first perspective, traits that may be common across historical time and cultural contexts could be represented by the idea that gifted individuals are those who are typified by high ability or aptitude in a domain or high achievement or have achieved success in their area of expertise (e.g. chemistry). Whereas in the second perspective could be represented by how giftedness is measured or described as it is operationalized in different settings.

For example, in a study conducted across several countries Stone (2002) demonstrated the distinction between the two perspectives by asking international participants to identify traits associated with gifted individuals in their culture. The results indicate that while participants from different countries selected different traits to describe a gifted individual in their own country, a common understanding about giftedness was shared among the countries. Gifted individuals were recognized as the individuals who performed at an above average level in comparison to other individuals. For example, participants in the United States chose the terms “high intelligence” or “high IQ” to describe giftedness, whereas in the United Kingdom the term “high achiever” and “advanced” were chosen. This suggests that participants in both countries understood giftedness in their own cultural context by using the terminology most

appropriate in their culture, illustrating a perspective that transcends historical time and cultural context. For the second perspective, based on each country's description of giftedness, the method to assess or measure the different traits may differ (e.g., different preferences for IQ tests which measure different conceptions of intelligence) or the cultural manifestation of the trait may differ based on the values of the culture. Frasier (1987) noted that general definitions of giftedness (the perspective that transcends across cultures) did not differentiate among socioeconomic status or race. However, certain adjustments were required in the identification process so that the abilities or the demonstration of strengths of students from the minority student population were considered. For example, Frasier, in reference to Baldwin (1978), recommended that descriptors of student behavior in a checklist or rating scale include descriptions representative of that particular population, such as "language rich in imagery and symbolism" (Frasier, 1987, p. 159). In the identification of gifted students in the school environment, this difference may also be observable.

Therefore, to determine whether the outcome of an identification process is defensible and representative of the definition, it would be appropriate to evaluate the identification process, including the procedures in the process, within the context in which the definition was developed.

The Identification Process

The identification of gifted and talented students is a complex and complicated process. In this study, I identify three key elements in the identification process that contribute to its complexity: the stages of identification, the individuals involved, and the instruments used.

Identification stages. Researchers (Hunsaker, 2012; Johnsen, 2011; McBee, 2006; McClain & Pfeiffer, 2012; Neber, 2004) identify three distinct stages in the identification process: the nomination, the screening, and the selection stage. Johnsen (2013) describes the nomination stage as the "first phase." In this stage, student information is collected from one or more sources (e.g. student, parent, teacher), using one or more procedures (e.g. achievement test, parent checklist, teacher rating scale), and for the purpose of identifying students for a program, to create a pool of potential candidates for a program. This data may also serve as data point for final decision making or, in later stages, as an indicator of students' achievement and/or ability (Johnsen, 2011, 2013; National Association for Gifted Children, 2013). That is, in practice, some may use the information collected at the nomination stage as the only information source to decide a student's suitability to participate in a gifted education program (National Association for Gifted Children, 2013). In this case, the screening stage is disregarded and the selection stage is immediately implemented. Others use the information at the nomination stage to create a pool of students, which may or may not involve decisions to include or exclude students based on the outcomes of this stage of data collection. The nomination stage is followed by the screening stage.

The screening stage described as the stage following the nomination stage, continues with further data collection which may include testing (e.g. IQ tests), observation, portfolio review or other data collection strategies, either with all students who were in the nomination cohort, or only for a few who were selected based on the outcomes of the nomination stage (Johnsen, 2011, 2013). The purpose of this stage is to gather more student-information before decisions are made at the selection stage. In

practice, this stage also may or may not involve decisions to include or exclude students based on the outcomes of the screening stage (Johnsen, 2011, 2013). The screening stage will always be followed by the selection stage.

The selection stage is the point when administrators consider all or some of the information collected during the identification process to decide which students have satisfied their requirements to participate in a gifted education program. The requirements and decision-making models (Pfeiffer, 2013), in practice, for participation in a gifted education program again may vary.

As making decisions for identification is part of the selection stage, students will have a fair and equitable chance to be identified if all students in the cohort are considered in this stage. However, decisions that are made earlier, for example at the screening stage, may affect a student's opportunity to be considered in the selection stage. Further, if decisions are made even earlier in the identification process, for example in the nomination stage, then not only will the students be eliminated from the screening stage but also from the selection stage. Thus, decisions in the nomination stage greatly affect the student's opportunity to demonstrate their potential and to participate in a gifted education program. Therefore, the nomination stage is a crucial stage because this stage determines whether or not a student will be considered for the gifted education program.

The importance of the first stage in the identification process has been demonstrated in studies on identification of students for gifted education programs (McBee, 2006; VanTassel-Baska, Feng, & Evans, 2007). In particular, in a study to understand the trends in the identification process in the state of Georgia, McBee (2006)

investigated the referral sources for identifying students in reference to their racial and socioeconomic groups and traced when in the process the problem of underrepresentation was likely to have occurred. As Georgia utilizes a multiple-criteria assessment procedure where multiple sources of student information are gathered at the nomination stage, McBee analyzed the referral sources in reference to free and reduced lunch and race (Asian, Black, Hispanic, Native American, and White). The analysis confirmed the presence of inequalities in the identification process based on racial and socioeconomic groups. The observed differences led McBee to deduce that the nomination stage as the first stage in Georgia's identification process was the "primary cause of differential representation in gifted program" (McBee, 2006, p. 109), and thus, is the pivotal stage as it greatly influences the likelihood a student will be identified for entry to a gifted education program. Due to its position in the identification process and its implications, the nomination stage is often referred to as the "gateway" to gifted education services (Miller, 2005).

Teachers as nominators. If the nomination stage is the "gateway," to gifted education programs, then teachers are the "gatekeepers" (Brighton, Moon, Jarvis, & Hockett, 2007; Ford, Grantham, & Whiting, 2008; Foreman & Gubbins, 2014; Peters, 2009; Rittner, 2009; Wilson, 2014). Teachers are the principle agents for nomination, and teacher nomination is one of the most common procedures used to identify gifted and talented students (Callahan, Moon, & Oh, 2013a, 2013b, 2013c; Foreman & Gubbins, 2014; McBee, 2006; Neber, 2004).

In a national survey of gifted education programs in elementary, middle, and high schools, gifted education coordinators reported that teacher or parent nomination was "a

common entry point in the identification process" (Callahan, Moon, & Oh, 2013a, p. 27, 2013b, 2013c). Despite this trend, research on how well teachers perform as nominators or identifiers of achievement and/or ability is mixed (Elhoweris, 2004; Gear, 1976; Hoge & Cudmore, 1986; Siegle, 2001; Siegle & Powell, 2004).

On the one hand, Gear's (1976) review of studies spanning several decades on teacher judgment, based on measures of effectiveness[2] and efficiency[3], concluded that teachers were "relatively poor" at nominating or identifying gifted students. However, Gagne (1994), in a critique of one the studies Gear reviewed (Pegnato & Birch, 1958), provided evidence that the measure of effectiveness and efficiency of evaluating teachers as judges or identifiers was methodologically flawed because both measures do not represent the true reflection of how well a teacher identified a student. When using measures of effectiveness and efficiency, a teacher nomination could be rated as low on efficiency even if a teacher's nomination was effective (i.e., 100% of students were identified). This is because the measure of efficiency depended on the cutoff score used to confirm the gifted status, and was independent of how well a teacher performed as a nominator; suggesting a negative correlation between measures of effectiveness and efficiency. Instead, Gagne suggested looking solely at the effectiveness of the nomination by investigating the relationship between a teacher nomination as the predictor and the gifted status as the outcome. Further, the description of the studies Gear reviewed asked teachers to nominate their students on the basis of perceived student intelligence without any clear guidelines, specific definition of giftedness, or training on how to identify the

[2] Effectiveness is represented by the ratio of confirmed students nominated by the teacher in the classroom to the actual number of gifted students in the classroom.
[3] Efficiency is represented by the ratio of confirmed students nominated by the teacher in the classroom to the actual number of gifted students in the classroom.

students. Therefore, it is uncertain if the studies based on the calculations of effectiveness and efficiency are accurate observations of teachers as nominators.

In more recent studies on teachers as nominators, researchers (Elhoweris, Mutua, Alsheikh, & Holloway, 2005; Elhoweris, 2004; Siegle & Powell, 2004; Siegle, 2001) revealed that teachers were influenced by their stereotypical beliefs about what behaviors constitute giftedness or what attributes represented a gifted student. To understand the types of teacher bias in their study, Siegle and Powell (2004) gave teachers (general classroom teacher and gifted education specialist) 12 hypothetical student profiles differentiated by their proficiencies in mathematics skills, reading, and knowledge. Siegle and Powell further specified areas within each proficiency and then distinguished between producers and non-producers. Using repeated measures ANOVA, the results indicated that general classroom teachers were more likely to nominate students who conformed to popular beliefs on giftedness than were gifted education teachers. This suggests that general classroom teachers may be influenced by their stereotypical beliefs when nominating students. The results of a study by Elhoweris (2004) using vignettes with student profiles which varied in socioeconomic status, concurred with those of Siegle and Powell in indicating that teachers are influenced by their stereotypical beliefs based on students' socioeconomic status.

Data supporting teachers having stereotypical views of students has also been collected from pre-service teachers. Carman (2011) asked a group of in-service and pre-service teachers to imagine a gifted person and then asked them to complete a questionnaire about their imaginary gifted persons. The questionnaire included items that were structured to reveal teachers stereotypical thoughts, for example "What gender was

your gifted person?" Her results indicate that both in-service and pre-service teachers held stereotypic views of students, but with stronger stereotypes among pre-service teachers. Carman hypothesizes that personal stereotypic beliefs may lead teachers to be biased in their identification of students. However, because participation in the study was by convenience sampling, generalizability of results may be limited.

On the other hand, some research (Borland, 1978; Foreman & Gubbins, 2014; Worrell & Erwin, 2011) has shown that teachers can be effective nominators of gifted students. Borland (1978) evaluated how well teachers identified gifted students if they were provided with a checklist. An analysis of the relationship between teacher's ratings and students' IQ scores demonstrated a moderate relationship, however when students were divided into a high achievement group and a low achievement group, the relationship was stronger for the low achievement group. This suggests that teachers were able to better recognize the strengths of underperforming students as measured by intelligence tests. Further, using the checklist, an approach that provided teachers with guidelines and the criteria of who to nominate, aided teachers in the nomination process. A recent study by Foreman and Gubbins (2014) asked teachers to nominate five to seven top performers in mathematical skills. In their analysis, students who had been nominated were also significantly better performers on mathematical problem solving tasks. This suggests that teachers are able to recognize students' strengths in a specific content area.

The recognitions of teachers as nominators may be a result of belief that their frequent interactions and familiarity with their student's behaviors, and thus are better equipped to provide useful data in the identification process (Moon, Brighton, Jarvis, & Hall, 2007; Worrell & Erwin, 2011). In contrast to testing, which only samples limited

student behavior at one point in time, when completing a checklist, a teacher's decision is based upon an accumulation of information about the student collected over a period of time. This information can reflect students' varied skills, learning, and communication with other students, as well as affective factors such as motivation, and other learning characteristics such a learning disability (Worrell & Erwin, 2011). Therefore, teachers often become the primary agent in the nomination stage because they represent the person most knowledgeable about the student within a school environment.

Teacher rating scales. Teacher rating scales are widely used to nominate students in the identification of gifted students (Jarosewich, Pfeiffer, & Morris, 2002; Moon, 2013; Peters, 2009; Pfeiffer, 2013; Westberg, 2010). Teacher rating scales are used to assess the extent or the intensity of certain behaviors, attitudes, or attributes that are related to a chosen definition of giftedness. Because teacher rating scales may provide differential views of students' achievement and/or ability, the outcomes could contribute towards creating a better understanding and a comprehensive view of the student's suitability as a candidate for the gifted education program.

As alluded to in the previous section, teacher nomination through teacher rating scales could also provide information that is different and supplemental to existing tests (Borland, 1978; Foreman & Gubbins, 2014). Being able to provide different types of information benefits the student because behaviors and achievements in particular areas may not be accessible through standardized achievement test. For instance, the updated version of the Scales for Rating Behavioral Characteristics of Superior Students (SRBCSS; Renzulli et al.,2009) includes behavioral descriptors for skills required in Mathematics, Science, Reading, and Technology. An example of a behavior in

Mathematics, “The student enjoys challenging math puzzles, games, and logic problems.” (Renzulli, et. al., 2009). With such rating scales, teachers will have the necessary guidelines to judge students’ potential based on what they know about the student in the particular area of interest.

Teacher rating scales could provide a different type of information across domains not assessed by achievement or standardized aptitude (Gentry & Peters, n.d.; Moon et al., 2007). For example attributes such as creativity or behaviors such as students’ interactions with other people may be better evaluated from an observer’s perspective instead as asking the student themselves. The teacher rating scale developed by Renzulli, Smith, White, Callahan, & Hartman (1976), the SRBCSS, includes a subscale on creativity. Elliot and Argulewicz (1983) as part of their study investigated whether similarities exist in the ratings of students from the majority and from culturally diverse populations on the creativity subscale. Their study found that there was no significant difference in the way teachers rated the students based on their cultural differences. This suggests that the subscale could effectively evaluate a student’s behavior in the area of creativity despite cultural differences.

A concern often raised by scholars (Ford et al., 2008) is the underrepresentation of students from diverse socioeconomic, ethnic, and cultural backgrounds. These scholars (Frasier, 1987; Milner & Ford, 2007) believed that some of the procedures in the identification process (e.g., standardized tests) may not be able to identify the strengths of students from underrepresented populations, and that the teacher rating scale as an additional procedure may be better at recognizing student’s strengths. Specifically, the teacher rating scales may include items describing behavioral manifestations of

giftedness that varies in different contexts, thus enabling teachers to be more attuned to subtle indications of giftedness. The study of the SRBCSS (Elliot & Argulewicz, 1983) and that on a recently developed teacher rating scale the Having Opportunities Promotes Excellence (HOPE; Gentry, Peters, Pereira, McIntosh, & Fugate, 2015) provides evidence of the potential of teacher rating scales. The HOPE scale was developed to include behaviors that "were observable in minority students or those from low-income families" (Peters, 2009, p. 55). Data on the scale suggests that it is effective at identifying more students from diverse socioeconomic and cultural background. Peters (2012, cited in Peters & Gentry, 2012) reported that using scores on the HOPE scale resulted in identification of a "near proportional representation of low-income students in the identified population," of students who in a typical identification process are often underrepresented. Therefore, use of teacher rating scales, such as the HOPE scale or the SCRBCSS, can be promising for the identification of students from diverse backgrounds.

Teacher rating scales are also widely used because they are a form of indirect measure that is easily implemented, (Jarosewich et al., 2002; Walrath, 2011). The scales are typically developed on a Likert scale, and teachers are only expected to select a response instead of providing a comprehensive description of a student's behavior. For example, the scales in SRBCSS ask teachers to rate their students' behavior on a 6-point scale with a range from "Never" to "Always." Hence, less time may be required.

Despite the potential of a teacher rating scale, they are not perfect (Borland, 2014; Jarosewich et al., 2002; Pfeiffer, 2002). Borland (2014) advocates for a more qualitative approach through teacher's "narrative recommendations," because he views teacher rating scales as an "unsatisfactory means of obtaining valuable information" (p. 333).

Admittedly, providing a rich description could yield a comprehensive and less contrived evaluation of a student's achievements, but it would be a challenge to assure quality and evaluate the contents reliably across teachers because of time demands and the variation in narrative writing skills. Furthermore, narrative accounts do not guarantee that the descriptions would satisfy the definition of giftedness that is of concern.

Pfeiffer (2012) has highlighted recurring issues regarding how the rating scales have been developed and how they are being used. Specifically, these critiques reference the objective of the process and question whether students identified from the outcomes of the teacher rating scale have the behaviors, attributes, and traits that were described in the definition. Because a defensible identification process hinges on a definition from which it was developed, teacher rating scales that do not reflect the definition could potentially misidentify students or miss students in the identification process. Such incidences when they do occur, are often not directly observable, and can only be detected and investigated in hindsight such as in the study by McBee (2010). Therefore, while researchers are aware of the potential pitfalls of the teacher rating scales, a balance needs to be achieved between the benefits and potential pitfalls of teacher rating scales.

Psychometric Properties of Teacher Rating Scales

The measure of a defensible teacher rating scale in gifted education relates to how well the outcomes reflect the definition of giftedness from which it was developed. Based on known strengths and issues with teacher rating scales, investigations can be conducted to establish and evaluate whether the scale represents the construct it was planned to measure. The outcomes of such an investigation would yield the first insight into an instrument's psychometric properties. Psychometric properties of a teacher rating scale in

gifted education are the quantifiable attributes of the scale that relate to its conceptual and statistical strength or weakness as they pertain to giftedness as determined by the chosen definition (Medical dictionary, 2012). These properties described in the Standards for Education and Psychological Testing, the Standards, was published "to provide criteria for the development and evaluation of tests and testing practices and to provide guidelines for assessing the validity of interpretations of test scores for the intended test uses" (AERA et al., 2014, p.1). Guided by the Standards, the two main constructs pertaining to psychometric properties of any instrumentation are validity and reliability.

Validity of teacher rating scales. Validity is considered the most important factor in instrument development (AERA et al., 2014). Validity of teacher rating scales for identifying students with potential can be defined as the extent to which the outcomes of the scales may be interpreted to provide information that is meaningful, trustworthy, and useful in the identification of gifted students and the extent to which the items in the scale reflect the chosen definition of giftedness. In some text books (e.g. Agresti & Finlay, 2009) validity may be described as content, criterion-related, and construct; however, the Standards adhere to Messick's (1989, 1995) recommendation that "validity becomes a unified concept and the unifying force in the meaningfulness or trustworthy interpretation of the test scores and their action implications, namely, construct validity" (Messick, 1994, p. 15). In other words, all validity types are in fact construct validity. The Standards explain six sources of evidence for validity (AERA et al., 2014): (1) content-related evidence, (2) evidence regarding cognitive processes, (3) evidence regarding internal structure, (4) evidence regarding relationships with conceptually related constructs, (5) evidence regarding relationships with criteria, and (6) evidence

based on consequences of tests. Each type of evidence carries a different meaning to the validity of the outcomes.

Reliability of teacher rating scales. In general terms, reliability relates to consistency (Agresti & Finlay, 2009). The Standards describe reliability either in terms of reliability/generalizability coefficients or reliability/precision (AERA et al., 2014). A reliability/generalizability coefficient of teacher rating scales indicates the consistency of the outcomes based on the correlation between outcomes derived from replications of ratings on the teacher rating scale on a sample of test takers or the correlations across two or more forms of the same scale. The three recognizable types of reliability/generalizability are: (a) alternate-form coefficients; (b) test-retest coefficients; and (c) internal-consistency coefficients. Reliability/precision relates to a more generic view of reliability in reference to "consistency of scores across replications of a testing procedure, regardless of how this consistency is estimated or reported" (AERA et al., 2014, p. 33).

Psychometric properties of teacher rating scales in instrument development. The description of validity and reliability in the Standards suggests there are multiple procedures that could and should be taken to demonstrate an instrument's psychometric properties. As such, demonstrating psychometric properties of an instrument is an iterative and continuous process (Furr, 2011). This means that there are certain investigations that take place at the beginning stages of an instrument development, and others that can only be investigated after the first basic investigations of its psychometric properties have been established. The reason for this staged approach ensures that before the instrument can be used widely, that developers have demonstrated that it does

measure what it is supposed to measure and that the outcomes are meaningful, trustworthy, and can be interpreted consistently in different test situations.

To evaluate the different types of investigations developers conducted at the initial stages of instrument development; I reviewed the processes undertaken by developers of three rating scales. First, I chose the Scales for Rating Behaviors of Superior Students (SRBCSS) developed by Renzulli and his colleagues because it is a scale that is consistently used and has been revised to include subscales that reflect current interest areas (Jarosewich et al., 2002; Renzulli et al., 1976; Renzulli et al., 2009; Westberg, 2010). Second, I chose the Gifted Rating Scales developed by Pfeiffer and Jarosewich (2003) because they are recently developed scales, developers have completed extensive investigations to demonstrate the instrument's psychometric properties, and other researchers (Li et al., 2009; Rosado, 2008) have investigated their application in varied settings. The final scale is another recently developed scale, the Having Opportunities Promotes Excellence (HOPE; Gentry et al., 2015), chosen because developers have delineated extensive steps taken in its development. A review of the investigations developers conducted has narrowed the three areas for investigations of initial psychometric evidence: content-related validity, evidence of internal structure, and reliability/generalizability coefficient (internal consistency).

Content related validity. The developers of the instruments named above took several steps to achieve content related validity. For instance, they first researched the literature broadly and extensively in the specific area of interest. Second, the instrument developers typically consulted experts to provide a review of the items on the scale to ensure the items that had been drawn to reflect the construct being evaluated. In each

case, the developers of the rating scale enlisted support from experts in gifted education and provided guidelines on the aspects of the items on which raters' feedback was required. In the translated version of the GRS, Rosado (2008) included experts proficient in Spanish in the review of the translated instrument.

Researchers (Polit, Beck, & Owen, 2007; Rubio et al., 2003) recommend calculating the Item Content Validity Index (I-CVI) which represents the proportion of experts giving the item a rating of (3) or (4) on the rubric. The suggested rubrics evaluates the instrument based on (1) representativeness of the content domain - which asks reviewers to evaluate the extent to which the item represents the content domain, and in this case, the extent to which the items on the gifted rating scale match the definition of the prescribed definition of giftedness; (2) clarity of the item – refers to the quality of the item, whether the item possessed any ambiguity i.e. does the item make sense to the reviewer, would it be likely to be observed based on the prescribed definition; (3) suggested factor – this rubric asks reviewers to suggest the factor in which the item belongs; and (4) comprehensiveness of the instrument – this pertains to the reviewer's overall evaluation of the instrument (Rubio et al., 2003). Additionally, other researchers (Haynes et al., 1995; McCoach, Gable, & Madura, 2013) differentiated between the dimension of representativeness and relevance. From their explanation, it could be interpreted that representativeness of an item in a teacher rating scale in gifted education would refer to the degree to which the items are proportional to the facets of the chosen definition of giftedness (Haynes et al., 1995). For example, the items in the teacher rating scale include traits or descriptions of giftedness in the definition. Whereas, relevance of a teacher rating scale in gifted education would refer to the appropriateness

of its elements for the targeted definition of giftedness and the function of the scale (Haynes et al., 1995). For example, the items in the scale are appropriate for the definition of giftedness and that if an item does not belong to the targeted definition then the item would not be relevant in the scale. Further, McCoach and Baslanti (n.d.) as cited in McCoach et al., (2013) also included a criterion, which asked experts their certainty towards their rating. Therefore, there are six possible criteria that could be asked of from expert reviewers to determine a scale's content-related validity. In the development of the scales reviewed, following an expert review, items on the scales were adjusted accordingly. The item content-validity index and the varied criteria will add to the overall quantitative evidence to support content validity.

Evidence of internal structure. The internal structure of an instrument refers to the relationship among the test items, and/or among factors. Typically this is measured by conducting a factor analysis: either exploratory or confirmatory. Results of an exploratory factor analysis reveals information regarding the internal structure of the instrument such as how well the items relate to each other, whether the items relate to each other better when combined together to create an idea or factor, how many factor exists within the instrument, which of those factors could be attributed to most of the variance observed, and whether there are items that do not fit well within the instrument (Gorsuch, 1997). Results of a confirmatory factory analysis reveals similar information as the exploratory analysis; however, within a confirmatory analysis the primary objective is to determine whether the instrument's factor structure aligns with an existing theory or established factor structure. Hence, it would be more common to apply an exploratory method at the

initial instrument development phase to investigate the factor structure, rather than a confirmatory analysis (Dimitrov, 2012; Furr, 2011).

An exploratory investigation was initially applied to determine the factor structure of the SRBCSS and the HOPE Scale, and then later followed by a confirmatory factor analysis to further confirm the factor structure (Peters et al., 2008; Renzulli et al., 1976). Recently, as new subscales were introduced to the existing SRBCSS, developers conducted a confirmatory factor analysis to investigate if the new subscales were able to maintain the same factor structure (Renzulli et al., 2009). For GRS, the developers did not investigate the factor structure through exploratory or confirmatory factor analysis; instead the final items in the scale were based on factors recommended by expert reviewers, the relationship between items reported to be a composite of factor analysis, as well as inter-rater and test-retest reliability (Pfeiffer & Jarosewich, 2003). However, there have been subsequent studies applying GRS in different countries that have demonstrated evidence for GRS's internal structure (Li et al., 2009; Rosado, 2008). In his study, Rosado (2008) conducted a confirmatory analysis as his first step to investigate whether the factor structure of the GRS-S (Spanish), remained consistent when translated in Spanish; thereby, establishing if the instrument's factor structure aligns with an existing theory or the established factor structure fit with the new population. Therefore, the exploratory factor analysis method was applied for exploring the theory behind the scale, and confirmatory factor analysis was used to confirm the hypothesized theory.

Evidence of internal consistency. Internal consistency refers to the reliability estimates based on average correlation among items within a test (Nunnally & Bernstein, 2010). To determine internal consistency, developers of SRBCSS, GRS, and HOPE

assessed the overall correlation of items within the teacher rating scale for the population (Peters et al., 2008; Renzulli et al., 2009; Rosado, 2008). Although internal consistency is a reliability estimate, it is also part of the investigation for validity because high correlation amongst items or high correlation among groups or clusters of items supports the evidence of internal structure. It was especially desirable for the GRS-S as it provided further evidence that the GRS-S could be used to identify gifted students in Puerto Rico (Rosado, 2008). In the teacher rating scales reviewed, the coefficient for internal consistency was conducted as part of factor analysis (Peters et al., 2008; Rosado, 2008).

Brunei's Teacher Rating Scale

Brunei's TRF, despite being used for six years, does not have evidence of its psychometric properties. Consequently, it is uncertain if the outcomes from the TRF reflect Brunei's definition of giftedness, and hence, its validity is questionable. Therefore, an investigation of its initial psychometric property is warranted and long overdue.

The TRF within the context of the identification process. The TRF is used in the first stage (the nomination stage) of the identification process and is completed by teachers to nominate Year 6 students. Teachers who are familiar with the students could individually or collectively nominate students. Only students who meet the criteria of a "minimum average of 90% in courses" (Special Education Unit, 2009a), receive awards for their achievements, serve in leadership positions, and have high proficiency in the English Language (Special Education Unit, 2009a) are nominated. Outcomes from the teacher nomination process and an achievement test, the Wide Range Achievement Test 4 - Level V (WRAT-4; Wilkinson & Robertson, 2006) are used to determine if students will proceed to the next stage of the identification process. Therefore, as the first

instrument used in the identification process, the TRF is an important instrument in Brunei's identification process because its outcomes could impact the likelihood that a student may be selected for a gifted education program.

The TRF. In 2009, a pilot study on the identification of gifted students in Brunei was conducted (Special Education Unit, 2009b). Part of the study was to develop and pilot the TRF. TRF is described in the report on the pilot study as an adaptation from Rogers's (2002) 51-item Teacher Inventory of Learning Strengths (TILS) (Special Education Unit, 2009b). The TILS rates student behaviors on a 4-point Likert scale of "Never/seldom," "Sometimes," " Often," and "All the time," in three identified areas of strength: personal, academic, and social. However, the TRF has 31 items measuring the same three areas with the same 4-point Likert scale. Based on the report, a committee of secondary school subject specialist teachers who had attended a professional development on gifted education and professionals at the Special Education Unit adapted the TILS for Brunei (Special Education Unit 2009b). However, details on scale selection, how items were selected, what decisions led to the exclusion of certain items, why certain items were combined, or the criteria for adding new items were not available in the report. Some researchers (e.g. Hambleton & Patsula, 1998) speculate that one of the reasons for adapting a test is because it is more cost and time efficient than preparing and developing a new one. A similar reasoning may have transpired in Brunei when deciding to adapt the TILS.

Brunei's Definition. A team of professionals from the Special Education Unit at the Ministry of Education and the Universiti Brunei Darussalam developed Brunei's definition of giftedness which is described in the seminal report "Concept Paper on the

Implementation of Gifted and Talented Education Programme in Brunei Darussalam," hereafter referred to as "the concept paper" (Special Education Unit, 2007). The concept paper is based on literature in gifted education; gifted education programs in Canada, Singapore, the United Kingdom, Australia, and New Zealand; as well as the Special Education Unit's mandate (Special Education Unit, 2007). In the concept paper, gifted students are defined as follows: "gifted and talented students are those who by virtue of outstanding abilities are capable of exceptional performance in general or specific ability areas" (Special Education Unit, 2007, p. 14).

If compared to other definitions (e.g., Tannenbaum, 2003; Renzulli, 1978) the definition in the concept paper does not provide specific areas of focus and directionality. However, as Brunei's definition was conceptualized within the context of its education system, an evaluation of the system could imply possible areas of focus and directionality in the definition. The Ministry of Education, as a key agent in attaining Brunei Vision 2035[4], has taken the responsibility to ensure that the reformation and restructuring efforts surrounding teaching and learning will lead to the expected improvement to the human capital (Ministry of Education, 2012). The Strategic Planning 2012-2017 document highlights several key initiatives that demonstrate a focus on developing and improving skills and knowledge in literacy, numeracy, and science to "produce experts, professionals and technicians required in commerce and industry" (Ministry of Education, 2012, p. 4).

In addition, in the revised national curriculum, Bahasa Melayu (Malay), English, mathematics, and science are considered compulsory core subjects between Year 1 and

[4] Brunei Vision 2035 is the national strategy to aspire and attain development in all sectors towards achieving economic sustainability and national prosperity (Brunei Economic Development Board, 2008).

Year 8 (Ministry of Education, n.d., 2007). This means that these content areas could be the focus of the definition in identifying students for the gifted education program. These key statements and documentation allude to the focus and directionality of the gifted education program and the students for whom the program is developed. This further implies that academic achievement could be the basis on which gifted and talented students may be identified. Therefore, within Brunei's educational system and Brunei's definition of gifted and talented, the gifted and talented student could be an academically achieving student in literacy, numeracy, or science whose potential could be developed to be experts, professionals, and technicians who may contribute to the human capital in Brunei.

Development of the TRF. Adaptation of instruments to a new setting often describes language translation as a focal change (Hambleton, 1996; Hambleton & Patsula, 1999; Peña, 2007). In fact, Hambleton and Pastula (1999) argue that translating instruments to the language that is commonly used increases its validity. Although Brunei's national language is Bahasa Melayu (Malay), English is commonly used (Cane, 1994; McLellan & Haji Othman, 2000; Wood, Henry, Malai Hj Abdullah, & Clynes, 2007). It can be considered as the dominant language of instruction within Brunei's education system as English is the language of instruction and assessment for all subjects except those related to the Malay language from Year 1(Kindergarten) onwards. Thus, it is common from Year 1(Kindergarten) onwards for both the teachers and the students to converse in English in their classrooms.

As part of the pilot study, several regular Year 6 teachers reviewed the TRF regarding their understanding of the items on the scale (Special Education Unit, 2009b).

Although the TRF was not translated to Malay, the vocabulary changed from the original TILS to words and terms that may have been more familiar with teachers in Brunei. For example, the TILS item "Concentrates well" was changed to "High level of concentration." Because the English in Brunei shares "grammatical and lexical features with other Southeast Asian varieties of English" (Cane, 1994, p. 360), the vocabulary change may not seem to be an equivalent adaptation to an English language native speaker; however, the changes may reflect the preferred term amongst Brunei teachers for that particular item.

Although the adaptation changed the TILS considerably, the TRF is still based on the three factors Rogers identified: the personal, academic, and social (Rogers, 2002). In the TRF, items related to personal factors described students' behavior, which were seen as a personal preference, a behavior that may stand out when the student is compared to other students, or the student would demonstrate a greater degree of a characteristic than other students, for example "high interest in complex problem solving." Items related to the academic factor described students' behaviors or attributes considered to contribute to high levels of success in school, for example, "excellent memory." Items related to the social factor described students' behaviors or attributes that provided insight into their understanding of their environment, of themselves as learners, and how they interacted with other people around them. A sample item for the social factor in the TRF is "Tolerant and respectful to others."

By comparing the TILS against the TRF, it is apparent that several items on the TILS were excluded and, on occasion, two or more items were combined to create one item. For example, the TILS item "Enthusiastic" was excluded from the TRF, and the

items “Independent thinker,” “Independent,” and “Independent in action” were combined in the TRF as “Independent and self-directed.” In addition, new items were also included in the TRF. Changes in the scales may indicate a step towards operationalizing the rating scale to perceived behaviors of the gifted students in Brunei’s student population.

Psychometric properties of the TRF. The TRF is the only known behavior rating scale for identifying the gifted population in Brunei. In the report of the pilot study one type of validity evidence was reported (Special Education Unit, 2009b). Content validity evidence was collected from four teachers who taught Year 6 regarding on the clarity of the items, in particular they were asked to comment on the language used in the items and the comprehensiveness of the scale. However, as the particular teachers who responded were not trained in identifying gifted students nor have they taught identified gifted and talented students before, their review may only have been based on personal conceptions of giftedness. Further, the review also did not seek to determine if the items on the scale represent Brunei’s definition, if the items indicated the possible areas of focus in Brunei, or whether the items were a fit with designated factors to which the items they were assigned. While other administrative aspects of the instrument were investigated, no other further investigations on the TRF’s psychometric properties have been carried out.

Consequently, fundamental information about the instrument such as whether the items in the scales measure what they purport to measure, whether the items reflect Brunei’s definition of gifted and talented, whether the factors as identified by Rogers (2002) in the TILS are also present in Brunei’s TRF, and whether the factors are independent is still unknown. Without examining such evidence the interpretation of the

scores obtained on the TRF may be questionable, as it is not certain whether the 31-items represent the behaviors of gifted and talented students in Brunei as guided by the definition. Therefore, this study seeks to conduct the initial investigation on the TRF's psychometric property, in particular the content-related evidence, evidence for internal structure, and internal consistency.

Research Questions

The focus of the study will be on evaluating the evidence of the TRF's construct validity, specifically content validity, structural validity, and internal consistency. Two types of validity evidence will be investigated: the content-related validity and evidence regarding internal structure. Evidence of reliability will be reflected in the measurement of internal consistency.

To answer the overarching question "Does the evidence for reliability as well as content and structural validity support the interpretation of the rating scale scores on the TRF in the identification of gifted students in Brunei," four specific-questions will be asked:

(1) Do the items on the scale reflect the explicit and implied factors in the accepted definition of giftedness in Brunei?

(2) How many factors are present in Brunei's TRF? Do they reflect the hypothesized factor structure of the TILS? Do those factors reflect Brunei's definition of giftedness?

(3) What is the consistency in the relationship among items and factors on the scale? Does the relationship among items and among factors reflect the factor structure in question 2?

(4) Which factor(s) is responsible for the most variance amongst the items?

Potential Impact of the Study

The broader potential impact of the study could lead to better identification procedures and methods in Brunei. If the investigations met with the expected outcomes, then this would indicate the TRF is an instrument that represents Brunei's definition and the outcomes from the TRF provides a valid indicator that the identified students are gifted. From this outcome, more investigations could be conducted to determine other validity and reliability evidences. On the contrary, although unfavorable outcomes may indicate the need to revise either one or both: the TRF or the definition of giftedness in Brunei; it also presents an opportunity to investigate the fundamental ideas of giftedness in Brunei. Eventually, a successful identification process, one that considers the multi-faceted aspect of giftedness within the Brunei context and is defensible, may eventually lead to fulfilling the gap in human capital in Brunei.

Chapter 3: Methodology

The investigation of the psychometric properties of Brunei's Teacher Referral Form (TRF) collected evidence of the content related validity of the instrument, evidence for evaluating its internal structure, and evidence of its internal consistency.

Instrument

Instrument description. The instrument to be evaluated, the TRF, is comprised of 31 items derived from Rogers's 51-item Teacher Inventory of Learning Strengths (TILS; Rogers, 2002). Each item is comprised of a stem describing a student behavior and a 4-point Likert rating scale for raters to use to indicate their judgment of how often they have observed the behavior described (never/seldom (1), sometimes (2), often (3), and all the time (4)). The items on the scale are divided into the three subscales as suggested by Rogers (2002). These three subscales are: Personal, Academic, and Social. The original 31-item TRF has been revised over the years (i.e., 2009-2014) (Special Education Unit, 2009c, 2010, 2011, 2012). See Appendix A. Only 22 items have remained constant across all versions. Ten items were modified or added: seven items were modified for language (15, 18, 22, 24, 28, 12, and16); two items (1 and 2) were combined to create one item; and one new item was added (31). As an example of an item modified for language, item 16 was changed from "Appreciation of beauty" to "Aesthetic appreciation." The combined item, "Reads extensively and prefers complex reading materials, i.e., of older age group or adult standard," was a combination of item

1: “Reads extensively,” and item 2: “Prefers complex reading materials, i.e., older age group or adult standard.” Although items were modified, they remained categorized under the same factors Rogers theorized (Special Education Unit, 2009b). Therefore, the investigation of validity will utilize all 31 items to enable a full investigation of the TRF’s internal structure based on the hypothesized factor structure.

Use of instrument. All Year 6 teachers used the 4-point Likert scale to rate the selected student in their class based on their assessment of the frequency with which the student exhibited the behavior (the item in the scale). To obtain the TRF’s total score, the three mean scores for the items on the three scales (Academic, Personal, and Social) were added (N. Tompal, personal communication, 2015).

Procedure for Data Collection

Between March and May of the school years 2009-2014, Year 6 teachers from both government and private schools were invited to an annual training session on the TRF (Special Education Unit, 2009b). At the training session staff from the Gifted Education Services (of the Special Education Unit) provided directions for completing the rating scale. The training session also included a discussion on how the behaviors described on the scale would manifest themselves in the teachers’ classrooms (N. Tompal, personal communication, 2015) and the use of ratings in the scale. For instance, for the scale “Never or Seldom” would be rated 1 to indicate behaviors that teachers never or seldom observed, and if observed had a frequency of less than twice; “sometimes” would be rated 2 to indicate behaviors that teachers would have observed once in a while and not a behavior that could be described as predictable; “Often” would

be rated 3 to indicate behaviors that teachers would have observed regularly but not a behavior demonstrated all the time; and "All the time" rated 4 to indicate behaviors that teachers were able to observe all the time without fail. Following the training, teachers had four weeks to complete a TRF form on the selected students in their classroom. Teachers could either submit the completed forms electronically, or as a hardcopy to the Gifted Education Services Section of the Special Education Unit. Teachers were given the option of completing the rating scale independently, in consultation with other teachers who may be more familiar with the student, or as a collective effort across multiple teachers. All data collected across the years 2009 to 2014 were kept on file at the Special Education Unit (N. Tompal, personal communication, 2015), and all completed forms will be considered for the analyses. Permission to access the data has been granted. See Appendix B.

Data

Data cleaning. The first step in the research process has been completed in order to determine whether sufficient data exists to carry out the proposed analyses. Data were cleaned to eliminate entries that were incomplete or entries, which seemed to have a different form (e.g., one form did not have the fourth response category on it). Additionally, if there were two responses selected, these will be treated like missing data. This reduced the original number of 335 completed rating scales to 300. An entry is a completed rating scale on one student by one teacher or a collective effort of multiple teachers.

Data Analysis

To answer the overarching question "Does the evidence for reliability as well as content and structural validity support the interpretation of the rating scale scores on the TRF in the identification of gifted students in Brunei," the following data analyses were conducted.

Descriptive analysis. The general descriptive statistics on the rating of the items will first be investigated. Information such as frequency and distribution of ratings for each item will provide an overview of mean teacher ratings on those items and as an indicator of the distribution of ratings. Furthermore, the data will also be investigated for multivariate assumptions such as independence, outliers, possible transformations, and homogeneity of covariance matrices for categorical data (Zijlstra, van der Ark, & Sijtsma, 2007).

Investigating evidence for content-related validity. This investigation addressed the following research question:

(1) Do the items on the scale reflect the explicit and implied factors in the accepted definition of giftedness in Brunei?

To assess the content-related validity for the TRF, expert opinion on the degree to which the scale contains an appropriate sample of items reflecting Brunei's definition of giftedness were gathered (Polit & Beck, 2006). Rubio et al. (2003) in reference to Lynn (1986) categorized experts into two categories: content experts and lay experts, and recommended a minimum of three and a maximum of ten experts for each category (Lynn, 1986), thus yielding a range of possible experts between six and 20. During the

initial instrument development, feedback and review of the instrument were sought from Year 6 teachers (lay experts), but they were not asked specific questions regarding the representativeness of the items in relation to Brunei's definition of giftedness, nor asked to indicate to which factor the item belonged. This study sought to repeat this investigation along six specific criteria and obtain reviews of the TRF from at least three Brunei teachers (lay experts) who have had experience completing the TRF for at least two years, and also from at least three content experts (professional experts) in gifted education. Five lay experts were identified and instructions to complete the instrument were explained to the group. Only four attended the briefing and completed the instrument. Meanwhile, an invitation to review the TRF was issued to several content experts and three agreed to review the TRF. Content experts in gifted education represent those with content knowledge in the area of gifted education, i.e., a minimum of having completed coursework toward a terminal degree, i.e., a Ph.D. or an Ed.D. in gifted education.

The instrument for assessing content validity is provided in Appendix C. Content expert reviewers received the electronic version of the instrument, which allowed them to choose their responses from a dropdown menu. On this instrument each item on the TRF was evaluated in relation to Brunei's definition of gifted and talented on six specific criteria. The first three criteria require experts to evaluate (1) the degree to which the item appears to be based or derived from (representative) of the definition of giftedness in Brunei; (2) the degree to which the item appears to be relevant with regard to the general understanding of giftedness; and (3) the degree of clarity of the item. Then the experts

were asked to (4) assign each item to any of the three factors (Personal, Academic, or Social) or suggest a new factor if the item did not match the given choices; (5) rate their certainty regarding their assignment of the item to the factor they selected; and (6) evaluate the overall comprehensiveness of the TRF (Fitzpatrick, 1983; McCoach et al., 2013; Rubio et al., 2003). See Appendix C.

The instrument yielded several measures on which the TRF could be evaluated. Criteria (1), (2), and (3) of the evaluation tool were used to calculate the item content validity index (I-CVI). The I-CVI is the proportion of experts giving the item a representativeness, relevance, and clarity rating of 3 or 4. This was followed by a calculation of a modified kappa (k^*) which provided the statistic likelihood of agreement predicted by chance for experts' ratings of 3 or 4 on the same criteria (Polit & Beck, 2006).

The following are the steps to calculating the k^*. First, the probability for a chance agreement among the number of experts who reviewed the scale is calculated.

$$p_c = \left[\frac{N!}{A!\,(N-A)!}\right].5^N$$

Where, N = number of experts

A = number of experts agreeing on the chosen criteria (1), (2), or (3)

Then, k^* is calculated by using the proportion of agreements on relevance (the I-CVI) and the probability of chance agreement (p_c) (Polit, Beck, & Owen, 2007).

$$k^* = \frac{ICVI - p_c}{1 - p_c}$$

The outcomes of the k^* assisted in determining the likelihood of agreement predicted by chance for experts' ratings of 3 or 4 on the item's representativeness, relevance, and clarity, and I-CVI greater than .78 would fall into the range considered as excellent (Polit et al., 2007).

For criteria (4) and (5) of the evaluation tool, the experts' ratings were compared to the expected factor assignment for each item. Ratings that do not match with the expected factor assignment will be assessed further to determine whether a new factor was suggested or a new factor assignment was recommended. The experts' rating for criteria (5) was used to guide their confidence in assigning the factors. Experts' evaluation on the assignment items to factors could provide support for the hypothesized factor structure. A Factor Validity Index (FVI) was also calculated to determine the likelihood of agreement predicted by chance, and similar to the I-CVI, an FVI of .78 would fall into the range considered as excellent (Polit et al., 2007).

For criteria (6), experts provided their view on the overall comprehensiveness of the scale in relation to Brunei's definition of giftedness.

Investigating evidence for structural validity and internal consistency. This investigation addressed these research questions:

(2) How many factors are present in Brunei's TRF? Do they reflect the hypothesized factor structure of the TILS? Do those factors reflect Brunei's definition of giftedness?

(3) What is the consistency in the relationship among items and factors on the scale? Does the relationship among items and among factors reflect the factor structure in question 2?

(4) Which factor(s) is /are responsible for the most variance amongst the items?

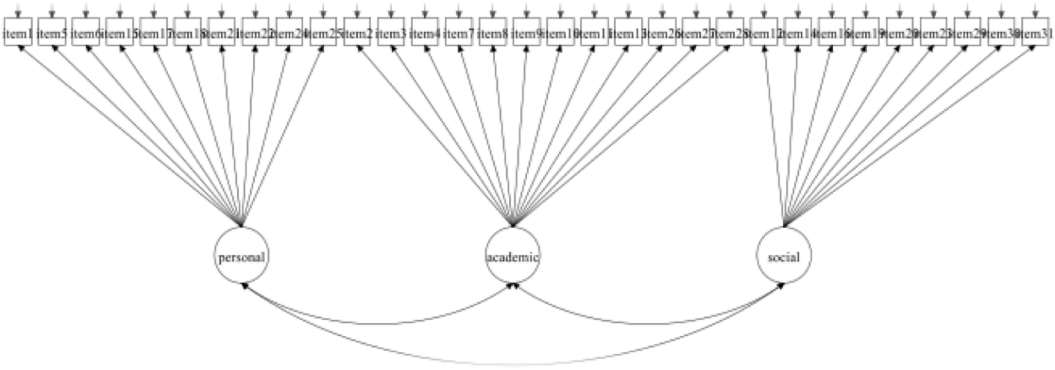
As the TRF was developed based on an existing scale, the TILS, a confirmatory factor analysis (CFA) was applied to investigate the TRF's structural validity as it pertains to the hypothesized factor structure (Personal, Academic, and Social). A CFA would also determine whether the modified items and the new items load on to the theorized factor structure. The analysis with the CFA included a Weighted Least Squared (WLS) estimation analysis to account for the categorical data with the 4-point scale on the Mplus (Muthén & Muthén, 2007a) software. The syntax used was as follows:

```
TITLE:      CFA of Teacher-Referral Form
DATA:       FILE = data.csv;
VARIABLE:   NAMES = 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
                    21 22 23 24 25 26 27 28 29 30 31;
            CATEGORICAL = 1-31;
MODEL:      f1 BY 1 2 6 7 16 18 19 22 23 25 26;
            f2 BY 3 4 5 8 9 10 11 12 14 27 28 29;
            f3 BY 13 15 17 20 21 24 30 31;
ANALYSIS:   TYPE = CFA 1 3;
            ESTIMATOR = WLS
```

Based on the hypothesized model by Rogers (2002), the factor loadings and errors, as well as the factors themselves, will be left uncorrelated, and a loading of 1 assigned to the first item on each factor as a basis for comparison. See Figure 1 for the hypothesized structure. Multiples measures of fit such as the chi-squared, the goodness of fit index (GFI), the tucker-Lewis index (TLI), comparative fir index (CFI), and the root mean

squared error of approximation (RMSEA), where an index of .95 for GFI, CFU, and TLI, and a value of .05 or less for RMSEA were utilized to indicate the best model fit.

Figure 1. The Hypothetical Model for the TRF based on Rogers's Factor Structure.



However, the theorized factor structure did not load on to the expected factors, and an exploratory factory analysis was applied to investigate a possible alternate factor structure for the TRF. For this analysis, using Mplus (Muthén & Muthén, 2007a), the default rotation was applied to determine the best model fit, and the Principal Component Analysis (PCA) estimation to determine the number of factors present. The number of suggested factors present was supported through investigations using the Horn's parallel analysis to confirm similarity in the number of factors extracted, Kaiser's eigenvalue greater than 1 rule, and a visual inspection of the scree plot. These results were expected to yield information that will reveal the factor pattern matrix among the factors, the amount of variance accounted for by the different factors, the factor that accounts for the

most variance, as well as the internal consistency. These outcomes were also expected to provide evidence for the internal structure and support the assignment of items to factors and/or support possible deletion of items.

The experts' content validity analysis will be compared to the CFA/EFA results to determine congruity and to assess the evidence of validity of the instrument. The results may lead to the conclusion that strong evidence of content and structural validity exists or that evidence is weak. One of the outcomes from the content validity analysis and the factor analysis may be the recommended reassignment of items to one of the existing factors or some other new factor, or elimination of items. Specifically, the outcomes will be used to support possible item deletion or reassignment to a new or existing factor towards creating a rating form that reflects Brunei's definition of giftedness and Brunei's educational climate.

Chapter 4: Results

Four specific questions guided the pursuit of the overarching question: Does the evidence for reliability as well as content and structural validity support the interpretation of the outcomes. Results from the first question provided evidence relating to the content related validity, while results from the second, third, and fourth questions were used to document the factor structure of the TRF rating scale.

Research Question 1: Do Content Experts and Practitioners Judge the Items on the TRF Scale to be Reflective of the Explicit and Implied Factors in the Accepted Definition of Giftedness in Brunei?

Content expert reviewers and practitioners (lay reviewers) completed an instrument designed to evaluate the content-related validity of Brunei's teacher rating scale along five categories (Appendix C). In the first part of the instrument, reviewers were asked to evaluate each of the items on the Brunei teacher rating scale for its content representativeness, clarity, and relevance. In the second part of the instrument reviewers were asked to assign the items according to the category they deemed best fit the item and then to indicate their confidence at assigning the item to the category. Finally, reviewers were asked to provide an evaluation of the overall comprehensiveness of the rating scale.

From the data on the first part of the raters' task, evaluating items on content representativeness, clarity, and relevance, a Content Validity Index (I-CVI) and

likelihood agreement k^*, as predicted by chance rating (Polit et al., 2007; Polit & Beck, 2006) were calculated for each item. To calculate the I-CVI, Rubio et al. (2003) recommended dividing the total number of reviewers who rated the items 3 or 4 on a 4-point scale by the total number of experts. According to Polit et al. (2007), reviewers rating of 3 or 4 on the 4-point scale are indicating agreement on the category being evaluated. In this specific case, a reviewer who rated an item 3 or 4 on the content representativeness would be indicating that he or she agreed that the item was reflective of Brunei's definition. A rating of 1 or 2 would mean that the reviewer did not agree that the item was reflective of Brunei's definition. For seven reviewers, an I-CVI at or above .83 (agreement among 6 reviewers) may be regarded as reflecting content representativeness, clarity and relevance—indicators of content validity (Lynn, 1986; Polit et al., 2007), and an I-CVI at or below .82 may be regarded as the reverse.

Further, Polit et al. (2007) recommended calculating the likelihood agreement, k^*, as predicted by chance on experts' ratings of 3 or 4, by using the proportion of agreements for the category (the I-CVI) and the probability of chance agreement (p_c) to establish the reliability of reviewers ratings. The probability for a chance agreement, p_c, is calculated using the formula below based on the number of experts who reviewed the scale.

$$p_c = \left[\frac{N!}{A!\,(N-A)!}\right].5^N$$

Where, N = number of experts and A = number of experts agreeing on the content representativeness, clarity, or relevance.

Then likelihood agreement, k^*, is calculated by using the proportion of agreements on relevance (the I-CVI) and the probability of chance agreement (p_c) (Polit et al., 2007).

$$k^* = \frac{ICVI - p_c}{1 - p_c}$$

Typically, a k^* of below .65 would indicate a "fair" agreement between .65 and .84 would indicate a "good" agreement, and above .84 would indicate an "excellent " agreement (Polit et al., 2007). Therefore, an item would be considered to have properties of content representativeness, clarity, and relevance if it had an acceptable I-CVI of .84 and above as well as a k^* of .84.

Content Representativeness. In this category, reviewers evaluated each item on the rating scale relative to Brunei's definition of giftedness in general as well as three other areas of aptitude identified as important in Brunei's educational system as they relate to Brunei's definition of giftedness: literacy, numeracy, and science.

Ratings of TRF items on their content representativeness relative to Brunei's general definition of giftedness. Twelve items met the criterion of an I-CVI of above .82 and k^* of above .84, as specified above as indicating a high degree of content representative relative to Brunei's general definition of giftedness. The items were 2, 4, 5, 6, 7, 9, 10, 11, 24, 26, 27, and 28. See Table 1. The overall content validity index for the scale, S-CVI, was .66.

Ratings of the TRF items on their content representativeness relative to literacy skills. Six items met the criterion of an I-CVI of above .82 and k^* of above .84, as specified above as indicating a high degree of content representative relative to literacy.

The items were 1, 4, 7, 9, 24, and 28. See Table 2. The overall content validity index for the scale, S-CVI, was .53.

Ratings of the TRF items on their content representativeness relative to numeracy skills. Five items met the criterion of an I-CVI of above .82 and k^* of above .84, as specified above as indicating a high degree of content representative relative to numeracy skills. The items were 6, 7, 9, 11, and 28. See Table 3. The overall content validity index for the scale, S-CVI, was .53.

Ratings of the TRF items on their content representativeness relative to Science skills. Eight items met the criterion of an I-CVI of above .82 and k^* of above .84, as specified above as indicating a high degree of content representative relative to science skills. The items were 2, 4, 7, 9, 10, 11, 24, and 27. See Table 4. The overall content validity index for the scale, S-CVI, was .57.

Clarity. In this category, reviewers evaluated the clarity of the items presented. The I-CVI indicating clarity of items was generally favorable; I-CVI for 23 out of the 31 items were above the criterion of I-CVI of above .82 and k^* of above .84. See Table 5. The overall content validity index for the scale, S-CVI, was .84.

Relevance. When reviewers evaluated the relevance of the items presented with respect to the general definition of giftedness, the I-CVI and k^* of 11 out of 31 items were rated as relevant to a general definition of giftedness. These items were 4, 5, 6, 7, 8, 9, 24, 26, 27, 28, and 30. See Table 6. The overall content validity index for the scale, S-CVI, was .69.

To analyze the data from the second half of the raters' responses in which they categorized the items and indicated the degree of confidence in that rating, I used a similar approach to calculate the I-CVI (Rubio et al., 2003). Rubio et al. recommended calculating the factorial validity index (FVI) for each item. The FVI is similar to I-CVI in that it represents the number of reviewers who have categorized the items correctly, and similar to I-CVI, an FVI of above .82 FVI would indicate that the item matched the factor criteria, and a k^* of .84 and above would indicate an "excellent" agreement" among experts.

Categorizing Items. The scale developer (Rogers, 2002) identified three theorized factors/subscales for the TRF: Academic, Personal, and Social. Based on the criterion of an FVI of above .82 and k^* of above .84, eight items were correctly assigned to the category as proposed by the scale developer. These items were 3, 4, 11, 14, 18, 22, 26, and 31. One of the reviewers assigned two factors to item 28; the category for which the reviewer rated with more confident was selected as the preferred factor. None of the reviewers proposed any other additional factors. See Table 7.

Comprehensiveness. Five of the seven reviewers provided responses to the question relating to comprehensiveness of the item set. The feedback was varied and could be summarized into three categories.

In the first category, a reviewer commented on the simplicity and vagueness of Brunei's definition and how it contributed to the "challenge" of rating the items.

In the second category, a reviewer highlighted the overlapping factors, in particular between items regarding Personal and Social factors. The reviewer explained

that this could be caused by "the influence of social setting and peers on the expression of personal traits." The reviewer suggested conceptualizing the relationship among the factors as "abilities vs. traits," with "academic items mostly being among abilities" and "trait factors could be subdivided in two parts on whether they are more internal (personal) or external (social)".

The last question on the rating scale solicited comments on the suitability of items. All reviewers commented on ways the TRF could be improved by critiquing specific items and the scale in general. Three reviewers suggested deleting one item each. Specifically, item1 (Reads extensively and prefers complex reading material) identified as a double-barrel item; item 12 (Holds strong belief) for being inappropriate; and item 21 (Displays an interest in mature topics) for being "too advanced for primary students." One reviewer recommended rewording or adding new items that would be "more clearly academic" to support the definition. Another reviewer suggested that the scale to include more "comparative/norm referenced" wording. While another reviewer recommended considering fluency in student's speech and ability to express themselves.

Research Question (2), (3), and (4): Structural Validity Evidence

How many factors are present in Brunei's TRF? Do the items reflect the hypothesized factor structure of the TILS? Do those factors reflect Brunei's definition of giftedness? Prior to investigating the factor structure of Brunei's TRF, I examined the items for their compliance to the assumptions underlying multivariate analysis, specific to its categorical nature. Missing data were identified as missing completely at random (MCAR). This was determined by returning to the original rating

form to ensure all ratings were included. It was then determined that the empty entries were found to have been left empty by raters.

The results of a confirmatory factor analysis (CFA) were used to evaluate whether the number of factors present in Brunei's TRF matched the hypothesized factor structure using the proposed syntax (see pg. 53) in the Mplus program (Muthén & Muthén, 2007b). However, the CFA yielded unsatisfactory model fit indices: X^2 (3726.46, N= 300); p<.000, CFI=.360; TLI=.309; and RMSEA=.160. Although X^2 tests are often not sensitive for sample sizes above 200 (Velicer, Eaten, & Fava, 2000**)**, the other fit indices (CFI, TLI, and RMSEA) also indicate an unsatisfactory model fit. Thus, I proceeded to conduct an exploratory factor analysis (EFA) to determine the underlying factor structure.

Due to the categorical nature of the item responses in the TRF, I ran a parallel analysis investigation using the R-program using the syntaxes recommended by Presaghi and Desimoni (2014) which calculated the possible number of factors to be extracted using a polychoric correlation. Polychoric correlation is considered more robust for categorical variables as compared to P correlation (Jöreskog & Moustaki, 2001). The results suggested a two-factor extraction.

Returning to Mplus, an exploratory factor analysis (EFA) was conducted with the syntax below, taking into consideration the suggested number of factors to be extracted. The syntax below utilized a WLSMV using an oblique with geomin rotation to derive the factors.

```
TITLE:      2 try EFA
DATA:       FILE IS Data for analysis_1.dat;
VARIABLE:   NAMES ARE 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
            21 22 23 24 25 26 27 28 29 30 31;
```

```
                CATEGORICAL ARE 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
                18 19 20 21 22 23 24 25 26 27 28 29 30 31;
                MISSING = ALL (999);
ANALYSIS: TYPE = EFA 1 2;
```

The pattern coefficients indicated a high factor loading on one factor only, and the factor loadings on the other factor not meaningful (see Table 8). Subsequently, another EFA was conducted with a one factor, whereby the data indicates a one-factor solution (see Table 9).

What is the consistency in the relationship among items and factors on the scale? Does the relationship among items and among factors reflect the factor structure in question 2? Using the syntax proposed by Gadermann, Zuhn, and Zumbo (2012) utilizing a polychoric correlation, the internal consistency was calculated using the R Programme and yielded an alpha of .97.

Which factor(s) is responsible for the most variance amongst the items? As a one factor structure was revealed through EFA, no one factor could be said to be responsible for the most variance amongst items.

Summary

To recapitulate the reviewer's ratings and the conclusions based on each category, I summarize the outcome of the individual categories from the content-validity instrument. See Table 10. Based on this summary, the overall S-CVI, which is the average of the I-CVI, for each category did not meet the criteria of above .82 and k^* of above .84, except for the rating on clarity. The EFA indicated a one-factor solution, with an internal consistency of .97.

Chapter 5: Discussion

The identification process in gifted education determines those students who educators believe would benefit from services provided through gifted education programs. Teachers' ratings of student characteristics collected over six years from the Teacher Referral Form (TRF), a checklist adapted from Rogers's (2002) Teacher Inventory of Learning Strengths (TILS) were analyzed to determine the validity of the outcomes for the identification of Year 6 students in Brunei, thereby providing information regarding the TRF's initial psychometric properties, specifically content-related validity and structural validity as well as internal consistency (reliability). Two separate analyses scrutinizing the content-related validity of the TRF and the factor structure based on the collected data provided this information.

In the first analysis, content experts and practitioners evaluated the TRF with an instrument that focused on the content of each item in reference to Brunei's definition, literacy related skills, numeracy related skills, and science related skills; clarity of item construction; relevance of the item in relation to gifted education; and whether they were able to clearly assign the items accordingly based on the suggested factors offered by Rogers for the rating scale. Reviewers were also asked to comment on the overall comprehensiveness of the TRF. The overall Scale Content Validity Index (S-CVI)[5] for expert ratings of the TRF did not meet the criteria of above .82 and k* of above .84 to be

[5] S-CVI describes the content validity for the whole instrument. In this case, S-CVI is the content validity index for the TRF.

described as possessing evidence for content-related validity. Further, reviewers suggested revision, addition, and/or elimination of certain items so that the instrument would be more reflective of Brunei's definition; highlighted the suitability of the hypothesized factors in relation to Brunei's definition; recommended a way to conceptualize the factors so that they may align with the definition; and critiqued the quality of Brunei's definition. These data indicate that overall the items on the TRF did not reflect Brunei's definition and did not match Rogers's hypothesized factors.

In the second investigation, a confirmatory factor analysis (CFA) was conducted to confirm the alignment of factors between TRF and Rogers's TILS. The CFA did not converge according to the hypothesized factor structure. Subsequently, an exploratory factor analysis yielded a one-factor solution, with an internal consistency (reliability) alpha coefficient of .97. Although a reliability coefficient of .97 is desirable, evidence indicates that teachers had consistently completed the ratings over the six years but did not complete the TRF with the view that the items represented three factors as originally intended.

Conclusions from the two investigations revealed that the data from the TRF did not support the premise that the items reflected Brunei's definition and the factor structure did not match that proposed by Rogers. Therefore, the validity and reliability data indicate that the TRF's psychometric properties are weak, and do not support use of the rating scales in their current form.

These results provided evidence for the internal consistency (reliability) of the TRF, but not the validity of the instrument for use in evaluating students relative to

Brunei's definition of giftedness. The data showed that the items on the TRF did not match Brunei's definition and that the items did not match the factor structure of the original checklist; indicating the need to re-evaluate the use of TRF and the application of Brunei's definition for the identification of gifted students in Brunei. Other desirable evidences of validity and reliability to support the further use of the TRF such as predictive validity or concurrent validity were not investigated. Without such information, it cannot be inferred if scores on the TRF can predict future academic performances or whether scores on the TRF were strongly related to scores on other achievement outcomes or other psychometric instruments, which purport to measure the same constructs.

Implications for Practice

The results from the analysis provide evidence that the identification process in Brunei is not defensible, which implicates the guiding definition for gifted and talented, the instrument used, or both. In addition, the decision making process and teachers' role as key elements within the identification process also needs further consideration.

Definition. The investigations indicate that in terms of validity and reliability, the outcomes of the TRF for the past six years could not be interpreted to provide information that is meaningful, trustworthy, and useful in the identification of gifted and talented students in Brunei, despite being used consistently. Content validity investigations with expert reviewers showed that the items in the TRF do not adequately reflect the content of Brunei's definition, and more importantly, they do not reflect the implied skills deemed as important in Brunei's education system (literacy related skills,

numeracy related skills, and science related skills). When an instrument fails to reflect a definition of an underlying construct, one can look to flaws in the instrument and its failure to reflect a definition. Or one can examine the definition of the construct to see if it is adequately defined to allow for meaningful assessment. The observed incongruence between the items on the TRF and Brunei's definition may be explained by the quality of Brunei's definition and the understanding, attributes, and/or traits associated with giftedness according to Brunei's unique learning and educational culture.

Quality of Brunei's definition. Brunei's definition was critiqued by one of the reviewers, an expert in gifted education, for being "so simple and vague." When a definition is vague, i.e. descriptors or domains of interest are not explicitly specified, then users resort to their personal inferences, based on their understanding and knowledge about the education system to interpret the criteria on which they rate students. Without explicit information embedded in the definition, consistency between teachers as they rate students in their class may be affected, the soundness of teachers as expert raters may be questioned, and the potential for false positive and negative selection increased - all of which may introduce elements of complexity in interpreting results and raise questions about and the integrity of outcomes. Such outcomes were observed in the analysis conducted. Further, Renzulli (1978) postulates that a definition should fulfill these three criteria: "(1) derived from best research studies dealing with gifted and talented; (2) provides guidance for the selection and/or development of instruments and procedures that can be used to design defensible identification systems; and (3) provides direction for programming practices that will capitalize upon the characteristics that bring gifted

youngsters to our attention as learners with special needs." Renzulli's recommendations for a quality definition are reflected in definitions that are often adopted or developed by states in the US (National Association for Gifted Children, n.d.).

Brunei's definition was based on definitions developed and operationalized in several countries around the world (Special Education Unit, 2007). One cannot ascertain from existing documents whether the characteristics or behaviors of students in Brunei, beliefs about giftedness, the research literature, or educational values of Brunei were considered during its development. Further, the critiques of experts, as summarized by the quote above, suggests that Brunei's definition does not provide much guidance as to what specific characteristics the definition infers. In addition, the definition also did not contain the exact purpose for identification and justification for why an identification process is required. These characteristics suggest that, Brunei's definition does not fulfill the other criterion proposed by Renzulli. It is crucial that a defensible identification process to be guided by the definition that describes the target gifted population (Callahan & Hertberg-Davis, 2013). This deficit indicates the need to revisit or revise Brunei's definition.

Understanding of giftedness including associated attributes and/or traits associated with Brunei's unique learning and educational culture. Brunei's learning and educational culture is unique to Brunei, and should be reflected in the identification process. Scholars (e.g. Sternberg, 2004; Stone, 2002) demonstrated the importance of incorporating local educational values within a definition to guide the identification of

students within the local context. This includes recognizing, labeling, or describing giftedness that is unique to the locality.

A study investigating Brunei's cultural dimensions of learning environment (Dhindsa, 2008) revealed two important outcomes that indicate students in Brunei may demonstrate unique learning behaviors. An understanding of these unique behaviors could influence the definition of giftedness, subsequently, the type of items to be included in a checklist of behaviors for the identification of gifted students in Brunei. Dhindsa in her study administered the Classroom Learning Environment Questionnaire (CLEQ) to 2,212 science students in tertiary (21.5%), upper secondary (37.3%; Grades 9-11), and lower secondary (41.2%; Grades 6-8) to investigate cultural dimensions of learning along nine factors: Gender Equity, Collaboration, Teacher Authority, Competition, Deference, Modeling, and Congruence. The first outcome highlighted the impact of the nature of Brunei's societal culture, which is collectivist (Hofstede, Hofstede, & Minkov, 2010), on student's learning behavior. Outcomes on the CLEQ revealed that students in Brunei displayed a balance between two typically conflicting behaviors: collaboration and competition. The observed behavior suggests that a balance between collaboration and competition are seen as accepted norms in Brunei, which indicates a state of ambivalence between working together and working individually.

The second outcome reveals the educational culture in Brunei. In Dhindsa's study, students were considered as dependent (on their teachers) learners. This suggests that in the typical classroom environment in Brunei, students rely on their teachers to acquire knowledge instead of independently searching or constructing knowledge. Such learning

behaviors are consistent with traditional teaching methods that are associated with rote learning, which is an approach to learning that has historically benefited Asian cultures (e.g., Tavakol & Dennick, 2010), such as Brunei.

If students in Brunei demonstrate unique learning behaviors as a consequence of the societal and educational culture, then it may be possible that behaviors that are valued or perceived as gifted behaviors in Brunei may be different than behaviors associated with gifted learners in Western literature. The misalignment between the definition and items in the instrument observed in the analysis, indicate that either the definition contains terms that teachers could not associate with students they perceive as gifted learners or that the vocabulary in the definition did not include descriptions that teacher in Brunei could recognize in their classrooms. Although subjects in Dhindsa's study were secondary and tertiary level students, these students would have experienced the same educational environment as the students for whom the TRF were completed. Thus, the outcomes could be generalized to students in the elementary schools, as these students would have been educated in the same education system within the same societal culture. Therefore the lack of evidence for content validity may be explained by the lack of locally used terminologies or descriptors in the definition or the lack of understanding on the interpretation of Brunei's definition to describe behaviors and characteristics that teachers would associate with gifted students or gifted behaviors in Brunei.

In summary, the findings suggest that Brunei's definition may need to be revised to incorporate descriptive behaviors of students characterized as gifted in Brunei. Once revised, the definition would need to be shared among teachers to better prepare them for

the task of rating behaviors or identifying students for the gifted education program based on the application of the definition in Brunei' learning and educational culture.

Instrument. Investigating the psychometric properties of an instrument is necessary during the development of new scales or adaptation of existing ones. When the TRF was initially developed it had not been investigated for its psychometric properties; the outcomes of the current analysis indicate that the TRF possesses weak initial psychometric properties relative to the existing definition.

Considering the outcomes of the analysis as well as reviewers' comments on the instrument, two possible directions could be taken relative to the instrument. These are summarized in Table 11 and discussed further as follows.

First, the data suggests that the TRF could be revised. If revised, the definition would remain the same and only items on the TRF that met the acceptable I-CVI criteria of above .82 and k^* of above .84 for its representativeness to Brunei's definition (i.e. items 2, 4, 5, 6, 7, 9, 10, 11, 24, 26, 27, and 28) would be retained. Further, as the factor analysis yielded only one factor, then the revised instrument would only be represented by one factor that describes the attributes of gifted students in Brunei.

Second, another instrument could replace the TRF. The lack of content-related validity as demonstrated in the overall S-CVI suggests that the TRF does not include behaviors or descriptors teachers could identify representing the definition or the typical student in Brunei. Subsequently, this leads to the questionability of the definition as discussed earlier. Further, the results of the factor analysis indicate that the TRF does not converge to the hypothesized factors, signaling the need for a new instrument or the

suitability of an existing instrument investigated to ensure an alignment between definition and instrument. Considering the likelihood that the definition would require revision, the practical implication presented through the data suggests the development of a new instrument to replace the TRF or the adaptation of an existing instrument that would align with the new definition and program objectives seems inevitable.

In summary, although two seemingly different options are available, both require the existing definition to be revised.

Identification stage. The outcomes of the analysis also impact the identification stage as decisions made in the nomination stages greatly affect a student's opportunity to demonstrate potential and to participate in a gifted education program. In Brunei, teachers only complete the TRF for students who met several specific criteria. These criteria are: a minimum average of 90% in all course work, receipt of awards for achievement, service in leadership positions, and high proficiency in the English Language. This means that even before teachers completed the TRF the nomination process created a narrow selection pool. Narrowing the selection pool may have unnecessarily limited the opportunity for some students who are not good test-takers or who do not have the opportunity to receive awards or hold leadership positions to be considered for the gifted education program. Instead, the nomination stage should be more inclusive and provide greater opportunity for students who may not excel academically, but demonstrate gifted behaviors as recognized within the Brunei educational culture to be considered for the gifted education program. In particular, it eliminates the opportunity for input from those who can judge students in the learning environment over time. This signals the need to

evaluate what takes place at the different identification stages irrespective of whether or not the definition remains the same.

The Role of Teachers. When teachers act as primary agents in the nomination stage or any other stage in the identification process, they represent the person most knowledgeable about the students' behavior within the school environment. This means teachers are positioned to be crucial information givers and they require training on how to use any chosen assessment to ensure the scale is completed in relation to the guiding definition. Further, the definition and the items on the scale must be clear and understood by teachers. In Brunei, teachers were trained on how to complete the TRF, and at the training sessions discussions took place on how the behaviors described on the TRF would manifest themselves in Brunei's classroom environment. With an S-CVI of above .82 and k^* of above .84 on clarity indicates that reviewers agreed that items on the TRF were clearly constructed. Further with a high reliability alpha coefficient of .97 indicates that the TRF was completed consistently over the six years and suggests that a particular component of the training session was effective at maintaining this observed consistency. However, as lack of content-related validity was observed and considering Brunei's unique learning and educational culture, there may be student characteristics in the TRF for which teachers do not have sufficient opportunity to observe in the typical classroom.

A teaching environment, such as that in Brunei classrooms, utilizes memorization (i.e. rote learning) over creating or developing information (i.e. constructivist approach) (e.g. Jaidin, 2009), may eliminate the opportunity for some student behaviors on the TRF to be observed. For instance, in an investigation utilizing the Learner's Perspective

Study[6] (LPS), four teachers' perspective on questioning revealed that in their typical mathematics lesson, students had little time or no opportunity to ask questions (Shahrill & Clarke, 2014). When students are presented with little time or no opportunity to ask questions, behaviors such as those described in the TRF (e.g. curious/inquisitive) may not be readily observed; thus rendering teachers' completion of scales such as the TRF for the students questionable. Subsequently, the impact of Brunei's learning and educational environment affects not only the definition, but also teachers' opportunity to observe behaviors and accurately rate students' behaviors on the TRF.

Conclusion. The results of this study have amplified the role of checklists for the identification of gifted students, the broader implication of adapting an existing checklist developed in a Western cultural setting, and the application of the definition and understanding of giftedness within a non-Western setting. This study affirms other studies that discourage the use of only one instrument as a method to select or enroll students into a gifted education program. Checklists should not be used in isolation and provide the sole information to select students for a program. The role of the TRF, like other similar instruments, is to provide information about students' academic achievement to be weighed and considered with other student related information. Further, despite the often questionable quality of teachers' rating of students using such checklists, they are the person(s) most familiar and most appropriate to provide an insight on the students' classroom achievement.

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[6] LPS is an adaptation of the complementary accounts methodology (Clarke, 1997), characterized by (1) the construction of "integrated data sets" (videotape and interview data); (2) the inclusion of the reflective voice of participants; and (3) an analytical approach that utilizes a research team with complementary but diverse areas of expertise to carry out a multifaceted analysis of a common body of classroom data.

The definition guides the development of the instrument with which to be used in the identification process. In particular the TRF, which as the information indicates was not based on the definition that has been described in the concept paper, may misidentify or limit the identification of the students appropriate for the program. In their investigation on definitions and identification practices in the United States, McClain and Pfeiffer (2012) collated seven domains, which they also describe as identification methods. Examples of these are intelligence, achievement/ability, specific area, creativity, leadership, performing arts, and motivation. Each domain has a specific method for measuring students' capability. "...performance in general or specific ability areas" as described in Brunei's definition does not provide guidance on the domains that are of interest nor does it provide information on how students' capability could be assessed. Thus, the nature of Brunei's vague definition does not provide explicit directions towards identification. As such, with the existing definition, it is difficult to determine the inferred domains in Brunei's definition[7] and also the metric or the ways in which the "exceptional performance" could be measured. Such uncertainties, which may lead to issues regarding identification, will be discussed in the next section.

The Influence of Culture - An Emergent Theme to Consider in Understanding the Observed Outcomes

Giftedness is a socially constructed phenomenon. Researchers (e.g. Kaufman & Sternberg, 2008) recognize that there are varied conceptions of giftedness, dependent on the societal expectations of that particular state, community, or society. Descriptions of

[7] Gifted and talented students are those who by virtue of outstanding abilities are capable of exceptional performance in general or specific ability areas.

giftedness in the definition are used as reference to guide educators to determine the domains of interest and to choose the appropriate tools in the identification process. As such, many existing descriptors including those in Rogers's checklist are based on the Western literature; Brunei as an Asian community may reflect descriptors that are different. In the following paragraphs, I discuss grounds for possible differences, the research and literature that evidence and support the existence of possible differences, the issue in acknowledging the legitimacy of the possible differences, then relate these differences to the observed outcomes on the TRF and the broader implication of this theory to the conception of giftedness as a whole.

Seeds of differences. Descriptors of giftedness related to Brunei may be governed by existing societal and cultural systems, called *adat*[8] (Phillipson, 2007). Within these systems, scholars (Blunt, 1989; Dhindsa, 2005, 2008) have reported that Brunei's society to be collectivist. The behaviors of individuals raised in a collectivist culture are "motivated by group interests," where "the group can be the extended family, the clan, the tribe, or some other type of in-group with which people have learned to identify" (Hofstede, 1984, p. 86). Indeed, such behaviors are not confined to social spaces. In fact, the influence of the cultural structure is reflected in students' behaviors in the classrooms as well as the interaction between teacher and student(s) (Dhindsa, 2008). If students in Brunei demonstrate different learning behaviors than those described in the Western

[8] Adat "refers to the wide range of local customary regimes characterizing the diversity of ethnic groupings and local communities across the Malay-Indonesian archipelago" (Levinson & Christensen, 2002, p. 13). The implication of such practice is broader than the typically referenced meaning of culture (Levinson & Christensen, 2002).

literature, as a consequence of the culture – the *adat*, this means that it is likely that descriptors of gifted students in Brunei may be different.

Evidence of differences. Being raised in a collectivist society predisposes an individual to behave in according to society-designed expectations. Though research on classroom environments in Brunei is limited, those available affirm the descriptors of student behaviors in a collectivist society as described by Hofstede et al. (2010). For instance, students' participation in the classroom is often limited (Dhindsa, 2008) including reduced opportunities to ask questions (Shahrill & Clarke, 2014). Limited participation from students suggests equally limited interaction between teacher and student(s). In the collectivist society, the role of hierarchy is important (Dhindsa, 2008), and in schools, teachers are considered to be higher up in the hierarchy. Dhindsa (2008) reported that students' discourse are often "suppressed by teachers" (p. 262), the person regarded as the superior authority in the classroom. The expectation would be that students comply with the person of authority (the teacher) to maintain harmony and face (Hofstede et al., 2010). When students behave in such a manner, it means that students greatly rely on their teachers (Dhindsa, 2008) as an information source to acquire knowledge and that learning would be in the form of memorization and not construction. Further, because of the teacher's cultural stature, to challenge their authority in class would not be common practice. Such learning behavior is consistent with rote learning, an approach that has been reported to be present in Brunei schools (e.g. Attwood & Bray (1989); Burns & Upex (2000), cited in Jaidin, 2009) which promotes minimal

confrontation and conflict in the classroom (Hofstede et al., 2010). Hence, teaching in Brunei is not child-centered -- often described as didactic (Jaidin, 2009).

When students' learning environment is shaped by influential cultural expectations, their learning behavior, how teachers teach, and behavioral expectations in the classroom may be affected. The learning behaviors described in the Western literature, borne from within an individualistic society would be different, if not directly opposite to those expectations in a collectivist society. Therefore, using a checklist of student behaviors for the gifted developed in the West, likely would consist of descriptors typically present and observed in an individualistic society. As discussed above, those descriptors may not represent the gifted according to Brunei culture. In fact, due to the differences between students' behaviors, teachers' (in Brunei) opportunity to observe behaviors and accurately rate students' behaviors on the TRF may not be present (i.e. teachers may have rated students on behaviors not typically present in Brunei classrooms).

Are possible differences legitimate? If differences exist, one would assume that the uniqueness would be recognized. Instead, despite the clear demarcation of Brunei's unique culture, the national goals and desires to achieve, aspire, compete, or be similar to developed systems internationally requires learning behaviors that are uncommon among the Brunei student population. This introduces an element of conflict between what exists within the system and what the system desires (Ministry of Education, 2012; Brunei Economic Development Board, 2008), suggesting a possible absence of the understanding that the conception of giftedness for Brunei may be different. The conflict

arises when Brunei aspires to embrace selected aspects of the modern Western culture that do not occur naturally within the cultural makeup or are contradictory to what is practiced locally. Such conflict has been recognized as the pull between modernity and tradition (e.g., Minnis, 2000).

Several scholars (e.g. Minnis, 2000; Blunt, 1998) have highlighted the conflict phenomena. Using Hofstede's (1984) cultural dimension, Blunt (1998) interviewed several senior executives in an educational institution to understand Brunei's organizational structure. His study concluded there was conflict within the organization that indicated, "a national policy designed to limit the extent and slow down the rate of cultural change and a development policy that advocates rapid educational and technological advancement" (p. 239). Using the same argument, Minnis (2000) speculated that the "limited success" in the vocational and technical education in Brunei might be due to the observed conflict between modernity and tradition. Abdullah Teo (2014) in her study with the aim to understand young people's (15 - 18 year olds) everyday experience provided a glimpse into the above-mentioned conflict. In one of her findings, she noted that students reported the difficulty in balancing academic expectations, social expectations, and familial expectations. In particular, the conflict exists across the dimensions of being expected to achieve academically, the desire to connect with friends, and the need to be present at all times with family members[9].

While the conflict between modernity and tradition needs to be acknowledged, it is a conflict that can be managed. The country's strong desire to continually improve and

[9] The Brunei family network typically includes extended families, and family members means beyond the nuclear family members.

upgrade her standing in the international arena could be used to catalyze the desired expectations. By using existing information and knowledge about Brunei learners, educational programs, curriculum, and standards as well as professional development for teachers could be geared towards shifting the learning and teaching expectation towards a specific common goal. Blunt (1998) recommended such a change "needs to be thought through and resolved at the macro (national) and micro (organizational) levels" (p 239). This common goal could address the identified areas of concern, in particular those areas that assist in developing student potential towards achieving the national goal of Brunei Vision 2035[10]. For instance, using known information, a study could be undertaken to specifically evaluate a particular customized teaching approach designed to develop the learning behaviors currently absent in the Brunei classrooms. For example, an aspect of the teaching approach could be to motivate and encourage students to ask questions by modifying teacher behavior in class, perhaps by giving students time to ask questions, or conveying clearly the message to students of the expectation that they need to ask questions. Or by applying more teaching approaches such as problem based learning or inquiry based learning to create a ready structure whereby asking question is part of the strategy. If asking questions is a new skill, then it may be a skill that should be taught. For example, the Future Problem Solving Program (FPSP) provides students with a structured strategy to solve problems. Successful alumnae from the FSPS apply these strategies on a regular basis when training for competitions, outside of the program, and into their adulthood and careers (Callahan, Alimin, Caughey, Park, & Uguz, 2012). The

[10] Brunei Vision 2035 is the national strategy to aspire and attain development in all sectors towards achieving economic sustainability and national prosperity (Brunei Economic Development Board, 2008).

FSPS approach could be used as template to plan for an integration of necessary skills in the curriculum.

How culture may have affected ratings on the TRF. Considering the influences affecting students' behavior in the classroom, the outcomes on the TRF may not be a true indicator of the gifted student according to Brunei's culture. Teachers may have completed the TRF without proper consideration about how to rate the students because the behavior may not be common or expected in a Brunei classroom. To rate students based on behaviors atypical of a Brunei classroom, may also introduce confusion among teachers as the behaviors in the checklist may conflict with their own beliefs or understanding of gifted behaviors. Further, the checklist itself may have introduced a new understanding or a different expectation of who gifted students may be.

Several items in the checklist may seem less suitable in the Brunei classroom. For instance, in a collectivist society (Blunt, 1989), item 30, "Individualistic, i.e., not afraid to be different from others" may not be easily observed by teachers as students are expected to demonstrate behaviors that represents the collective interest of the group. Hence, a student unafraid to stand out from others may be misinterpreted as being disruptive or as negative, and perhaps, not considered as potentially gifted. In addition, item 8 "Independent and self-directed without minimal guidance/instruction" would be a behavior typically present in a constructivist classroom and not a traditional classroom. In a classroom where learning largely is rote, such behaviors reflecting the constructivist approach may not be easily observed or recognized. Further, other learning behaviors nurtured in the constructivist classroom such as item 17 "Original/innovative and able to

generate new ideas and solutions for problems" and item 27 "Understand abstract ideas and concepts" may be equally difficult or frequently observed, or not present at all.

Reconciling differences. Researchers (e.g. Leung, 1981; Frasier, 1987) suggest a solution that views giftedness from two perspectives. The first perspective views giftedness as a set of underlying traits that transcends historical time and cultural contexts, and the second perspective views the behavioral manifestations of giftedness, which may vary in different contexts and relates to how the definition may be operationalized. More recently, Subotnik, Olszewski-Kubilius, & Worrell (2011) proposed a definition that may support Leung's (1981) proposition, where based on their research on giftedness, that it represents "performance or production that is clearly at the upper end of the distribution in a talent domain even relative to that of other high-functioning individuals in that domain" (Subotnik, Olszeweski-Kubilius, & Worrell, 2011, p. 7) and that "reflects the values of the society" (Subotnik, Olszeweski-Kubilius, & Worrell, 2011, p. 7).

Therefore, though cultural differences exist, this does not indicate or suggest that Brunei classrooms are devoid of any of the student's behavior in the checklist. The difference merely contributes to an understanding that there are other behaviors, described by the research, that are more prominent and descriptive of student's behaviors in Brunei. Subsequently, these behaviors should be included in the checklist to be considered by teachers as descriptors of gifted students in Brunei.

Proposal for a Revised TRF

Brunei is predominantly populated by Malays (CIA, 2014). As the dominant race, many of the cultural practices and rituals adhere to the Malay culture. Phillipson (2007) theorized the Malay conception of giftedness through a discourse of Malay culture and the practices observed based on the history of Malays, Malay classical literature and art form, and Malay psychology and cultural practices. Malay cultural practices include Malay shamanistic practices, Malay *adat*, Malay policies, and political leadership. According to Phillipson, four main values contribute to the Malay conception of giftedness: cunningness, natural ability, creativity, and mastery. Phillipson based her chapter on the Malays in Malaysia; Brunei being part of the Malay Archipelago[11], also shares similar culture, practices, and beliefs, with the exception of political leadership. Further, as the dominant culture, these behaviors may be those equally valued by Brunei's society.

In addition, the behaviors representative of students in Brunei described in research may not fully describe gifted students in Brunei. A more comprehensive understanding of the gifted Brunei student may require investigations on teachers', parents'/ experts' description of those behaviors, a reconciliation of how western valued learning characteristics is manifested in Brunei classrooms, and investigations of how implicit and explicit cultural values affect teaching practices and influence students' learning behaviors. Unless additional information is sought, the TRF remains questionable.

[11] Malay archipelago is the collection of islands and landmasses in South China Sea and its immediate surrounding area.

Study Limitations

First, due to the exclusive criteria for nomination, the number of entries for TRF was far less than what was expected. Considering the number of years for which the data was collected and the number of schools in Brunei, the final number should have been more. The limited number may have contributed to the outcomes on the factor analysis.

Second, McCoach, Gable, and Madura (2013) recommend "having a diverse and representative sample is very important during the pilot process. (p. 117)." The development of TRF did include a pilot study; however, the sample may have been limited and the pilot study itself did not include any statistical analysis.

Third, as gifted education is new in Brunei, it is uncertain as to whether teachers' understanding of gifted education was based on Brunei's definition, norms of the Brunei culture, or images of giftedness from mass media. The analysis of the data does not provide insight into the underlying understanding of giftedness –either in general or in relation to the Brunei culture.

Fourth, in some instances some of the TRF were based on a combined rating among several teachers. Although teachers were asked to decide on the rating based on consensus among teachers, it is uncertain how the final ratings were decided upon.

Summary

Despite the limitations discussed above, the analysis of use of the Teacher Referral Form in Brunei points to several issues that should be carefully considered in the adoption of any instrument for use in a new setting, and particularly in a new cultural setting. The first of these is the appropriateness of the definition of the construct, which the

measurement is intended to reflect. When a Western construct is applied in other cultures the meanings may not reflect the beliefs and values of the other culture, which may then result in measurement issues. Even if the definition is satisfactory, an instrument selected to measure the definition/construct may not have content validity for that definition or may not be suitable in reflecting the cultural manifestation of the construct. The data from the use of the TRF in Brunei illustrates the potential for both of these issues to inhibit adequate identification of gifted students.

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Appendix A. The TRF from 2009 -2014

	2009		2010		2011		2012		2013		2014
1	Reads extensively	1	Reads extensively	1	Reads extensively	1	Reads extensively and prefers complex reading materials i.e. of older age group or adult standard	1	Reads extensively and prefers complex reading materials i.e. of older age group or adult standard	1	Reads extensively and prefers complex reading materials i.e. of older age group or adult standard
2	Prefers complex reading materials i.e. of older age group or adult standard	2	Prefers complex reading materials i.e. of older age group or adult standard	2	Prefers complex reading materials i.e. of older age group or adult standard						
3	Excellent memory	3	Excellent memory	3	Excellent memory	2	Excellent memory	2	Excellent memory	2	Excellent memory
4	High level of concentration and task commitment in area of interest	4	High level of concentration and task commitment in area of interest	4	High level of concentration and task commitment in area of interest	3	High level of concentration and task commitment in area of interest	3	High level of concentration and task commitment in area of interest	3	High level of concentration and task commitment in area of interest
5	Extensive vocabulary beyond age or grade level either	5	Extensive vocabulary beyond age or grade level either	5	Extensive vocabulary beyond age or grade level either	4	Extensive vocabulary beyond age or grade level either	4	Extensive vocabulary beyond age or grade level either	4	Extensive vocabulary beyond age or grade level either

	verbal or written		verbal or written		verbal or written		verbal or written		verbal or written		verbal or written
6	Curious/inquisitive; asks intelligent questions (distinct from factual or information questions); tries to ask "how" or 'why' of things	6	Curious/inquisitive; asks intelligent questions (distinct from factual or information questions); tries to ask "how" or 'why' of things	6	Curious/inquisitive; asks intelligent questions (distinct from factual or information questions); tries to ask "how" or 'why' of things	5	Curious/inquisitive; asks intelligent questions (distinct from factual or information questions); tries to ask "how" or 'why' of things	5	Curious/inquisitive; asks intelligent questions (distinct from factual or information questions); tries to ask "how" or 'why' of things	5	Curious/inquisitive; asks intelligent questions (distinct from factual or information questions); tries to ask "how" or 'why' of things
7	High interest in complex problem solving	7	High interest in complex problem solving	7	High interest in complex problem solving	6	High interest in complex problem solving	6	High interest in complex problem solving	6	High interest in complex problem solving
8	Learns information and skills quickly with little repetition and practice	8	Learns information and skills quickly with little repetition and practice	8	Learns information and skills quickly with little repetition and practice	7	Learns information and skills quickly with little repetition and practice	7	Learns information and skills quickly with little repetition and practice	7	Learns information and skills quickly with little repetition and practice
9	Independent and self-directed with minimal guidance /instruction	9	Independent and self-directed with minimal guidance /instruction	9	Independent and self-directed with minimal guidance /instruction	8	Independent and self-directed with minimal guidance /instruction	8	Independent and self-directed with minimal guidance /instruction	8	Independent and self-directed with minimal guidance /instruction
1	Highly	1	Highly	1	Highly	9	Highly	9	Highly	9	Highly

0	self-motivated	0	self-motivated	0	self-motivated		self-motivated		self-motivated		self-motivated
11	Good analytical skills i.e. able to see relationships/ patterns/ critical details	11	Good analytical skills i.e. able to see relationships/ patterns/ critical details	11	Good analytical skills i.e. able to see relationships/ patterns/ critical details	10	Good analytical skills i.e. able to see relationships/ patterns/ critical details	10	Good analytical skills i.e. able to see relationships/ patterns/ critical details	10	Good analytical skills i.e. able to see relationships/ patterns/ critical details
12	Advance numerical skills	12	Advance numerical skills	12	Advance numerical skills	11	Advance numerical skills	11	Advance numerical skills	11	Advance numerical skills
13	Stubborn in own beliefs; strong principles	13	Stubborn in own beliefs; strong principles	13	Holds strong beliefs	12	Holds strong beliefs	12	Holds strong beliefs	12	Holds strong beliefs
14	Reflective/ deep thinker	14	Reflective/ deep thinker	14	Reflective/ deep thinker	13	Reflective/ deep thinker	13	Reflective/ deep thinker	13	Reflective/ deep thinker
15	Socially mature i.e. able to interact comfortably with peers of same age, older and with adults	15	Socially mature i.e. able to interact comfortably with peers of same age, older and with adults	15	Socially mature i.e. able to interact comfortably with peers of same age, older and with adults	14	Socially mature i.e. able to interact comfortably with peers of same age, older and with adults	14	Socially mature i.e. able to interact comfortably with peers of same age, older and with adults	14	Socially mature i.e. able to interact comfortably with peers of same age, older and with adults
16	Appreciation of beauty	16	Appreciation of beauty	16	Aesthetic appreciation	15	Aesthetic appreciation	15	Aesthetic appreciation	15	Aesthetic appreciation
17	Subtle sense of humor	17	Subtle sense of humor	17	Subtle sense of humor	16	Sense of humor	16	Sense of humor	16	Sense of humor

18	Original/ innovative and able to generate new ideas and solutions for problems	18	Original/ innovative and able to generate new ideas and solutions for problems	18	Original/ innovative and able to generate new ideas and solutions for problems	17	Original/ innovative and able to generate new ideas and solutions for problems	17	Original/ innovative and able to generate new ideas and solutions for problems	17	Original/ innovative and able to generate new ideas and solutions for problems
19	Strives towards perfection; self-critical; high expectation of self; often not satisfied with own work or speed	19	Strives towards perfection; self-critical; high expectation of self; often not satisfied with own work or speed	19	Strives towards perfection; self-critical; high expectation of self; often not satisfied with own work or speed	18	Perfectionist tendency; self-critical; high expectation of self; often not satisfied with own work	18	Perfectionist tendency; self-critical; high expectation of self; often not satisfied with own work	18	Perfectionist tendency; self-critical; high expectation of self; often not satisfied with own work
20	Confident; high self-esteem	20	Confident; high self-esteem	20	Confident; high self-esteem	19	Confident; high self-esteem	19	Confident; high self-esteem	19	Confident; high self-esteem
21	Strong sense of justice; concerned about right and wrong/ ethical issues	21	Strong sense of justice; concerned about right and wrong/ ethical issues	21	Strong sense of justice; concerned about right and wrong/ ethical issues	20	Strong sense of justice; concerned about right and wrong/ ethical issues	20	Strong sense of justice; concerned about right and wrong/ ethical issues	20	Strong sense of justice; concerned about right and wrong/ ethical issues
22	Displays an interest in mature topics e.g. war, politics, economy	22	Displays an interest in mature topics e.g. war, politics, economy	22	Displays an interest in mature topics e.g. war, politics, economy	21	Displays an interest in mature topics e.g. war, politics, economy	21	Displays an interest in mature topics e.g. war, politics, economy	21	Displays an interest in mature topics e.g. war, politics, economy

	etc.		etc.		etc.		etc.		etc.		etc.
23	Emotionally sensitive to self and others	23	Emotionally sensitive to self and others	23	Sensitive	22	Sensitive	22	Sensitive	22	Sensitive
24	Tolerant and respectful to others	24	Tolerant and respectful of others	24	Tolerant and respectful of others	23	Tolerant and respectful of others	23	Tolerant and respectful of others	23	Tolerant and respectful of others
25	Observant; Perceptive; Intuitive; Learn more out of a story/ film etc. than others	25	Observant; Perceptive; Intuitive; Learn more out of a story/ film etc. than others	25	Observant; perceptive; intuitive	24	Observant; perceptive; intuitive	24	Observant; perceptive; intuitive	24	Observant; perceptive; intuitive
26	Able to adapt to changes in situations and environment	26	Able to adapt to changes in situations and environment	26	Able to adapt to changes in situations and environment	25	Able to adapt to changes in situations and environment	25	Able to adapt to changes in situations and environment	25	Able to adapt to changes in situations and environment
27	Highly knowledgeable in a variety of topics	27	Highly knowledgeable in a variety of topics	27	Highly knowledgeable in a variety of topics	26	Highly knowledgeable in a variety of topics	26	Highly knowledgeable in a variety of topics	26	Highly knowledgeable in a variety of topics
28	Understand abstract ideas and concepts	28	Understand abstract ideas and concepts	28	Understand abstract ideas and concepts	27	Understand abstract ideas and concepts	27	Understand abstract ideas and concepts	27	Understand abstract ideas and concepts

29	Likes to learn new things;	29	Likes to learn new things	29	Eager to learn new things	28	Eager to learn new things	28	Eager to learn new things	28	Eager to learn new things
30	Carries responsibilities well; reliable and dependable	30	Carries responsibilities well; reliable and dependable	30	Carries responsibilities well; reliable and dependable	29	Carries responsibilities well; reliable and dependable	29	Carries responsibilities well; reliable and dependable	29	Carries responsibilities well; reliable and dependable
31	Individualistic i.e. not afraid to be different from others	31	Individualistic i.e. not afraid to be different from others	31	Individualistic i.e. not afraid to be different from others	30	Individualistic i.e. not afraid to be different from others	30	Individualistic i.e. not afraid to be different from others	30	Individualistic i.e. not afraid to be different from others
						31	Altruistic behavior i.e. unselfish regard for devotion to the welfare of others	31	Altruistic behavior i.e. unselfish regard for devotion to the welfare of others	31	Altruistic behavior i.e. unselfish regard for devotion to the welfare of others

Appendix B. Permission to Access Data

Flat C3, JKR 1005, Simpang 373-18
Jalan Pasar Baharu, Gadong BE1318
Tel : 2446553
Faks : 2446551

اونيت ڤندидيقن خاص
UNIT PENDIDIKAN KHAS
KEMENTERIAN PENDIDIKAN
MINISTRY OF EDUCATION
NEGARA BRUNEI DARUSSALAM

(02)/Sp.Ed/P/21/I Pt.2

12 Sya'ban 1436
30 Mei 2015

Yang Mulia,
Dayang Mona Aliana binti DP Hj Mohd Alimin
136 University Gardens, Apt 9,
Charlotteville, VA 22903,
USA
JPKT/PA/7875

Cikgu,

MEMOHON KEBENARAN MENGGUNAKAN MAKLUMAT PELAJAR DI UNIT PENDIDIKAN KHAS

Dengan hormat sukacita merujuk surat Cikgu bertarikh 15 Rejab 1436 / 04hb Mei 2015 mengenai permohonan kebenaran untuk menggunakan data atau maklumat mengenai pelajar cerdas pintar yang dirujuk ke Unit Pendidikan Khas.

Sehubungan itu, sukacita memaklumkan bahawa Unit Pendidikan Khas, Kementerian Pendidikan tidak ada halangan dan membenarkan Cikgu untuk menggunakan data dan maklumat mengenai pelajar cerdas pintar yang dirujuk ke Unit Pendidikan Khas sebagai bahan penyelidikan projek Ph.D Cikgu. Cikgu boleh berhubung dengan pegawai di Unit Pendidikan Khas yang bernama berikut bagi mendapat dan menggunakan maklumat yang diperlukan.

Dyg Rozi Suzanah binti Yatab, Pegawai Pelajaran, Unit Pendidikan Khas melalui nombor telefon: 8806258 atau fax bernombor: 2446551 atau e-mail: honeybee_27@live.com

Sekian dimaklumkan.

"Keluarga Berwawasan"

(AWG BUKIT BIN HIDUP)
b.p. Ketua Unit Pendidikan Khas
Unit Pendidikan Khas
Kementerian Pendidikan
Negara Brunei Darussalam.

BH/Kai...HP1

Translation of the permission letter:

Dayang Mona Aliana binti DP Hj. Mohd. Alimin
136 University Gardens, Apt 9,
Charlottesville, VA 22903,
USA
JPKT/PA/7875

Salutation,

Permission to Access Student Data at the Special Education Unit

In reference to your letter dated 15 Rejab 1436/04 May 2015 regarding the permission to access and use information on student referred to the Special Education Unit.

I am pleased to hereby inform you that the Special Education Unit, Ministry of Education has granted you permission the access to and use of data on students who were referred to the Special Education Unit (Gifted Education Services) for the purposes of your dissertation study. You may contact the officer named below to access the data of interest.

Dyg Rozi Suzanah binti Yatab, Education Officer, Special Education Unit on 880358, or fax at 2446551, or via email at honeybee_27 @live.com.

For your further perusal.

Awg Bukit bin Hidup
On behalf of the Head of Special Education Unit,
Special Education Unit,
Ministry of Education,
Brunei Darussalam.

Appendix C. INSTRUMENT TO EVALUATE CONTENT-RELATED VALIDITY OF BRUNEI'S TEACHER REFERRAL FORM

INSTRUCTIONS

This measure is designed to evaluate the content validity of Brunei's Teacher Referral Form (TRF) against Brunei's definition of giftedness. Brunei's definition states that, "Gifted and talented students are those who by virtue of outstanding abilities are capable of exceptional performance in general or specific ability areas" (Special Education Unit, 2008, p.14).

Your task will be to assess the 31 items on the TRF based on five different dimensions.

These five dimensions are divided into two parts: part A and part B.

Part A includes three dimensions: content representativeness, relevance, and clarity.

i. **Content representativeness.** Rate the degree to which the item appears to be based on or derived from some aspect of Brunei's definition of giftedness.
   - **Content —**
     1- not based or derived from Brunei's definition
     2- vaguely based or derived from Brunei's definition
     3- partially based or derived from Brunei's definition
     4- is based or derived from Brunei's definition

   In addition, also rate the degree to which the item appears to refer to skills related to literacy, numeracy, or science[12].

ii. **Relevance.** Rate the degree to which this item is relevant based on your understanding and knowledge of giftedness.
   - **Relevance —**
     1- not relevant
     2- somewhat relevant
     3- relevant
     4- very relevant

[12] A review of curricular documentation alluded to an emphasis on skills related to literacy, numeracy, and science.

iii. **Clarity.** Rate the degree of clarity of the item –the degree to which the statement would likely be easily understood and commonly understood by teachers.

- **Clarity —**
  1- not clear
  2- somewhat clear
  3- clear
  4- very clear

Part B includes two dimensions: factor assignment, and comprehensiveness.

iv. **Factor assignment.** Indicate which of the several proposed underlying factors this item best represents

- **Factors —**
  1-Academic - behaviors or attributes to be successful in school;
  2-Personal - behaviors that are seen as a personal preference, a behavior that may stand out when compared against other students;
  3-Social - behaviors or attributes that provide insight into students' understanding of their environment, of themselves as learners, and how they interact with other people around them.
  4-None of the above – if the item does not fit any of the suggested factors. Suggest a factor that may be more suitable for this item

v. **Confidence**. Please indicate your level of confidence that the item belongs to the factor which you have assigned

- **Certainty —**
  1-completely unsure
  2-unsure
  3-pretty sure
  4-very sure

vi. **Comprehensiveness.** Please evaluate the comprehensiveness of the entire measure by indicating items that should be deleted or added.

Before proceeding with the review, please describe in your own words your idea or perception for the definition of giftedness in the box below.

Thank you for your willingness and time to provide this review.