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“Is the beast finally consumed?”

- Critically un-packaging the elusive construct of Distributed Leadership

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Abstract

A review of the literature reveals broadness in the conceptual and operational definition of the construct, Distributed Leadership (DL) (refer to discussions by Spillane, Gronn, Harris, Bennett, and Leithwood), making it elusive. The elusive nature of DL is due in part to the term 'leadership' which is contested among educational theorists; while the other, is due to the lack of attempts at trying to unpack and measure this construct. The purpose of this study is to unpack and discuss key dimensions of the construct of DL based on a nation-wide survey of school leadership in Singapore. Special care was taken in critically determining these dimensions and not areas or aspects where DL may be applied. In other words, we are more interested in the essence of DL rather than categories of distributed leadership practices, which most leadership researchers employ. This study is especially timely in view of the rising trend in school-based curriculum development and innovation towards growing expansion of student learning outcomes beyond the academic subjects such as the 21st century skills. The growing importance of school-based development and innovation calls for leadership practices that not only improve classroom teaching and learning, but also greater devolvement of decision-making power at the school and classroom levels. In the process of better understanding the DL construct, it is an imperative aim of much multivariate analysis is to reduce the dimensionality of the data collected. This is essentially desirable in the investigative stages of a research to provide a lucid interpretation of the data and theoretical measurement model building. This requires the use of a proper metric. As such, Exploratory Factor Analysis was performed on the Rasch (linearized) standardized residuals (see Linacre, 1998, 2006; Wright, 1994, 1996). The DL instrument consists of 25 items, and the sample involved schools leaders from Singapore (i.e., 224 Principals, 322 Vice-Principals and 686 middle-level school managers). The findings provided evidence that the Rasch residual-based factor analysis yielded 4 possible factors of DL. The discussion on these factors will be presented.

Introduction

Although the term 'distributed leadership' (DL) has been around for a long time, it has only recently gained currency in the educational discourse (Gronn, 2000; Harris, 2004; Gronn, 2006; Harris & Spillane, 2008). Hartley (2007, 2009) observed that the rise to prominence in DL can be attributed to contemporary reform of the public service that demand greater joined-up or network regime of governance, a societal culture wherein all categories and classifications are weakened and rendered increasingly permeable (a flexible 'liquid modern' view of space and time) and the new work order consistent with the knowledge economy, where individuals work and learn beyond bureaucratic enclosures using their loose spatial and temporal codes. Specifically, DLs' attraction in education lies in its potential to bring about school improvement (Harris, 2007). Claims have also been made on DL's potential impact on instructional aspects of leadership (Elmore, 2000; Smylie, Conley & Marks, 2002; Spillane & Louis, 2002), and leveraging on instructional improvement (Murphy & Datnow, 2003; Timperley, 2005; McBeth, 2008). DL, along with transformational leadership, has also been claimed to supersede transactional leadership in influencing school climate and environment, and enhancing the instructional capacities of teachers (Spillane, Halverson, & Diamond, 2003). And although the literature remains agnostic about its impact on the effectiveness on student achievement due to insufficient empirical data (Bennett *et al.*, 2003), its potential to do so remains intuitively attractive and compelling (Leithwood *et al.*, 2006), and as such, it is officially endorsed as good practice (Hopkins, 2001).

However, the understanding of DL in the educational leadership discourse is mainly broad, and to a lesser extent, contested. Ironically, the elasticity of its meaning has contributed to its appeal (Spillane & Diamond, 2007, p.1). The term has been equated to shared leadership, delegated leadership and democratic leadership, even though these are not synonymous to the distributed perspective of leadership that Spillane (2005) offers. Indeed, there are few clear definitions of DL (Bennett *et al.*, 2003). The lack of clarity in the definition of DL has also been contributed to the elasticity that educational leadership researchers bestow on the term 'leadership'.

While the broadness of DL's definition is accepted among educational leadership researchers, some had attempted to make it more understandable by providing aspects of its principles. As an example, Harris (2008) identified the following common principles of distributed leadership:

- is broad-based leadership
- requires multiple levels of involvement in decision-making
- focuses primarily on improving classroom practice or instruction
- encompasses both formal and informal leaders
- links vertical and lateral leadership structures
- extends to students and encourages student voice
- is flexible and versatile (non-permanent groupings)
- is fluid and interchangeable
- is ultimately concerned with improving leadership practice

While such attempts are laudable, its substantive conceptual construct remains elusive. This elusiveness potentially weakens the methodological explanatory force of its effects on a range of school improvement outcomes, which some educational leadership researchers had tried to establish thus far (e.g., Silins & Mulford, 2002; Leithwood *et al.*, 2004; Leithwood *et al.*, 2007; Leithwood & Mascal, 2008; Hallinger & Heck, 2009; Heck & Hallinger, 2009; Camburn & Han, 2009; Louis *et al.*, 2009, Mayrowetz *et al.*, 2009; Timperley, 2009).

Furthermore, although DL has been said to be in its adolescence stage (Leithwood, Mascal & Strauss, 2009), its empirical methodological rigor is still in its infancy. In their conclusion of their book *Distributed Leadership According to Evidence*, Leithwood *et al.* (2009) stressed the importance of gaining a more nuanced appreciation of the anatomy of DL in regard to its potentially wide array of different leadership patterns and functions which arise as a response to many different challenges. Without this, they claimed that "it is not at all clear how one would have conceptualized and measured distributed leadership in order to assess its effects, whatever they might have been" (p. 281). They also stressed in

the same text that the dilemma is the “independent variable” in impact studies of DL. This implies the necessity to go back to research basics – “What is the essence of DL?” or “What is the construct of DL?”

With the current call for further impact study of DL on a range of school improvement outcomes including student learning outcomes (Harris, 2009; Leithwood, Mascall & Strauss, 2009), the inevitability of relying on quantitative research method and its methodological principles become more apparent. One aspect of quantitative methodological rigor has to do with measurement of constructs. As constructs are basically human abstractions containing the essence of observed phenomena, they are derived by the merging of theoretical and operational analyses. And although much has been written on the theoretical analysis of DL, what is still lacking is the rigor of the operational analysis of DL, which requires the construction of DL measures. Even though this proposition predominantly relies on the quantitative methodology, it is justified on two grounds. First, the pursuit to attain rigor in large scale impact studies of DL requires appropriate statistical models belonging to quantitative research methods. The use of qualitative research methods such as ethnographic data collection to investigate the impact of DL are nevertheless possible but is highly resource demanding, and suffers from the inability to make tight comparisons of the constituents in the phenomenon being observed from the wide diverse range of contexts. Second, quantitative methodology employs the notion of reductionism at the methodological, ontological and theoretical levels. Correspondingly, they seek to reduce an explanation, reality and theory to the smallest possible entity. This is useful for DL field of study, as well as educational leadership in general, insofar as it compels education leadership researchers to agree on the constituents of the DL construct, rather than accepting the broadness of it or adding on more to it. The process of reductionism essentially ensures the derivation of the DL construct that is tight, coherent and distinguishable from other leadership models or types. The reliance on reductionism to generate the DL construct does not necessarily lead to an over-simplification of the phenomenon, which is consistent with the critique on positivist understanding of social phenomena. Rather, we rely on a post-positivist approach to the generation of a social science construct – that is, a construct can have multiple distinct but related dimensions

which in combination produce the construct (Law, Wong & Mobley, 1998). Without a tight, coherent and distinguishable construct of DL, the veracity of any statistical model will be severely undermined.

However, research examining the effective measurement of DL is still scarce (Hulpia, Devos & Rosseel, 2009). The task now is for educational leadership researchers to seriously consider generating robust measures for the DL construct. The current broadness or looseness of DL construct potentially undermines the rigor of any quantitative or qualitative research studies in DL. And although it has been critiqued that most empirical studies on DL employs qualitative research method (e.g., Timperley, 2005; Firestone & Martinez, 2007), we maintain that construct validity is not absent in qualitative studies of DL even though it may be couched in different terms such as 'essence', 'concept' or 'phenomenon', and should be vigorously and persistently pursued. Both quantitative and qualitative research methodologies cannot escape the necessity for the iterative dialectical analysis between the theoretical and observational terms of the DL construct. While the former relies on conceptual construction based on existing theories, the latter relies on practical construction based on existing observations. The latter is consistent with the operational analyses mentioned earlier. Spillane (2004) is therefore correct to focus on practice – asserting that “distributed leadership is first and foremost about leadership practice rather than leaders, leadership roles, or leadership functions” (p. 1). The theorization of DL practices would enable us to operationalize its concept, and in doing so, arrive at its conceptual construct. The importance of understanding leadership through practice has also been emphasised by Leithwood et al. (2007) proposing that DL essentially “assumes a set of direction-setting and influence practices” (p. 20) which are “potentially enacted by people at all levels rather than a set of personal characteristics and attributes located in people at the top” (Fletcher & Kaufer, 2003, p. 22). The focus on practice/s or patterns of practices proposed by Leithwood et al. (2007, 2009) only strengthened our stand in the necessity to clarify the operations of DL in order to clarify the construct of DL and its potential multiple dimensions in either quantitative or qualitative research paradigm so as to attain rigor in future impact studies of DL.

Another principle of measurement which we recommend is the concept of linearity of data to enhance validity of construct measures. The impact studies of DL mentioned above had predominantly rely on raw scores, which are non-linear. Concerns over the use of ordinal (raw score) variables are not new and have been the subject of considerable discussion in the methodological literature (see Clogg & Shihadeh, 1994; Harwell & Gatti, 2001). Ordinal data are categorical data with certain kind of order structures or logical ordering to the categories. As such, not all numbers represent equal interval scales, no matter how equally spaced their values may appear. Rank order numbers do not specify whether the distance between 1 and 2 is equal, greater or less than the distance between 2 and 3 in the 'amount' of the variable that it is measuring. A good example is raw scores obtained from respondents responding to Likert scales. Sadly, raw scores do not necessarily satisfy the assumption of normality necessary in many statistical procedures and statistical results may be biased or spurious which threatens the validity of inferences (Harwell & Gatti, 2001; Zumbo & Zimmerman, 1993). This is because uncontrolled or inadequately assessed random measurement error can weaken the research conclusions in relation to the fit between a model and the data (Blalock, 1965). The bigger contribution to errors in statistical inferences and correlations, however, is the fact that raw scores are non-linear (see for example, Wright, 1992, 1993a, 1993b).

Finally, we propose that the understanding of the DL construct be understood beyond western cultural lenses. Many researchers remain cautious in embracing such 'universal' management concepts and principles cross-culturally (e.g., Collard 2007; Dimmock & Walker 2000a, 2000b, 2000c, 2004; Hallinger & Kantamara 2000, 2001; Hallinger & Leithwood 1996a, 1996b).

Purpose of Study

It is evident from the review of the existing literature that there is much dissension and lack of agreement on the conceptualization and operationalization of DL. As such, researchers are often faced with several major obstacles in their quest to unpack this elusive DL construct: (1) they may not understand fully the dimensions of the DL construct in the education context, (2) they do not have reliable and valid instruments for measuring perceptions of DL practices, and (3) they continue to overlook cultural variations,

preferences and sensitivities of educators who possess distinct cultural identities. In the absence of a sound empirical based theory and more robust methodology in measuring DL perceptions, researchers and educators alike can never be sure what factors provide appropriate explanation of leadership in schools. Acknowledging these concerns, the aim of this study is to address the above problems by combining existing rich perspectives (albeit varied) on DL with a robust measurement approach in the hope of unraveling DL in a Singapore context. This study has three main research objectives – (1) To develop a scale and sub-scales for measuring the DL construct, (2) to validate the instrument through Rasch Analysis (i.e., removal of misfitting items and /or persons), and (3) to determine the factor structure of the DL construct.

Methodology

A total of 1,232 Singapore school leaders participated in this study, comprising 224 Principals, 322 Vice-Principals and 686 middle-level school managers. The key variables under investigation are school principals' perceptions of their own DL practices and (ii) vice-principals and key personnel's perceptions of their principals' DL practices along corresponding items from the Principals' instrument. The instrument was developed for this study based on our analyses of the facets of DL from existing literature. From our initial analyses of the literature, there seems to be three possible dimensions of DL and they are – (i) degree of empowerment, (ii) degree of interaction for shared leadership and (iii) degree of development for leadership. The instrument consists of 25 statements relating to DL practices based on the three dimensions (See Appendix 1). The respondents were asked to check one of the following responses in surveys: '1=*Strongly disagree*'; '2=*Disagree*'; '3=*Neutral*'; '4=*Agree*'; or '5=*Strongly agree*'.

Analysis

(a) Data cleaning and constructing a common scale

Rasch Model is a probabilistic model for which the raw scores are sufficient statistics for the determination of measures, and it does extremely well at “constructing linearity out of ordinality and at aiding the identification of the core construct inside a fog of collinearity”

(Schumacker & Linacre, 1996, p.470). Rasch analysis converts raw rating scale responses into linear units of measurement called 'Logits' or 'Log-Odds Unit'. For polytomously scored items, such as the level of agreement on a five-point scale on our instrument, there are five categories of responses. The probability for any person n responding in category k to item i , according to Wright and Masters (1982), is given by:

$$P_{ntk} = \frac{\exp \sum_{j=0}^k [b_n - (d_i + m_j)]}{\sum_{r=0}^s \exp \sum_{j=0}^r [b_n - (d_i + m_j)]} \quad k = 0, 1, 2, \dots, s$$

Wright (1993) went further to argue that "by observing that when data fit the theory, the specification that a one logit positive difference between any person and any item anywhere on the scale always has the same stochastic consequence" (p.288). When data fit, the interval specification of the theory is established in the data. This puts "ability" (in this case, "the strength of a perception") and "difficulty" (in this case, "the difficulty in agreeing to an item") on a common interval scale. Most importantly, non-linear raw scores results in spurious correlations while clearly, linear measures result in correlations that are closer to their "true" values.

In order that the items are properly calibrated, respondents who did not take the rating scales seriously and are misfitting in their responses (sometimes referred to as misbehaving on the rating scale), need to be removed. Rasch analysis was then run on the data for the measurement of respondents' perceptions of DL. From the analysis, the fit of the items and persons were analyzed. As a guide to what may be considered large infit and outfit mean squares, it is noted that Wright & Stone (1979, p.168) stated that in their practical experience, rejecting persons with a normal deviate (fit statistic) of about 2 is 'unnecessarily conservative' which implies that values slightly above 2 may be tolerated. As such, respondents and items with large z-standardized infit and outfit mean squares of more than 3, as well as large residuals, are considered misfitting and were removed. In the first run, 4 persons (i.e., 1 Principal, 1 Vice-Principal and 2 Key Personnel) were deemed misfitting and removed from the next run. A final Rasch analysis was then run for the cleaned data set (i.e., 1,228 persons) and using all 25 valid items in the instrument. With

this final analysis, we obtained the final person measures in logits of their perceptions of the DL.

(b) Exploratory factor analysis on Rasch standardized residuals

Once the interval scale is established, it is important to note that a given variable may be a hybrid of small existing factors that a single measure will represent (Linacre, 1998). Linacre further added that if factor analysis still needs to be done it should be done using the standardized residuals (i.e., of observed responses minus their expectations) of the item calibrations as these residuals are linear. A residual is defined as “the difference in what is predicted by a model and what is actually observed” (Ludlow, 2002, p.1). According to Ludlow (2002), while some researchers may have dismissed the residual as a nuisance and a distraction he considers residuals as key in the development of theories and models. Evidently, the purpose of the factor analysis of Rasch standardized residuals is an attempt to:

“extract the common factor that explains the most residual variance under the hypothesis that there is such a factor. If this factor is discovered to merely ‘explain’ random noise, then there is no meaningful structure in the residuals.” (Linacre, 1998, p.636)

Providing further support to the use of factor analysis on standardized residuals rather than observed scores, Smith (1996) concluded that when the data are dominated by a small number of highly correlated factors, or one factor, the use of Rasch analysis is recommended. Once a factor has emerged, the advice was to separate its items out of the instrument and use Rasch analysis to analyze them further in order to make sense of the variable (see Goekoop & Zwinderman, 1994). Factor analyses using raw scores and Rasch standardized residuals can result in different factor structure (Green, 1996). However, factor analyses of Rasch measures were simpler to interpret, more stable and informative than those of raw scores (Chang, 1996). Essentially, Rasch analysis provides item and person location on the variable, facilitating the development of a construct theory. This is

not possible with factor analysis using raw scores as it only identifies relationships to the underlying variable, and not the location on it.

Results

(a) Person and Item Separation Reliabilities

Table 1 shows that the person separation reliability is 0.95. The large value indicates a large spread in persons' measures on the perceptions of DL practices and that the instrument can reliably tell the persons apart. At the same time, Table 1 also depicts the instrument's (items) separation reliability as 0.98. This means that the items are well targeted and provide a good spread of the different aspects of perceptions of DL practices in order to sufficiently and hence reliably measure the respondents on this measure.

Table 1: Summary of Persons and Items Separation Reliabilities

INPUT: 1232 PERSONS, 25 ITEMS MEASURED: 1228 PERSONS, 25 ITEMS

SUMMARY OF 1111 Measured (NON-EXTREME) PERSONS

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	MNSQ	INFIT ZSTD	MNSQ	OUTFIT ZSTD
MEAN	102.6	25	3.46	0.46	0.97	-0.4	0.96	-0.4
S.D.	14.4	0	2.4	0.13	0.75	2.5	0.78	2.5
MAX.	124	25	8.38	1.02	5.28	9.9	5.47	9.9
MIN.	26	25	-6.95	0.29	0.04	-5.9	0.04	-5.9
REAL RMSE	0.53	ADJ,SD	2.34	SEPARATION	4.43	PERSON RELIABILITY		0.95
MODEL RMSE	0.48	ADJ,SD	2.35	SEPARATION	4.88	PERSON RELIABILITY		0.96
S.E. OF PERSON MEAN = .07								
MAXIMUM EXTREME SCORE: 115 PERSONS								
MINIMUM EXTREME SCORE: 2 PERSONS								
DELETED: 4 PERSONS								

SUMMARY OF 25 Measured (NON-EXTREME) ITEMS

	RAW SCORE	COUNT	MEASURE	MODEL ERROR	MNSQ	INFIT ZSTD	MNSQ	OUTFIT ZSTD
MEAN	4558.8	1111	0	0.06	0.99	-1	0.96	-1.3
S.D.	118.4	0	0.49	0	0.29	4.3	0.35	4.3
MAX.	4758	1111	0.85	0.07	2.13	9.9	2.34	9.9
MIN.	4347	1111	-0.86	0.06	0.66	-7.8	0.62	-7.2
REAL RMSE	0.07	ADJ.SD	0.49	SEPARATION	7.26	ITEM RELIABILITY		0.98
MODEL RMSE	0.06	ADJ.SD	0.49	SEPARATION	7.58	ITEM RELIABILITY		0.98
S.E. OF ITEM MEAN = .10								

UMEAN=.000 USCALE=1.000
ITEM RAW SCORE-TO-MEASURE CORRELATION = -1.0

(b) Factor analysis

The decision on the number of factors extracted from the Exploratory Factor Analysis of Rasch standardized residuals was based on the following predetermined criteria:

- (i) The latent root criterion. That is, in accordance with the Kaiser (1960) rule, eigenvalues greater than 1 are considered significant. The eigenvalue is the sum of the squared correlations between a factor variate and the p original variables;
- (ii) The percentage of variance criterion (aims to achieve a specified cumulative percentage of total variance extracted by the successive factors); and
- (iii) The Scree test (Cattell, 1966) criterion. The Scree test is used to identify an optimum number of factors that can be extracted before the amount of unique variance starts to dominate the common variance structure.

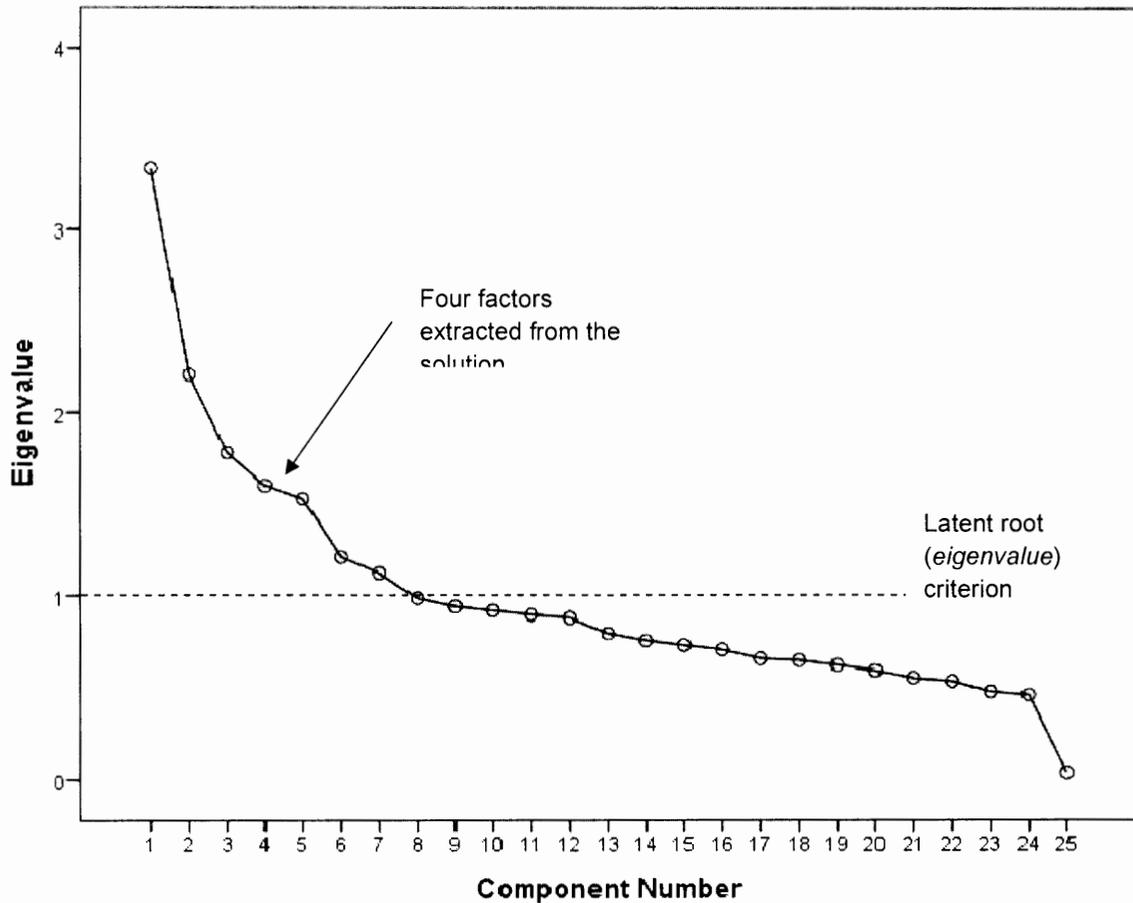
The total variance explained (shown in Table 2) and a Scree test (shown in Figure 1) indicated the presence of four factors, in the matrix accounting for 13.3%, 8.8%, 7.1%, and 6.4% of the matrix variance respectively. From the scree plot, the eigenvalue for the first factor is 3.3, followed by 2.2, 1.8 and 1.6 for the second, third and fourth factor respectively. The total variance explained by the four factors was 35.7%.

Table 2: Total Variance Explained from Principal Components Factor Analysis of Standardized Residuals

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.335	13.341	13.341	3.335	13.341	13.341	2.521	10.085	10.085
2	2.208	8.830	22.171	2.208	8.830	22.171	2.055	8.221	18.306
3	1.782	7.128	29.299	1.782	7.128	29.299	1.888	7.553	25.859
4	1.603	6.414	35.713	1.603	6.414	35.713	1.741	6.963	32.822
5	1.530	6.121	41.834	1.530	6.121	41.834	1.611	6.443	39.266
6	1.210	4.840	46.674	1.210	4.840	46.674	1.608	6.430	45.696
7	1.123	4.493	51.167	1.123	4.493	51.167	1.368	5.471	51.167
8	.987	3.946	55.113						

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 NB: Eigenvalues greater than 1 were considered.

Figure 1: Scree Plot on Rasch Residuals



The four factors were rotated to orthogonal structure using varimax procedures with eigenvalues greater than one. Items loading $>.30$ are listed under their tentative factor labels in Table 3. The four factors from the standardized residuals solution were:

- **Factor I.** There were 5 items in this factor. The loadings reflected a general emphasis on a 'bounded' model of empowerment, albeit with predominantly negative loadings for the Singapore context. The 'bounded-ness' is indicated by the following terms: *'some key operational decisions'*, and *'make decisions within their work scope'*. Also, opportunities for distributed decisions are to be made within a bounded purpose of attaining the school agenda and

informal positions. On the whole, the analysis indicates that empowerment is understood within a set boundary. This factor is labeled '*Bounded Empowerment*'.

- **Factor II.** There were 5 items in this factor. The loadings indicated a broad emphasis on developing leadership – seeking opportunities for staff to gain leadership developmental experiences. However, it must be noted that Singapore schools leaders do not feel that they need to 'accept ultimate accountability for any outcome of shared decisions' or 'build trusting relationships with and among staff'. This factor is labeled 'Developing Leadership'.
- **Factor III.** There were 6 items that loaded on this factor. The loaded items reflected a broad belief about shared decisions. The items related to promoting shared responsibility and the benefits of shared decisions. However, it must be noted that Singapore school leaders feel that they should not be expected to (i) build rapport or trusting relationships with staff, or (ii) provide them with constructive feedback. This factor is labeled '*Shared Decisions*'.
- **Factor IV.** There were 3 items that loaded on this factor. The items all reflected the notion of a collective sense of engagement, such as 'encouraging staff engagement', 'providing platforms for team work' and 'involving staff in shared school decision-making'. This factor is labeled '*Collective Engagement*'.

Table 3: Items loading >.30 on the factor analysis on standardized residuals of the DL practices instrument (NB: Items depicted below are phrased for Principals' instruments)

FACTORS		I	II	III	IV
Factor 1: Bounded Empowerment					
Q11	I coordinate to ensure alignment of decisions made by different staff.	.375			
Q1	I relinquish control of some key operational decisions to my staff.	-.499			
Q4	I encourage staff to make decisions within their work scope.	-.709			
Q3	I create opportunities for my staff to take initiatives to improve school processes and outcomes.	-.712			
Q2	I give my staff opportunities to assume informal leadership responsibilities.	-.732			
Factor 2: Developing Leadership					
Q22	I exploit every opportunity for my staff to gain experience in developing their leadership competencies.		.757		
Q21	I am continuously looking to develop staff at all levels in my school with leadership potential.		.683		
Q23	I ensure that the competencies of shared leadership are incorporated in our staff development programs.		.616		
Q10	I proactively build trusting working relationships with and among my staff.		-.320		
Q6	I assure staff that as their leader I accept ultimate accountability for the outcome of any shared decisions they make.		-.424		
Factor 3: Shared Decisions					
Q15	I constantly affirm the importance of shared responsibility for decision-making			.498	
Q14	I encourage my staff to consider all relevant stakeholders' viewpoints (teachers and leaders) when making shared decisions			.432	
Q5	I go out of my way to demonstrate the benefits of shared decision-making			.383	
Q10	I proactively build trusting working relationships with and among my staff			-.301	
Q19	I provide regular guidance to staff after giving them leadership responsibilities.			-.615	
Q18	I provide constructive feedback to staff to help develop their leadership competencies.			-.671	

Collective Engagement

Q9	I make the best use of staff talent by involving them in shared school decision-making.	.720
Q8	I provide platforms for teachers to work in teams to improve school processes.	.651
Q7	I encourage staff engagement in all key school-wide decisions	.593

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization (Rotation converged in 12 iterations).

Discussion

The Exploratory Factor Analysis on the Rasch standardized residuals generated four factors or dimensions on DL. The analysis not only concurs with the major literature on DL, but also further sharpens the construct on DL and its multi-dimensionality. The analysis also sheds light on the perceived practices of DL in the context of Asian Singapore schools.

Bounded Empowerment

Empowerment can be defined as investing in subordinates the power to make decisions. It stands in exact diametrical opposition to the conventional notion of the single 'heroic' leader standing atop a hierarchy (Camburn, Rowan & Taylor, 2003). Within conventional organisational structures, distributing leadership implies distributing decisions to other members in the organization, especially those who are in the subordinate positions. The intent of distributing leadership inevitably translates in the practice of letting go of decision-making power to others. In our view, empowerment is a necessary prerequisite for the principles of broad-based leadership where there are multiple levels of involvement in decision-making as proposed by Harris (2008). Further, empowerment has been identified by Muijs and Harris (2003) as a dimension of DL, albeit in the discourse of teacher leadership. Empowerment has also been identified by Heck and Hallinger (2009) as part of the dimension of "*Emphasize school governance that empowers staff and students, encourage commitment, broad participation, and shared accountability for student learning*" (p. 670). In simplicity, without empowerment the notion of leadership practices distributing over leaders, followers and their situation and incorporates the activities of

multiple groups of individuals (Gronn, 2000; Spillane *et al.*, 2001, 2003, 2004) cannot materialize.

However, the analysis of the loadings of the five items within the empowerment factor shows a restrictive or bounded nature of empowerment – hence, the identification of the dimension on *'Bounded Empowerment'*. In other words, the act of giving subordinates authority to make decisions does not necessarily translate to relinquishing all control of decisions to subordinates. First, empowerment is bounded insofar as there is clear scope in which decisions can be made. In other words, there are certain areas of decisions that cannot simply be given to others. Woods *et al.* (2004) is accurate to highlight that non-negotiable values and aims are not inappropriate even when distributed leadership favours autonomy. Second, empowerment is bounded insofar as the person giving the power to make decision to subordinates is kept informed of the decisions made by the subordinates. In other words, teachers' autonomous decisions are not without the superiors' knowledge and approval, even if it may be silent in nature. The act of relinquishing decisions to others does not equate to relinquishing responsibility and accountability. Woods *et al.* (2004) see the importance of accountability in the goals and values set by formally constituted leaders who are accountable for the performance of the organisation, especially if these goals and values are seen as non-negotiable. Third, empowerment is bounded insofar as decisions made by the subordinates are aligned to school goals and in harmony with decisions made by others within the organisation towards the school goals. Decisions made by empowered subordinates need to be coordinated in ways that achieve alignment with the school goals and with other departmental goals. This is precisely consistent with Gronn's notion of 'concertive action' (or holistic) – and what Spillane terms 'person plus' synergistic relationship (Spillane, 2006), as opposed to 'additive action'. While the latter is the aggregated effect of a number of individuals contributing their initiative and expertise in different ways to a group of organization, the former is about the additional dynamic which is the product of conjoint activity and where the outcome is greater than the sum of individual actions (Bennett *et al.*, 2003; Gronn, 2002). Silins and Mulford (2002) alluded to the notion of bounded empowerment in terms of coordinated decisions when they stated that governance regimes are perceived as legitimate by teachers only when they are being

actively involved in decision-making, and when teachers believed they are empowered in areas of importance to them, they are very positive in the way the school is organized and run. In other words, teachers co-decide with their school leaders and not make decision on their own. In summary, it can be said that empowerment simply does not and cannot translate to individual subordinates having unfettered power to make limitless decisions without being accountable to superiors and peers. This truism holds true in both Western egalitarian and Eastern hierarchical organisations.

Developing Leadership

The second factor or dimension that was identified is '*Developing Leadership*'. Bennett et al. (2003) has surfaced this necessity in DL even though this is not situated within the discourse of a dimensionality of the DL construct. The dimension of '*Developing Leadership*' is closely tied to the first dimension on '*Bounded Empowerment*' insofar as they mutually reinforce each other. The degree to which a leader relinquishes power to the follower is dependent on the degree of leaders' confidence or trust in the competence of the subordinate to perform the task. An aspect of leadership is decision-making as influence to reach a shared goal among members in the group. The competence-confidence-empowerment triplex applies in all horizontal and vertical relationships in the structure of organizations and systems – among teachers, heads of department, between teachers and heads of department, between heads of department and school leaders (principals/vice-principals), between school leaders and district superintendents and MOE headquarters. The degree of empowerment is thus contingent on the degree of confidence in the competence of organizational members to make the right decisions for the organization as a source of influence to reach shared goal group members. Finally, the relationship between trust or confidence and competence is inextricably linked to accountability. The act of developing leadership capacities and competencies in the context of empowerment of subordinates is synonymous to the act of being accountable. Herein lies the significance of leadership development.

To promote leadership practices that empower teachers, the development of the following examples of leadership competencies are necessary: taking initiative, rallying

others towards common group goals, considering individual needs of group members in decision-making in consideration of others, making decisions based on micro and macro contextual knowledge (e.g., situational and organizational analysis), and promoting shared ownership and accountability. DL thus requires the building of leadership capacity of staff members. In this regard, DL does not equate to superficial delegation (Harris, 2008), where a task is passed down from the supervisor to the supervisee absent of capacity and authority. Using Critical Theory lenses, empowerment is thus rightly defined as building people's capacities such as knowledge, energy and authority to act successfully within an existing system and structures of power – working within the system, on their own behalf (Inglis, 1997; Maynard, 2004). Besides building leadership capacities and competencies of staff members, it is also necessary to consider extending the reach of opportunities for leadership development – both for formal and informal leadership roles (Bennett et al., 2003; Harris, 2008).

Although the term 'Developing Leadership' can cover a multiple range of ideas, we choose to adopt a more parsimonious substantive conception or essence of leadership – that is, influencing others to do what they might not otherwise have done towards a shared goal. Our preoccupation on the conception or essence of leadership is to minimize possible slippages to understanding leadership according to aspects of its practices, instead to the substance or essence of its practices. For example, an aspect of leadership practices is culture building, but a set of transformational leadership practices in culture building is and should be more or less different to a set of DL practices in culture building. The focus on developing knowledge, skills and attitudes of a more parsimonious conception of leadership – influencing others towards a shared goal – would therefore minimize the blurring of leadership concepts taken from the wide range of adjectival leadership types. Besides developing knowledge, skills and attitudes on influencing others towards a shared goal, the leadership development should also include knowledge, skills and attitudes specific to DL. Although research work on this area is still new (e.g., Murphy et al., 2009), some have established areas or aspects for DL development. For example, Murphy (2006) identified the following categories: building strong relationships with teachers, rethinking conceptions of power, and fashioning organizational structures.

Shared Decisions

The third factor or dimension that was identified is '*Shared Decisions*'. In their construction of DL Inventory, Hulpia, Devos and van Keer (2010) identified one dimension which they termed '*Participative decision making of all school members*'. Heck and Hallinger (2009) had also identified the notion of shared decisions as one dimension of DL, which they termed '*Make collaborative decisions on educational improvement*'. The notion of shared decisions can be vertical or horizontal in nature. In this regard, Harris (2008) was right to say that DL is broad based leadership and links vertical and lateral leadership structure. In order for the conjoint action and activity to take place (Gronn, 2002; Bennett et al., 2003), a substantial degree of coordination in decision-making must take place. For DL to successfully take effect, empowerment and leadership development must be followed by the actual outcome of shared decision.

The degree to which organizational members reach shared decisions through collective engagement depends on the degree to which goals and values of individual members of the organization coalesce. However, the degree to which these goals and values coalesce is dependent on the nature of power relation among members in the organization. In fact, the notion of power has yet to be developed by the proponents of activity theory (Daniels, 2006), which had influenced Gronn's conceptualization of DL. We postulate that for shared decision to be reached in the collective engagement among organization members, greater symmetrical and lesser asymmetrical power must take place, or rather, a moving towards this end of the symmetrical power spectrum. This notion of symmetrical power, where every member in the organization has equal opportunity to assert influence over another regardless of hierarchy, is related to the empowerment, which is the first dimension of DL mentioned earlier. Empowerment has the potential to weaken the asymmetrical power relations. The notion of symmetrical power relations is also contemporaneous to the notion of 'consensual power' (Haugaard, 2002) where decisions among organizational members are reached through consensus as opposed to conflict. Although some commenters (e.g., Achinstein, 2002; Kelchtermans, 2004) claimed that conflict is central to community as it provides the context for learning to take place, we

propose that in order for organizations to remain sustainable communities, conflicts are can and should be a means to reach consensus. Finally, we also recognize that there are certain deontological values that underpin symmetrical or consensual power relations such as respect, trust, care and shared responsibility and accountability.

Collective Engagement

The third factor or dimension that was identified is '*Collective Engagement*'. Collective engagement is the social material base for shared decisions to happen, and fits perfectly with the idea that DL is an emergent property of a group or network of interacting individuals, which is derived from Gronn's notion of 'emergent work-related influence' (cited in Bennett et al., 2003, p. 15). And this is consistent with Spillane's (2004) assertion that "a distributed perspective on leadership argues that school leadership *practice* is *distributed* in the interactions of school *leaders, followers, and their situation*" (p. 2). The first common sense behind Spillane's (2004) argument is that DL is first and foremost about practice rather than leaders, roles and functions, and is therefore situated in the interactions between leaders and followers. The second common sense is that leadership practice takes place in the interactive web of leaders, followers, and their situation. Hence, leadership does not reside in the leader or follower, rather in the interactive actions and interactions between leaders and followers. In other words, leadership is a relationship between leaders and followers. And within these interactive relations, influence resulting to decisions takes place. These interactions are what we termed '*Collective Engagement*' where leadership practices are distributed over leaders, followers and their situation and incorporates the activities of multiple groups of individuals (Gronn, 2000; Spillane *et al.*, 2001, 2003, 2004).

To illustrate this dimension on collective engagement and using Spillane's distributed perspective of leadership, the subordinate could either respond to the superior's initiation by engaging an action back to the superior, or initiates or engages an action or influence first towards the superior from which the superior follows. In other words, the initiation of an act of engagement or influence could start from anyone – the superior or subordinate, or between subordinate and another subordinate. Proponents of

DL thus allude to interactions that are not single directional but dual directional in the leader/superior-subordinate relationship. What is primordial is the interaction in the relationship. In the conventional hierarchical relationship, this direction is one directional as the leader/superior initiates or engages an action from which the follower/subordinate follows. This is also synonymous to the notion of openness to boundaries of leadership in the definition of DL (Bennett et al., 2003). The conception of leadership residing in relationship therefore transcends notions of formal or informal distinction of leadership roles. Collective engagement can thus be characterized by interactivity, flexibility and permeability, which are consistent two of Harris' (2008) DL principles, namely flexibility and versatility (non-permanent groupings), and fluidity and inter-changeability. This interactivity, flexibility and permeability further points to the presence of conjoint activity in DL.

The dimension on '*Collective Engagement*' also involves division of labor of expertise among group members, which is consistent to the notion of conjoint activity. In other words, the distribution of labor according to expertise enhances conjoint activity. When staff members are brought together, it is possible to forge a concertive dynamic which represents more than sum of the individual contributors (Bennett *et al.*, 2003). In fact, Bennett et al. (2003) proposed that initiatives may be inaugurated by those with relevant skills or expertise. However, the presence of expertise alone does not guarantee collective engagement. In our view, it enhances or aids in collective engagement. The onus is on school leaders to promote collective engagement through various utilizations of rules and resources. Nevertheless, what remains convincing is that DL has the potential to develop expertise, and thus maximizing the human capacity, through team work (Harris, 2004), but whether collective capacity building leads to leadership development as proposed by Mayrowetz (2008) remains questionable. Our stand is that a good degree of intentionality on developing leadership capacity and competencies must become part and parcel of DL practices. The idea of collective engagement also resonates well with the notion of patterns of distribution in DL – spontaneous collaboration, intuitive working relations, and institutionalized practice (Gronn, 2002). Leithwood et al. (2007) extended this taxonomy to

include planful alignment, spontaneous alignment, spontaneous misalignment, and anarchic misalignment.

Singapore School Principals' DL Practices

In addition to sharpening the construct of DL and its dimensionality, the Exploratory Factor Analysis also sheds light on the perception of DL practices in Singapore schools. Firstly, the analysis indicated that Singapore school principals were perceived to be not empowering their staff members in terms of relinquishing some key operational decision, providing opportunities for decisions through informal leadership actions, taking initiatives to improve school processes and outcomes, and making decisions within their work scope. Even when decisions are somehow made by different staff members, there is need for coordination and alignment as positive loading on the phrase *'I coordinate to ensure alignment of decisions made by different staff'*. Not surprisingly, this fits perfectly with the Asian cultural value for hierarchy, and the Singapore pragmatic value for efficiency and the need for control in order to attain efficiency as observed by both local and foreign commentators – *strategic pragmatism* (Schein, 1996), and *economic pragmatism* (Hairon, 2006). Secondly, although school principals were perceived to be developing leadership capacities and competencies across all levels of the school organization, they do so in a cautious manner as evidenced in the negative loadings on two phrases: *'I assure staff that as their leader I accept ultimate accountability for the outcome of any shared decisions they make'* and *'I proactively build trusting working relationships with and among my staff'*. Again, the pragmatic value for efficiency and control, and the Asian cultural value for hierarchy surfaced. The need for control is ubiquitous in all public institutions. In his study of governance in Singapore, Worthington (2003) describes the Singaporean state as a neo-Gramscian hegemonic state – as being corporatist, authoritarian, oligarthic and elitist, and 'depends for its reproduction and continuity on strong, balanced forces of both coercion and consent' (p. 248). Thirdly, it was perceived that school principals do make attempts to promote shared decisions and responsibility among staff members. However, once more, shared decisions have to be done cautiously and have to serve efficiency rather than developmental needs. Although Asian cultures are well known in preserving the value for

collectivism, the preservation of hierarchy must be equally maintained. For the case of Singapore, the Asian cultural value for hierarchy is enhanced by the pragmatic value for efficiency and control. Finally, it was perceived that school principals do promote collective engagement. The key driving force underlying collective engagement is one of pragmatic efficiency in school improvement processes evidenced by the following phrases: *'in all school-wide decisions'*, *'to improve school processes'*, and *'make the best use of staff talent'*.

Conclusion

In this paper, we have unpacked the construct of DL and its multi-dimensionality according to four dimensions using Exploratory Factor Analysis on the Rasch (linearized) standardized residuals. These four dimensions are: 'Bounded Empowerment', 'Developing Leadership', 'Shared Decisions', and 'Collective Engagement'. We have also showed how the school principals in Singapore were perceived in regard to their DL practices, and how societal culture plays a huge part in shaping how DL practices played out in schools. Specifically, social agents draw upon the Asian Confucius cultural values for collectivism and hierarchy in the DL actions. The role of societal cultural value for collectivism, hierarchy and pragmatism significantly alters the way DL is theorised and practised in Singapore schools. This is consistent with the notion that leadership practices are very much influence by context – in this case, the interplay between respect for hierarchy, collectivism and pragmatic efficiency and control in the Singaporean societal. The motivation behind this study is premised on the belief that DL does have the potential to contribute to the overarching theory on school leadership, and on school improvement processes and outcomes. And this requires a clearer and sharper understanding of the essence or construct of DL using more robust methodology in measuring DL. Adopting a psychometric approach in understanding DL will potentially eliminate the stigma of DL being called as broad, loose or elusive. This study has at best contributed to the further sharpening of the DL construct. Is the beast finally consumed? We believe more work needs to be done – not so much in trying to add on to the DL theory, but to sharpen it down to what its essence is really about.

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Appendix 1: Perception of Distributed Leadership Practices

Empowerment

No.	Items	Your Rating				
		Strongly disagree				Strongly agree
1.	I relinquish control of some key operational decisions to my staff.	1	2	3	4	5
2.	I give my staff opportunities to assume informal leadership responsibilities.	1	2	3	4	5
3.	I create opportunities for my staff to take initiatives to improve school processes and outcomes.	1	2	3	4	5
4.	I encourage staff to make decisions within their work scope.	1	2	3	4	5
5.	I go out of my way to demonstrate the benefits of shared decision-making.	1	2	3	4	5
6.	I assure staff that as their leader I accept ultimate accountability for the outcome of any shared decisions they make.	1	2	3	4	5
7.	I encourage staff engagement in all key school-wide decisions.	1	2	3	4	5
8.	I provide platforms for teachers to work in teams to improve school processes.	1	2	3	4	5
9.	I make the best use of staff talent by involving them in shared school decision-making.	1	2	3	4	5

Interactive relationships for shared decisions

No.	Items	Your Rating				
		Strongly disagree				Strongly agree
10.	I proactively build trusting working relationships with and among my staff.	1	2	3	4	5
11.	I coordinate to ensure alignment of decisions made by different staff.	1	2	3	4	5
12.	I always take the competence of my staff into account when deciding whether to involve them in shared decision-making.	1	2	3	4	5
13.	I provide platforms for staff to build networks among colleagues to work collaboratively.	1	2	3	4	5
14.	I encourage my staff to consider all relevant stakeholders' viewpoints (teachers and leaders) when making shared decisions.	1	2	3	4	5
15.	I constantly affirm the importance of shared responsibility for decision-making.	1	2	3	4	5
16.	I constantly encourage staff to express their viewpoints about work to me.	1	2	3	4	5
17.	I invest significant time and energy to build rapport with my staff.	1	2	3	4	5

Developing Leadership

No.	Items	Your Rating				
		Strongly disagree				Strongly agree
18.	I provide constructive feedback to staff to help develop their leadership competencies.	1	2	3	4	5
19.	I provide regular guidance to staff after giving them leadership responsibilities.	1	2	3	4	5
20.	I constantly develop leadership talents across all levels of my staff.	1	2	3	4	5
21.	I am continuously looking to develop staff at all levels in my school with leadership potential.	1	2	3	4	5
22.	I exploit every opportunity for my staff to gain experience in developing their leadership competencies.	1	2	3	4	5
23.	I ensure that the competencies of shared leadership are incorporated in our staff development programmes.	1	2	3	4	5
24.	I provide opportunities for staff to work in teams as a means of developing their decision making skills.	1	2	3	4	5
25.	I often discuss school leadership problems and possible solutions with my staff as a way of developing their leadership skills.	1	2	3	4	5