Art. #1720, 15 pages, https://doi.org/10.15700/saje.v41n2a1720

Preparation of an observation card to measure the developmental learning difficulties among primary school students in Sana'a City, Yemen

Abdo Hasan AL-Qadri and Wei Zhao
School of Education, Shaanxi Normal University, Xi'an, China
lubna23112015@outlook.com

Developmental learning difficulties are among the prevalent exceptionalities school learners have today. In this regard, identification and placement are among the facilitators of later successful intervention for these groups of learners (West-Olatunji, Shure, Pringle, Adams, Lewis & Cholewa, 2010). However, there are not enough resources such as tools to measure the learners' difficulties (Alim, Abdallah, Ramaroson, Sidikou & Van de Wiel, 2007) available. The tools, which objectively help a professional to identify a learner's level of difficulty is an essential resource, however, they are scarce. With this study we aimed to develop an observation card to determine the prevalence of developmental learning difficulties among primary school students in Sana'a City, Yemen. A 24-item tool was used and analysed to test its psychometric properties. A total of 238 students with ages ranging from 6 to 13 years participated in the study. The findings of the study suggest the final formulation of the items to be included in the observation card that can measure the prevalence of this exceptionality through the use of observation scores. The observed raw score had been standardised by its deviation from the sample's mean. Further, the findings reveal that there were statistically significant differences in the respondents' level of difficulties in terms of their gender and grade. Recommendations of the study are presented in this article.

Keywords: developmental learning difficulties; observation; primary school students

Introduction

At the policy development level, countries depend on human resources to improve their economy. Thus, they develop strategies and plans that are in line with individuals' abilities and qualifications to prepare and qualify them through an appropriate educational system. Like other countries, Yemen regards primary education as very important. The number of children who start school at the age of 6 has increased from 310,167 in 1991 to 314,830 in 2000 to 622,909 in 2008 (Save the Children, 2016). Most countries are interested in identifying students with learning difficulties and conducting surveys to determine their level of developmental learning difficulties (DLDs) in order to take the necessary measures and to intervene to help these students to learn better (Cortiella & Horowitz, 2014).

In the United States of America (USA), as an example, the percentage of students with learning difficulties is 12% (Cortiella & Horowitz, 2014) whereas the number in the United Kingdom is about 21% (Emerson, Hatton, Robertson, Roberts, Baines, Evison & Glover, 2012).

Surveys to measure the prevalence of learning difficulties among students in the Arab world showed that 13 to 46% are suffering from these difficulties (Ahmad, 2015). Learning difficulties are very common among primary school students (Abosi, 2007), so they are in real need of care and attention since the learning difficulties could be recognised at this stage.

In 2013 the World Health Organization (WHO) stated that the number of Arabs with learning difficulties were over 53 million (Hadidi & Al Khateeb, 2015). With this estimation, it was important to refer to the efforts made by Arab countries like Kuwait and the Kingdom of Saudi Arabia. Kuwait, for instance, had the oldest and the largest centre, The Child Evaluation and Teaching Center, established in 1984, for the purpose of detecting students with learning difficulties and designing the appropriate programmes for these students (ALmenaye, 2009; Elbeheri, Everatt, Reid & Al Mannai, 2006; WHO, 2011). Likewise, Saudi Arabia created a programme at the King Saud University in 1992 to train teachers and familiarise them with learning difficulties. In 1995, a department was established by the General Secretarial of Special Education (GSSE) to manage and intensify the learning difficulties programmes in Saudi primary schools (Al-hano, 2006).

In a country like Yemen, with a high population density of 21 million of which about half are aged 15 or maybe less, no studies had been recorded to estimate the rates of learning difficulties in the country (Alyahri & Goodman, 2008).

Literature Review

Psychological and educational literature identify students with learning difficulties as those students who show differences between their expected performance (as measured with a mental capacity tests) (Van Luit & Toll, 2018; Visser, Korthagen & Schoonenboom, 2018) and their actual performance (as measured by achievement tests) in one or more academic areas due to difficulties in the basic psychological processes (perception, attention, solving problems, remembering) (Miciak, Taylor, Denton & Fletcher, 2015) and whether such difficulties occurred in the early stages (pre-school, primary school, preparatory school) or not.

In 1962 the American psychologist, Samuel Kirk, coined the term "learning disabilities" in a book on special education (Colker, 2011; Danforth, Slocum & Dunkle, 2010). After that, a conference was held in 1963

in which educators, psychologists, and parties interested in learning disabilities participated to discuss and investigate the difficulties of children suffering from mental retardation (Annamma, Ferri & Connor, 2018; Freedman & Ferri, 2017).

In 1983, Kirk illustrated that DLDs were considered to be one of the factors that explained the reason for low academic achievement, including disorders of memory efficiency, perception, attention, thinking, and language (Anderson, 2002). Consequently, such disorders lead to difficulties that impede academic progress as a result of an internal psychological or neurological process or a group of disorders that appear in the form of obvious disabilities in terms of acquiring reading, writing, spelling, and calculating skills (Keyes & Brandon, 2012; Thomas & Whitten, 2012).

It was important to note that the term "learning difficulties" was chosen rather than the term "learning disabilities." Learning difficulties could readily be alleviated through intensive educational intervention, while learning disabilities are lifelong and pervasive, and do not respond readily to intensive education intervention (Thomas & Whitten, 2012).

The causes of DLDs vary from student to student. There seems to be a great controversy on what the causes of DLDs are (Randall, 2006). Some scholars relate these difficulties to neurological factors while others relate them to environmental factors (Macdonald, 2010). McGuinness (2004) argues that students fail in school mainly because of environmental causes and not biological factors. This means that certain factors in the environment may cause developmental learning difficulty in some students. For instance, a lack of motivation at school or at home, or a lack of effective teaching methods could cause students to suffer from learning difficulties (Degener, 2016).

DLDs are related to brain functions and cognitive processes that students need for academic achievement such as sensory perception, hearing, thinking, language, and memory (Cortiella & Horowitz, 2014; Jacobs & Collair, 2017). These difficulties are due to functional tracings in the central nervous system. These can be divided into initial difficulties, which were related to the processes of attention, perception, memory, and secondary difficulties such as thinking, understanding, and oral language (Coladarci, 1992; López-Villalobos, Andrés-De Llano, López-Sánchez, Rodríguez-Molinero, Garrido-Redondo, Martínez-Rivera & Sacristán-Martín, 2015).

The following is an explanation of primary and secondary DLDs.

1) Primary DLDs:
   - Attention difficulties. One of the factors that can have a substantial impact on a student's academic performance and his degree of motivation is attention disorder, which affects the student's ability to focus and control his behaviour. These two factors contribute most significantly to a child's daily progress and performance in the classroom. Three to 15% of students have attention difficulties; 50% of students are at risk and may suffer from school failure (Carpenter, Loo, Yang, Dang & Smalley, 2009; Perold, Louw & Kleynhans, 2010; Topkin, Roman & Mwaba, 2015).
   - Perception difficulties. These include impaired visual motor coordination, spatial and other cognitive factors (Ahmad, 2015).
   - Memory difficulties. The inability to recover what has been seen, heard, practiced or trained. Children with obvious visual or auditory problems may have trouble learning to read, spell, write and calculate (Gomez, Hafetz & Gomez, 2013).
2) Secondary DLDs:
   - Difficulties of thinking. This involves problems in mental processes including judgment, comparison, computation, verification, evaluation, reasoning, critical thinking, problem solving and decision-making (Moreno & Pelegrina del Rio, 2011).
   - Verbal language difficulties. Language difficulties involve difficulty in understanding language and verbally expressing ideas (Mwanamukubi, 2013).

Mahin, Haghdoost, Afsaneh and Hamideh (2014) investigated the prevalence of learning difficulties among primary school students. The study sample consisted of 793 primary students. A questionnaire of 40 items was developed. The results indicate that there was a significant difference between males and females. The research results of a study conducted by Abolhassanzadeh, Shafiee-Kandjani, Vaziri, Molavi, Sadeghi-Movahhed, Noorazar and Basharpoor (2016) to investigate the prevalence and risk factors of attention deficit hyperactivity disorder (ADHD) among elementary school students indicate that there was a relatively high prevalence of ADHD. Abdullah and Shehab (2013) studied the identifying non-adaptive behaviours of students with learning difficulties at the basic primary stage. The sample consisted of 303 students with learning difficulties and ordinary students. The study used the Walker measure. Means, *t*-tests and ANOVA were used for statistical analysis. The study found that there were statistically significant differences in the non-adaptive behaviour in favour of students with learning difficulties. There were differences in favour of male students. There were differences in favour of the first grade, fifth grade, and fourth grade students respectively.

Children in developing countries such as Yemen face many barriers to accessing better quality of education and cannot learn the basics of subjects like mathematics and language because of untrained teachers and a lack of learning tools (HLSP S.L., 2005).

Several studies have shown that more funds should be made available for the training of teachers, provision of tools to detect DLDs, and preparation of resource rooms with appropriate educational aids in order to help the large numbers of students suffering from DLDs to overcome those difficulties (O'Connor & Geiger 2009; Zimmerman & Smit, 2014).

Despite many studies on DLD, to the best of our knowledge, no independent research exists for standardisation studies which have established psychometric properties and utility as part of a comprehensive assessment or as a predictor of DLD.

Further evidence from teacher observation may contribute to a comprehensive screening, assessment, and prediction of DLD as described above because the teacher's observation is based on his or her experiences and direct interactions with students at different times – unlike tests which are performed at specific time segments.

Thus, if it is shown that the teacher's observation of students is adequate, then students can be accurately diagnosed and supported until standardised tools become available. This need is even more pressing in Sana'a City, where standardised tests for the assessment of students are scarce.

This makes a clear case for Sana'a City schools to secure a standardised tool for the assessment of students. In line with this, it was necessary to develop a measure which functions as an observation card to determine the DLD of the students and prepare programmes by specialists to overcome these difficulties.

Research Objectives

The objective of this study was to develop a diagnostic tool for DLD which would standardise student's raw scores during the evaluation process. Furthermore, it would also assist in standardising student scores based on the arithmetic mean of peers and analysing the degree of DLD according to gender and grade. This tool will further assist us to determine the levels of DLD among primary school students.

Methodology

The main focus of the study was to prepare an observation card to measure the DLD of students. The psychometric method was used through which the determined observation card was applied in this study. This design was deemed appropriate for this study because it enabled us to obtain information relating to the nature of DLD among primary school students in Sana'a City and determining the methods to assist the educators with the diagnosis of DLD.

Participants

The sample used in this study was chosen on the basis of official statistics which indicated that only five public schools in Sana'a City had resource rooms (Central Statistical Organization, 2016) serving a total number of 2,113 students (1,095 males and 1,018 females) who performed poorly. The five schools were from five educational districts according to the educational system in Yemen – three schools for males and two for females. Only 15 teachers showed interest and volunteered to observe students under their supervision. Taking the variables of gender, age and grade into consideration, 238 students (120 males and 118 females) (11%) between the ages of 6 and 13 years from six different grades (M = 9.327, SD = 1.863) were involved in this study in the 2017/2018 academic year.

Measure

Based on a number of previous studies that measured the levels of DLDs among primary school students, the measured items were adapted to correspond to the Yemeni environment and included more items derived from literature on DLD (The Pupil Rating Scale) developed by Helmer Myklebust in the USA in 1981 (Rasugu, 2010). Myklebust's instrument is a behavioural checklist for classroom teachers to rate suspected students with cognitive and psychological abilities (e.g., attention, memory, perception, thinking, and verbal language) (Gregg, 2010; Pisoni, Kronenberger, Chandramouli & Conway, 2016; Rasugu, 2010).

The tool was developed in Arabic as it is the native language of the participants. The tool consisted of 24 items as initial formulation.

The observation card was presented to a panel of seven specialists and experts in the fields of psychology and education to confirm the face validity of the tool. After implementing the amendments proposed by the panel, it was agreed to modify, replace and improve some statements (e.g., "Learner's difficulty to complete the work assigned to him/her" instead of "Student doesn't do his homework"; "Learner's difficulty to use their hands" instead of "Student has shaky hands"; "Learner's difficulty to remember the word they heard before" instead of "Student's ability to memorise and recite words is extremely weak"; "Learner's difficulty to follow the teacher during the explanation" instead of "Student's attention is distracted by playing instead of listening to the teacher"; "Learner lacks the ability to distinguish between directions (right, left, up, down)" instead of "Student always mixes directions and walks to the opposite side").

We conducted a pilot test using the

observation card with 30 students to verify the psychometric properties (validity and reliability) thereof. The results show Cronbach's Alpha of (α) = 0.771 and the square root of α = $\sqrt{\alpha}$ = 0.878 (Smits, Van der Ark & Conijn, 2018). As specified by Heale and Twycross (2015), the reliability and validity values were acceptable. The observation card included 24 items in two dimensions: Primary learning difficulties (attention, memory, and perception) and secondary developmental difficulties (thinking and verbal language).

After an observation of the student's behaviour and achievement, the teachers specified the student's level of agreement with the items on the scorecard in accordance with a five-level Likert scale (Always applicable, Almost applicable, Sometimes applicable, Seldom applicable and Not applicable at all) used in the observation card.

Statistical Analysis

Validity of the scale was established by using Pearson's correlation coefficient to determine the correlation between each item and the overall observation tool. The items in the observation card are presented in Table 1: items 1 to 9 for attention difficulties, items 10 to 15 for memory difficulties, items 16 to 18 for perception difficulties, items 19 to 22 for thinking difficulties and items 23 and 24 for verbal language difficulties. The validity of the observation card is also presented in Table 1, and it is clear that all the items were statistically significant at 0.01. The highest correlation was with the third item (0.869) (Learner's difficulty to complete the work assigned to him/her), while the lowest correlation was with the sixth item (0.549) (Learner has difficulty to use his/her hands). According to Heale and Twycross (2015), a correlation coefficient of less than 0.3 signifies a weak correlation, 0.3 to 0.5 moderate, and greater than 0.5, a strong correlation.

Table 1 Correlation for each item

No	Items	*r*	*ρ*
1	Learner has difficulty to focus on work that requires attention for a longer period.	0.825**	0.00
2	Learner has difficulty to continue with one activity.	0.799**	0.00
3	Learner has difficulty to complete the work assigned to him/her.	0.869**	0.00
4	Learner's attention is easily distracted from his/her work.	0.859**	0.00
5	Learner's kinaesthetic balance is weak.	0.660**	0.00
6	Learner has difficulty to use his/her hands.	0.549**	0.00
7	Learner shows deficiency in kinaesthetic skills.	0.611**	0.00
8	Learner has difficulty to absorb some of what he/she hears.	0.712**	0.00
9	Learner frequently moves from one task to another or from one job to another.	0.735**	0.00
10	Learner has difficulty to distinguish sound stimuli.	0.647**	0.00
11	Learner has difficulty to remember.	0.779**	0.00
12	Learner has difficulty to remember the alphabet or numbers that he/she has heard.	0.795**	0.00
13	Learner has difficulty to remember the words that he/she has heard before.	0.788**	0.00
14	Learner has difficulty to remember the names of his/her classmates.	0.575**	0.00
15	Learner forgets information very quickly.	0.811**	0.00
16	Learner has difficulty in recognising spatial relationships.	0.792**	0.00
17	Learner has difficulty to follow the teacher during an explanation.	0.836**	0.00
18	Learner avoids participation with peers in group activities.	0.799**	0.00
19	Learner has difficulty in recognising letters and numbers.	0.745**	0.00
20	Learner lacks the ability to distinguish between sizes.	0.721**	0.00
21	Learner lacks the ability to distinguish between directions (right, left, up, down).	0.657**	0.00
22	Learner has difficulty to acquire and use information that helps to think and solve problems.	0.757**	0.00
23	Learner has difficulty talking to others.	0.795**	0.00
24	Learner has difficulty to connect facts and ideas.	0.737**	0.00

Note. **$\rho \leq 0.01$.

Criterion-related validity was also investigated to determine the correlation between a student's achievement score for the last year (as a criterion) and the observation card's score (of the current scale). The negative sign indicates that the increase of learning difficulties has led to the lowest educational achievement (see Table 2).

Table 2 Correlation between DLD observation and educational achievement

Variable	Observation score	Achievement score
Observation score	1	-0.636**
Achievement score	- 0.636**	1
ρ	0.00	0.00

Note. **$\rho \leq 0.01$.

In order to determine the reliability, Cronbach's Alpha (α) and the Guttman Split-half coefficients were employed to assess the reliability of the total scale. The values were 0.919 and 0.881 respectively (see Table 3), which indicated a suitable reliability for this measure. These results were in line with the findings of Cho and Kim (2015).

Table 3 Reliability of the observation card

No. of Items	Cronbach's Alpha(α)	Guttman Split-half	*ρ*
24	0.919**	0.881**	0.00

Note. $^{**}\rho \leq 0.01$.

Results

The level of DLD among students had been determined by calculating the range,

Range = maximum(xi) – minimum(xi) (CK-12 Foundation, 2009),

where (xi) represents the set of values 114 - 24 = 90. The observation card contained five options. The range had been divided into five categories to determine the length of the category:

(L) = 90/5 = 18

As presented in Table 4, 76 of 238 students (32%) had a moderate level of DLD, 72 students (30%) had a low level of DLD, while 46 students (19%) had a very low level of DLD. Thirty-two students (14%) had a high level of DLD and only 12 students (5%) were suffering from a very high level of DLDs.

Table 4 Levels of DLD among observed students

Level	Category	*N*	%
Very high	(100–118)	12	5
High	(81–99)	32	14
Moderate	(62–80)	76	32
Low	(43–61)	72	30
Very low	(24–42)	46	19
Total		238	100

From the observation card scores it is clear that attention as a primary developmental learning difficulty was the most common among the primary school students observed (*M* = 21.48, *SD* = 8.89, variance = 79.03 and range = 35), followed by memory difficulties (*M* = 14.17, *SD* = 6.07, variance = 36.85 and range = 24) and perception difficulties (*M* = 7.17, *SD* = 3.57, variance = 12.75 and range = 12). Thinking as a secondary developmental learning difficulty was the most common among the primary school students observed (*M* = 8.53, *SD* = 4.02, variance = 16.16 and range = 16) while verbal language were the least common (*M* = 5.37, *SD* = 2.53, variance = 6.41 and range = 8). As shown in Table 5, the values of the total arithmetic mean, standard deviation, variation and the range were used to find the *z*- score, *t*- score and scaled score for each raw score where the students' raw scores were compared to the *t*-score and scaled score.

Table 5 Arithmetic mean, standard deviation, variance and range of developmental learning difficulties

		M	*SD*	Variance	Range
Primary developmental learning difficulties	Attention	21.48	8.89	79.03	35
	Memory	14.17	6.07	36.85	24
	Perception	7.17	3.57	12.75	12
Secondary developmental learning difficulties	Thinking	8.53	4.02	16.16	16
	Verbal language	5.37	2.53	6.41	8
Overall		56.72	23.14	535.46	90

Standardising Current Measure

In order to standardise the raw score of DLD, the following equations were used:

Standard score (*z*-score) = raw score – mean / standard deviation, transformed score (*t*-score) = 50+ 10Z and scaled score = 10 + 3Z

To determine the observation scores of the students, the transformed score (*t*-score) and scaled score for each raw score were calculated. The raw score was classified under the transformed score (*t*-score). To remove the decimals, we used the transformed score (*t*-score) instead of the standard score (*z*-score) (Test Partnership, 2017). We also used the scaled score to standardise the observation score of the students (see Table 6) and standardise the raw score according to the grades (Standards and Testing Agency, 2016) (see Table 11).

Table 6 *T*-score and scaled score for each raw score

Raw score	*t*	Scaled score	Raw score	*t*	Scaled score	Raw score	*t*	Scaled score
24–25	36	6	56–57	50	10	88–89	64	14
26–27	37	6	58–60	51	10	90–92	65	15
28–29	38	6	61–62	52	11	93–94	66	15
30–32	39	7	63–64	53	11	95–96	67	15
33–34	40	7	65–66	54	11	97–99	68	15
35–36	41	7	67–69	55	12	100–101	69	16
37–39	42	7	70–71	56	12	102–104	70	16
40–41	43	8	72–73	57	12	105–106	71	16
42–43	44	8	74–75	58	12	107–108	72	17
44–46	45	9	76–78	59	13	109–110	73	17
47–48	46	9	79–80	60	13	111–113	74	17
49–51	47	9	81–82	61	13	114	75	17
52–53	48	10	83–85	62	14			
54–55	49	10	86–87	63	14			

By comparing the means that examined whether students' DLD differed by gender, it was indicated that male students had the highest mean score (M = 60.65, SD = 24.18) while female students scored (M = 52.73, SD = 21.41) (see Table 7).

Table 7 Differences according to gender variable by independent *t*-test

Gender	No. of students	*M*	*SD*	*df*	*t*	*ρ*
Male	120	60.65	24.18	236	2.67**	0.008
Female	118	52.73	21.41			

Note. **$\rho \leq 0.01$.

Table 8 shows the arithmetic means differences according to grade. Grade 1 students scored the highest arithmetic mean (M = 61.45, SD = 29.94), while Grade 6 students scored the lowest arithmetic mean (M = 51.09, SD = 19.47).

Table 8 Arithmetic means and standard deviations of students with grade variable

	No. of students			
	Male	Female	*M*	*SD*
Grade 1	21	17	61.45	29.94
Grade 2	32	22	61.05	24.45
Grade 3	26	24	59.26	24.13
Grade 4	12	17	54.96	21.29
Grade 5	20	22	54.81	14.09
Grade 6	9	16	51.09	19.47
Overall	120	118	56.72	23.14

Figure 1 shows the arithmetic means differences according to grade. Grade 1 students scored the highest arithmetic mean, while Grade 6 students scored the lowest arithmetic mean. There was a difference in the mean score between grades.

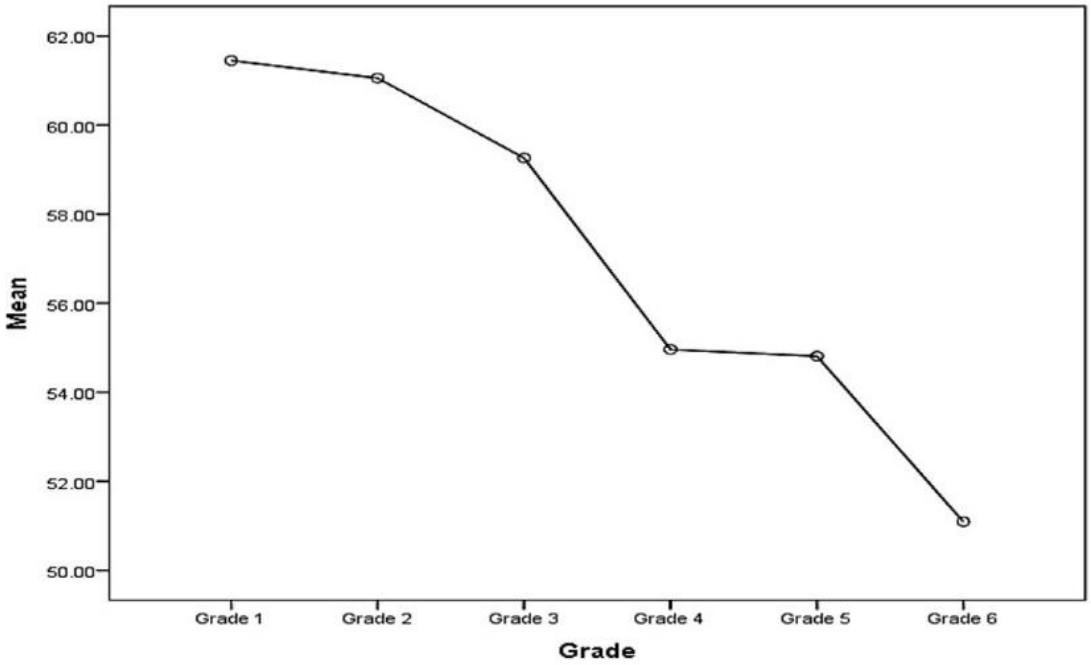

Figure 1 Differences in developmental learning difficulties for grades

A comparison of DLD between the six grades illustrated that there were no significant differences between Grades 1 and 2 (ρ = 0.552) and Grades 1 and 3 students (ρ = 0.101). However, there were significant differences between Grades 1 and 4 (ρ = 0.053) and Grades 5 (ρ = 0.049) and 6 students (ρ = 0.041) (see Table 9).

Table 9 *T*-test comparison between Grade 1 and other grades

	Grades	*df*	*t*	*ρ*
Grade 1	Grade 2	90	0.09	0.552
	Grade 3	86	1.12	0.101
	Grade 4	65	2.02*	0.053
	Grade 5	78	2.12*	0.049
	Grade 6	61	2.23*	0.041

Note. *$\rho \leq 0.05$.

A one-way ANOVA analysis was conducted to find whether the differences seen among arithmetic means in Table 8 were statistically significant. The results of the analysis are presented in Table 10 and shows that there was a significant difference based on the grade *F*-value 2.267, ρ = 0.051 at the 0.05 level.

Table 10 One-way ANOVA (multiple comparison between the six grades)

	SS	*df*	*MS*	*F*	*ρ*
Between groups	3625.04	5	725.01	2.267*	0.051
Within groups	123320.66	232	531.56		
Total	126945.69	237			

Note. *$\rho \leq 0.05$.

For a fair evaluation, the observation of the DLD for each student was compared to the mean of the same grade, because it was not realistic to compare the general mean for all grades as there were significant statistical differences between grades.

The mean and deviation for each grade's *z*-score, *t*-score and scaled score for each raw score had been calculated depending on the arithmetic mean and the standard deviation (see Table 8) and as illustrated in Table 11 and Appendix A.

Table 11 Raw score and scaled scores of the grades

Grade											
Grade 1		Grade 2		Grade 3		Grade 4		Grade 5		Grade 6	
Raw score	Scaled score	Raw score	Scaled score	Raw score	Scaled score	Raw score	Scaled score	Raw score	Scaled score	Raw score	Scaled score
_	3	_	3	_	3	_	3	24	3	_	3
_	4	_	4	_	4	_	4	_	4	_	4
_	5	_	5	_	5	_	5	29–30	5	_	5
24–27	6	24–32	6	24–29	6	7–30	6	37	6	24–28	6
28–36	7	33–38	7	32–37	7	32	7	43	7	29	7
37–43	8	41–47	8	39–47	8	41–42	8	44–47	8	35–37	8
47–54	9	51–54	9	50–52	9	45–48	9	49–52	9	43–45	9
62	10	57–63	10	57–62	10	_	10	53–56	10	49–53	10
67	11	66–70	11	63–65	11	49–61	11	58–61	11	55–60	11
78–82	12	75	12	73–79	12	70–72	12	65	12	64–65	12
92	13	85	13	81–86	13	74	13	67–71	13	69–72	13
98–106	14	92–95	14	88–95	14	80–85	14	_	14	74–77	14
109	15	103–105	15	99	15	86–87	15	_	15	_	15
_	16	110–114	16	_	16	94–96	16	81–83	16	87	16
_	17	_	17	_	17	_	17	_	17	100	17

In order to compare the means and to classify the difficulties for each grade, each grade was standardised separately as shown in Table 11 and Appendix A. We observed the degree of DLD for students as follows: For Grade 1 students the deviation of *z*-score on the negative side was -1.251, *t*-score = 37, scaled score = 6 and on the positive side +1.588, *t*-score = 66, scaled score = 15. For Grade 2 students the deviation on the negative side was -1.515, *t*-score = 35, scaled score = 6 and on the positive side 2.166, *t*-score = 72, scaled score = 16. For Grade 3 students the deviation on the negative side was -1.461, *t*-score = 35, scaled score = 6 and on the positive side 1.647, *t*-score = 66, scaled score = 15. For Grade 4 students the deviation on the negative side was -1.313, *t*-score = 37, scaled score = 6 and in the positive side 1.928, *t*-score = 69, scaled score = 16. For Grade 5 students the deviation on the negative side was -2.187, *t*-score = 28, scaled score = 3 and on the positive side 2.000, *t*-score = 70, scaled score = 16. For Grade 6 students the deviation on the negative side was -1.391, *t*-score = 36, scaled score = 6 and on the positive side 2.512, *t*-score = 75, scaled score = 17. Scaled scores are standard scores with a mean of 10 points; scaled scores also have a standard deviation of three points (Von Davier, 2011). Regarding the tested scaled score, the values 7 and below are classified as below average, values 8 to 12 are classified as average and values 13 and above are classified as above average (Rubin, A 2009).

Discussion

In this study we calculated the psychometric properties of the scale (validity and reliability) to be practical in assisting specialists to evaluate the prevalence of DLD among primary school students. The scale's validity analyses used the requisite content and criterion of the observation card. The value -0.636 indicated that academic achievement tends to fall with increasing DLD. The reliability calculated using Cronbach's Alpha coefficient (α) and Guttman's Split-half with the values of 0.919 and 0.881 respectively, indicated high reliability for the observation card (Cho & Kim, 2015; Heale & Twycross, 2015).

The evidence in the literature review suggests that developmental learning difficulty is one of the basic difficulties that many students suffer from (Angelka & Goran, 2018; Rubin, IL, Merrick, Greydanus & Patel, 2016).

DLDs are considered to be one of the factors responsible for academic difficulties later on in life and hinders the child's academic progress (Jacobs & Collair, 2017; Kavale, Kauffman, Bachmeier & LeFever, 2008). The difficulty prevalence rates reported by countries in a study of the Economic and Social Commission For Western Asia ([ESCWA], 2014), were as follows: 0.6% in Egypt, 4.8% in the Sudan and 1.9% in Yemen.

In our study, to investigate the prevalence of DLD among primary school students and analysis of socio-demographic characteristics, 238 students were tested of which 76 (32%) students represented with a moderate level of DLD. This prevalence can be considered low when compared with other studies (Dhanda & Jagawat, 2013; Dilshad, 2006). Mazzocco and Myers (2003) report that about 6% of primary students had different types of learning difficulties. The explanations for these differences might be in the use of different measurement instruments. We did not use a single instrument to estimate learning difficulties. Furthermore, we found that attention difficulties were more prevalent than perception, memory, thinking and verbal language difficulties.

Abolhassanzadeh et al. (2016) and Bener, Al Qahtani and Abdelaal (2006) also found that attention was one of the most prevalent psychiatric disorders among children and adolescents, which may lead to negative consequences such as

dysfunction in education, personal, and social relationships. Weiss and Hechitman (1993) report that attention difficulty is a chronic, debilitating disorder that may affect many aspects of an individual's life, including academic difficulties, social skills problems, and disturbance in parent-child relationships (Bener et al., 2006).

The findings also indicate that the rate of prevalence of DLD among male students was more than among female students. Gender was a contradictable variable in the prevalence of learning difficulties. Researchers say that the reason for that was due to the psychological differences. Lerner (2000) and Rasugu (2010), explain that due to biological causes, males may be more vulnerable to learning difficulties due to cultural factors (i.e., males tend to exhibit more disruptive behaviour that is troublesome to adults), and expectation pressures for success in school, which may be greater for males than for females. The studies of Dilshad (2006) and Mahin et al. (2014) showed similar results.

In addition, the findings of our study revealed that there were significant differences according to the grade, in which Grade 1 students scored the highest arithmetic mean. These results can be clarified as follows: DLDs are directly affected by age. Therefore, when growing up, the abilities to focus, perceive and think increase. These findings are in agreement with the findings of Ameer and Singh (2013) who found that students in higher grades performed better than students in lower grades. But in a study by Talepasand and Vahed (2012), prevalence of difficulties did not differ significantly by grade.

Conclusion

In this study we developed the observation card's psychometric properties to assist educationists responsible for developing therapeutic programmes that help students with learning difficulties. The findings reveal a tangible correlation between the observation card's overall value and each item's value. Criterion validity analysis proved a sizeable correlation between academic achievement levels and DLDs. The Guttman Split-half and Cronbach's Alpha coefficients were used for assessing overall reliability of this scale.

The results show that around 76 of the 238 students were vulnerable to moderate DLDs. DLD was identified as the most prevalent learning difficulty among students at primary school level. Results varied significantly based on gender, as males scored the highest arithmetic means on average. The grade level also displayed a similar effect, with students from the lowest grade level (Grade 1) observed to have scored the highest arithmetic means.

With this study we shed light on developmental learning difficulty programmes necessary to counter gender and grade level related performance issues. Similarly, our study lends credence to the necessity for resource rooms in primary schools to evaluate students with learning difficulties and to help specialists and teachers implement the programmes according to the students' needs in order to overcome learning difficulties, and to enable these students to keep up with their peers in terms of academic development.

In conclusion, we recommend the creation of special programmes for children with DLDs, taking into consideration the different categories and variables covered in this study. Additionally, we also suggest that future studies should consider expanding the constructs for measuring the characteristics of the students suffering from DLDs.

Acknowledgements

We appreciate the subsidy granted by the Cognitive and Behavior Research Center for Special Needs at SNNU in Xi'an, China. We would like to thank the experts and specialists in this field, as well as the principals and teachers of the five schools that actively participated in this research project for believing in our project, welcoming us into their daily work, and for allowing us access to their classrooms and students. Additionally, we would like to thank the Dean, Vice Dean and professors at the School of Education at SNNU for continued encouragement.

Authors' Contributions

The manuscript was completed by two authors who worked together. AHA completed the literature review, data collection and analysis, discussion, and conclusion for the manuscript. WZ, as the project supervisor, oversaw the work and reviewed the entire manuscript.

Notes

ii. DATES: Received: 7 June 2018; Revised: 15 February 2020; Accepted: 5 April 2020; Published: 31 May 2021.

References

Abdullah A & Shehab E 2013. Identifying non-adaptive behaviors of pupils with learning disabilities in the basic primary stage in Irbid. *Journal of the Islamic University for Educational and Psychological Studies*, 21(1):2.

Abolhassanzadeh M, Shafiee-Kandjani A, Vaziri Z, Molavi P, Sadeghi-Movahhed F, Noorazar G & Basharpoor S 2016. The prevalence and risk factors of attention deficit hyperactivity disorder among the elementary school students in Ardabil, Iran, in 2011-2012. *Journal of Research in Clinical Medicine*, 4(3):146–152. https://doi.org/10.15171/jarcm.2016.024

Abosi O 2007. Educating children with learning disabilities in Africa. *Learning Disabilities*

Research and Practice, 22(3):196–201. https://doi.org/10.1111/j.1540-5826.2007.00242.x

Ahmad FK 2015. Use of assistive technology in inclusive education: Making room for diverse learning needs. *Transience*, 6(2):62–77. Available at http://www2.hu-berlin.de/transcience/Vol6_No2_62_77.pdf. Accessed 3 May 2021.

Al-hano IA 2006. Representations of learning disabilities in Saudi Arabian elementary schools: A grounded theory study. PhD dissertation. Madison, WI: University of Wisconsin-Madison. Available at http://dr-banderalotaibi.com/new/admin/uploads/1/1.pdf. Accessed 3 May 2021.

Alim A, Abdallah KB, Ramaroson S, Sidikou M & Van de Wiel L 2007. *Accelerating girls' education in Yemen: Rethinking policies in teacher recruitment and school distribution*. New York, NY: UNICEF. Available at https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.394.1074&rep=rep1&type=pdf. Accessed 10 March 2021.

ALmenaye N 2009. Memory and executive functioning in Arabic literacy skills. PhD thesis. Guildford, England: University of Surrey. Available at https://core.ac.uk/download/pdf/18322893.pdf. Accessed 3 May 2021.

Alyahri A & Goodman R 2008. The prevalence of DSM-IV psychiatric disorders among 7–10 year old Yemeni schoolchildren. *Social Psychiatry and Psychiatric Epidemiology*, 43(3):224–230. https://doi.org/10.1007/s00127-007-0293-x

Ameer IS & Singh P 2013. Exploring grade levels and gender differences in Numeracy thinking among secondary school students. *Procedia - Social and Behavioral Sciences*, 90:187–195. https://doi.org/10.1016/j.sbspro. 2013.07.081

Anderson P 2002. Assessment and development of executive function (EF) during childhood. *Child Neuropsychology*, 8(2):71–82. https://doi.org/10.1076/chin.8.2.71.8724

Angelka K & Goran A 2018. Learning problems in children with mild intellectual disability. *International Journal of Cognitive Research in Science, Engineering and Education*, 6(1):31–37. https://doi.org/10.5937/ijcrsee1801031K

Annamma SA, Ferri BA & Connor DJ 2018. Disability critical race theory: Exploring the intersectional lineage, emergence, and potential futures of DisCrit in education. *Review of Research in Education*, 42(1):46–71. https://doi.org/10.3102/0091732x18759041

Bener A, Al Qahtani R & Abdelaal I 2006. The prevalence of ADHD among primary school children in an Arabian society. *Journal of Attention Disorders*, 10(1):77–82. https://doi.org/10.1177/1087054705284500

Carpenter E, Loo SK, Yang M, Dang J & Smalley SL 2009. Social functioning difficulties in ADHD: Association with PDD risk. *Clinical Child Psychology Psychiatry*, 14(3):329–344. https://doi.org/10.1177/1359104508100890

Central Statistical Organization 2016. *Statistical yearbook 2016*. Sana'a, Yemen: Author.

Cho E & Kim S 2015. Cronbach's coefficient alpha: Well known but poorly understood. *Organizational Research Methods*, 18(2):207–230. https://doi.org/10.1177/1094428114555994

CK-12 Foundation 2009. *CK-12: Probability and Statistics (Advanced) 2009*. Palo Alto, CA: Author.

Coladarci T 1992. Teachers' sense of efficacy and commitment to teaching. *The Journal of Experimental Education*, 60(4):323–337. https://doi.org/10.1080/00220973.1992.9943869

Colker R 2011. The learning disability mess. *Journal of Gender, Social Policy & The Law*, 20(1):81–106. Available at http://moritzlaw.osu.edu/sites/colker2/files/2012/12/TheLearningDisabilityMess.pdf. Accessed 29 April 2021.

Cortiella C & Horowitz SH 2014. *The state of learning disabilities: Facts, trends and emerging issues* (3rd ed). New York, NY: National Center for Learning Disabilities. Available at https://www.ncld.org/wp-content/uploads/2014/11/2014-State-of-LD.pdf. Accessed 4 May 2021.

Danforth S, Slocum L & Dunkle J 2010. Turning the educability narrative: Samuel A. Kirk at the intersection of learning disability and "mental retardation". *Intellectual and Developmental Disabilities*, 48(3):180–194. https://doi.org/10.1352/1944-7558-48.3.180

Degener T 2016. Disability in a human rights context. *Laws*, 5(3):35. https://doi.org/10.3390/laws5030035

Dhanda A & Jagawat T 2013. Prevalence and pattern of learning disabilities in school children. *Delhi Psychiatry Journal*, 16(2):386–390.

Dilshad H 2006. Prevalence of learning difficulties / disability among primary school children: Effect on emotional problems and academic achievement. MSc dissertation. Dharwad, India: University of Agricultural Sciences.

Economic and Social Commission for Western Asia 2014. *Disability in the Arab region: An overview*. Beirut, Lebanon: Author. Available at https://www.unescwa.org/sites/www.unescwa.org/files/page_attachments/disability_in_the_arab_region-_an_overview_-_en_1.pdf. Accessed 4 May 2021.

Elbeheri G, Everatt J, Reid G & Al Mannai H 2006. Dyslexia assessment in Arabic. *Journal of Research in Special Educational Needs*, 6(3):143–152. https://doi.org/10.1111/j.1471-3802.2006.00072.x

Emerson E, Hatton C, Robertson J, Roberts H, Baines S, Evison F & Glover G 2012. *People with learning disabilities in England 2011: Services and supports*. London, England: Improving Health and Lives: Learning Disabilities Observatory. Available at https://www.glh.org.uk/pdfs/PWLDAR2011.pdf. Accessed 4 May 2021.

Freedman J & Ferri BA 2017. Locating the problem within: Race, learning disabilities, and science. *Teachers College Record*, 119:1–28. Available at https://www.researchgate.net/profile/Beth-Ferri/publication/317220998_Locating_the_problem_within_Race_learning_disabilities_and_science/links/5a5fe9dda6fdcc21f487927b/Locating-the-problem-within-Race-learning-disabilities-and-science.pdf. Accessed 27 April 2021.

Gomez R, Hafetz N & Gomez RM 2013. Oppositional defiant disorder: Prevalence based on parent and teacher ratings of Malaysian primary school children. *Asian Journal of Psychiatry*, 6(4):299–302. https://doi.org/10.1016/j.ajp.2013.01.008

Gregg DG 2010. Designing for collective intelligence. *Communications of the ACM*, 53(4):134–138. https://doi.org/10.1145/1721654.1721691

Hadidi MS & Al Khateeb JM 2015. Special education in Arab countries: Current challenges. *International Journal of Disability, Development and Education*, 62(5):518–530. https://doi.org/10.1080/1034912x.2015.1049127

Heale R & Twycross A 2015. Validity and reliability in quantitative studies. *Evidence-Based Nursing*, 18(3):66–67. https://doi.org/10.1136/eb-2015-102129

HLSP S.L. 2005. *Assessment of child development project, Yemen: Final report*. Barcelona, Spain: Author. Available at https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.693.9353&rep=rep1&type=pdf. Accessed 8 May 2021.

Jacobs C & Collair L 2017. Adolescent identity formation in the context of vocationally oriented special needs schools. *South African Journal of Education*, 37(3):Art. # 1249, 10 pages. https://doi.org/10.15700/saje.v37n3a1249

Kavale KA, Kauffman JM, Bachmeier RJ & LeFever GB 2008. Response-to-Intervention: Separating the rhetoric of self-congratulation from the reality of specific learning disability identification. *Learning Disability Quarterly*, 31(3):135–150. https://doi.org/10.2307/25474644

Keyes SE & Brandon T 2012. Mutual support: A model of participatory support by and for people with learning difficulties. *British Journal of Learning Disabilities*, 40(3):222–228. https://doi.org/10.1111/j.1468-3156.2011.00698.x

Lerner J 2000. *Learning disabilities: Theories, diagnosis, and teaching strategies* (8th ed). Boston, MA: Houghton Mifflin.

López-Villalobos JA, Andrés-De Llano JM, López-Sánchez V, Rodríguez-Molinero L, Garrido-Redondo M, Martínez-Rivera MT & Sacristán-Martín AM 2015. Prevalence of oppositional defiant disorder in a sample of Spanish children between six and sixteen years: Teacher's report. *Actas Espanolas de Psiquiatria*, 43(6):213–220.

Macdonald S 2010. Towards a social reality of dyslexia. *British Journal of Learning Disabilities*, 38(4):271–279. https://doi.org/10.1111/j.1468-3156.2009.00601.x

Mahin ES, Haghdoost AA, Afsaneh N & Hamideh RS 2014. Prevalence of learning disability in primary school students in Kerman city. *European Online Journal of Natural and Social Sciences*, 3(3):534–540. Available at http://european-science.com/eojnss/article/view/795. Accessed 22 August 2014.

Mazzocco MMM & Myers GF 2003. Complexities in identifying and defining mathematics learning disability in the primary school-age years. *Annals of Dyslexia*, 53(1):218–253. https://doi.org/10.1007/s11881-003-0011-7

McGuinness D 2004. *Early reading instruction. What science really tells us about how to teach reading*. Cambridge, MA: MIT Press.

Miciak J, Taylor WP, Denton CA & Fletcher JM 2015. The effect of achievement test selection on identification of learning disabilities within a patterns of strengths and weaknesses framework. *School Psychology Quarterly*, 30(3):321–334. https://doi.org/10.1037/spq0000091

Moreno EE & Pelegrina del Rio M 2011. Prevalencia, sintomatología y distribución del trastorno negativista desafi ante [Prevalence, symptoms and distribution of oppositional defiant disorder]. *Psicothema*, 23(2):215–220. Available at http://www.psicothema.com/PDF/3873.pdf. Accessed 25 April 2021.

Mwanamukubi L 2013. Reading difficulties in grade 6 learners and challenges faced by teachers in teaching reading: A case of Chadiza and Chipata districts, Zambia. Master of Arts in Child and Adolescent Psychology dissertation. Lusaka, Zambia: The University of Zambia. Available at http://palevel.unza.zm/bitstream/handle/123456789/2715/mwanamukubi.pdf?sequence=1&isAllowed=y. Accessed 25 April 2021.

O'Connor J & Geiger M 2009. Challenges facing primary school educators of English Second (or Other) Language learners in the Western Cape. *South African Journal of Education*, 29(2):253–269. https://doi.org/10.15700/saje.v29n2a167

Perold M, Louw C & Kleynhans S 2010. Primary school teachers' knowledge and misperceptions of attention deficit hyperactivity disorder (ADHD). *South African Journal of Education*, 30(3):457–473. https://doi.org/10.15700/saje.v30n3a364

Pisoni DB, Kronenberger WG, Chandramouli SH & Conway CM 2016. Learning and memory processes following cochlear implantation: The missing piece of the puzzle. *Frontiers in Psychology*, 7:493. https://doi.org/10.3389/fpsyg.2016.00493

Randall SV (ed.) 2006. *Learning disabilities: New research*. New York, NY: Nova Science.

Rasugu GKO 2010. Nature and prevalence of learning disabilities among standard three primary school pupils in Starehe division of Nairobi Province, Kenya. MEd thesis. Nairobi, Kenya: Kenyatta University. Available at https://ir-library.ku.ac.ke/bitstream/handle/123456789/407/Grace+Kwamboka+Omete+Rasugu.pdf?sequence=3. Accessed 24 April 2021.

Rubin A 2009. *Statistics for evidence-based practice and evaluation*. Belmont, CA: Cengage Learning.

Rubin IL, Merrick J, Greydanus DE & Patel DR (eds.) 2016. *Health care for people with intellectual and developmental disabilities across the lifespan* (Vol. 1). Switzerland: Springer. https://doi.org/10.1007/978-3-319-18096-0

Save the Children 2016. *Joint Education Needs Assessment Report: Aden – Yemen*. Available at https://resourcecentre.savethechildren.net/node/12526/pdf/aden_2016_joint_education_needs_assessment.pdf. Accessed 24 April 2021.

Smits N, Van der Ark LA & Conijn JM 2018. Measurement versus prediction in the construction

of patient-reported outcome questionnaires: Can we have our cake and eat it? *Quality of Life Research*, 27:1673–1682. https://doi.org/10.1007/s11136-017-1720-4

Standards and Testing Agency 2016. *How to convert key stage 2 raw scores to scaled scores*. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/616977/2016_KS2_scaled_scores.pdf. Accessed 7 May 2021.

Talepasand S & Vahed MI 2012. Prevalence of Mathematic disability in primary schools. *Iranian Rehabilitation Journal*, 10(1):28–34.

Test Partnership 2017. *Insights series technical manual*. Available at https://www.testpartnership.com/samplereports/psychometric-properties.pdf. Accessed 11 March 2021.

Thomas G & Whitten J 2012. Learning support for students with learning difficulties in India and Australia: Similarities and differences. *The International Education Journal: Comparative Perspectives*, 11(1):3–21. Available at https://files.eric.ed.gov/fulltext/EJ1003821.pdf. Accessed 11 March 2021.

Topkin B, Roman NV & Mwaba K 2015. Attention Deficit Disorder (ADHD): Primary school teachers' knowledge of symptoms, treatment and managing classroom behaviour. *South African Journal of Education*, 35(2):Art. # 988, 8 pages. https://doi.org/10.15700/saje.v35n2a988

Van Luit JEH & Toll SWM 2018. Associative cognitive factors of math problems in students diagnosed with developmental dyscalculia. *Frontiers in Psychology*, 9:1907. https://doi.org/10.3389/fpsyg.2018.01907

Visser L, Korthagen FAJ & Schoonenboom J 2018. Differences in learning characteristics between students with high, average, and low levels of academic procrastination: Students' views on factors influencing their learning. *Frontiers in Psychology*, 9:808. https://doi.org/10.3389/fpsyg.2018.00808

Von Davier A (ed.) 2011. *Statistical models for test equating, scaling, and linking*. New York, NY: Springer. https://doi.org/10.1007/978-0-387-98138-3

West-Olatunji C, Shure L, Pringle R, Adams T, Lewis D & Cholewa B 2010. Exploring how school counselors position low-income African American girls as mathematics and science learners. *Professional School Counseling*, 13(3):184–195. https://doi.org/10.1177/2156759X1001300306

World Health Organization 2011. *World report on disability*. Geneva, Switzerland: Author. Available at https://www.who.int/disabilities/world_report/2011/report.pdf. Accessed 8 March 2021.

World Health Organization 2013. *Summary report on the first stakeholders' meeting for developing an Arab report on disability* (WHO-EM/HLP/077/E). Cairo, Egypt: Author. Available at https://applications.emro.who.int/docs/IC_Meet_Rep_2013_EN_14926.pdf. Accessed 8 March 2021.

Zimmerman L & Smit B 2014. Profiling classroom reading comprehension development practices from the PIRLS 2006 in South Africa. *South African Journal of Education*, 34(3):Art. # 962, 9 pages. https://doi.org/10.15700/201409161101

Appendix A: *Z*-Score, *T*-Score and Scaled Scores of the Grades

	z						*t*						Scaled score					
Raw score	1st	2nd	3rd	4th	5th	6th	1st	2nd	3rd	4th	5th	6th	1st	2nd	3rd	4th	5th	6th
24	-1.251	-1.515	-1.461	_	-2.187	-1.391	37	35	35	_	28	36	6	6	6	_	3	6
25	-1.217	-1.474	-1.412	_	_	_	38	35	36	_	_	_	6	6	6	_	_	_
26	_	-1.434	_	_	_	_	_	36	_	_	_	_	_	6	_	_	_	_
27	-1.151	_	_	-1.313	_	_	38	_	_	37	_	_	6	_	_	6	_	_
28	-1.117	-1.352	-1.259	_	_	-1.186	39	36	37	_	_	38	7	6	6	_	_	6
29	-1.084	-1.311	-1.254	_	-1.832	-1.135	39	37	37	_	32	39	7	6	6	_	5	7
30	_	-1.269	_	-1.169	-1.761	_	_	37	_	38	32	_		6	_	6	5	_
31	-1.017	-1.229	_	_	_	_	40	38	_	_	_	_	7	6	_	_	_	_
32	_	-1.188	-1.129	-1.078	_	_	_	38	39	39	_	_	_	6	7	7	_	_
33	_	-1.147	_	_	_	_	_	39	_	_	_	_	_	7	_	_	_	_
34	_	_	-1.047	_	_	_	_	_	40	_	_	_	_	_	7	_	_	_
35	_	-1.065	_	_	_	-0.826		39	_	_	_	42	_	7	_	_	_	8
36	-0.850	-1.025	_	_	_	_	41	40	_	_	_	_	7	7	_	_	_	_
37	-0.817	_	-0.923	_	-1.264	-0.724	42	_	41	_	37	43	8	_	7	_	6	8
38	_	-0.923	_	_	_	_	_	41	_	_	_	_	_	7	_	_	_	_
39	_	_	-0.840	_	_	_	_	_	42	_	_	_	_	_	8	_	_	_
40	_	_	-0.798	_	_	_	_	_	42	_	_	_	_	_	8	_	_	_
41	-0.683	-0.820	_	-0.656	_	_	43	42	_	43	_	_	8	8	_	8	_	_
42	-0.650	-0.779	_	-0.609	_	_	44	42	_	44	_	_	8	8	_	8	_	_
43	-0.616	-0.738	-0.674	_	-0.838	-0.416	44	43	43	_	42	46	8	8	8	_	7	9
44	_	-0.697	_	_	-0.767	_	_	43	_	_	42	_	_	8	_	_	8	_
45	_	_	-0.591	-0.468	_	-0.313	_	_	44	45	_	47	_	_	8	9	_	9
46	_	_	_	-0.421	-0.625	_	_	_	_	56	44	_	_	_	_	9	8	_
47	-0.483	-0.575	-0.508	_	-0.554	_	45	44	45	_	44	_	9	8	8	_	8	_
48	_	_	_	-0.327	_	_	_	_	_	47	_	_	_	_	_	9	_	_
49	_	_		_	-0.412	-0.107	_	_	_	_	46	49	_	_	_	_	9	10
50	_	_	-0.384	_		-0.056	_	_	46	_	_	49	_	_	9	_	_	10
51	_	-0.411		_	-0.270	-0.005	_	46	_	_	47	50	_	9	_	_	9	10
52	_	_	-0.301	_	-0.199	_	_	_	47	_	48	_	_	_	9	_	9	_
53	-0.282	-0.329	_	_	-0.128	0.098	47	47	_	_	49	51	9	9	_	_	10	10
54	-0.249	-0.288	_	_	-0.057	_	48	47	_	_	49	_	9	9	_	_	10	_
55	_	_	_	_	_	0.201	_	_	_	_	_	52	_	_	_	_	_	11
56	_	_	_	_	0.084	_	_	_	_	_	51	_	_	_	_	_	10	_
57	_	-0.166	-0.094	_	_	_	_	48	49	_	_	_	_	10	10	_	_	_
58	_	-0.125	-0.052	_	0.226	0.355	_	49	49	_	52	54	_	10	10	_	11	11
59	_	_	_	0.189	0.297		_	_	_	52	53	_	_	_	_	11	11	_
60	_	-0.043	_	0.237	0.368	0.458	_	50	_	52	54	55	_	10	_	11	11	11
61	_	-0.002	_	0.284	0.439	_		50	_	53	54	_	_	10	_	11	11	_
62	0.018	_	0.114	_	_	_	50	_	51	_	_	_	10	_	10	_	_	_
63	_	0.080	0.155	_	_	_	_	51	52	_	_	_	_	10	11	_	_	_
64	_	_	0.196	_	_	0.663	_	_	52	_	_	57	_	_	11	_	_	12
65	_	_	0.238	_	0.723	0.714	_	_	52	_	57	57	_	_	11	_	12	12

	z						*t*						Scaled score					
Raw score	1st	2nd	3rd	4th	5th	6th	1st	2nd	3rd	4th	5th	6th	1st	2nd	3rd	4th	5th	6th
66	_	0.202	_	_	_	_	_	52	_	_	_	_	_	11	_	_	_	_
67	0.185	_	_	_	0.865	_	52	_	_	_	59	_	11	_	_	_	13	_
68	_	_	_	_	0.936	_	_	_	_	_	59	_	_	_	_	_	13	_
69	_	_	_	_	1.007	0.919	_	_	_	_	60	59	_	_	_	_	13	13
70	_	0.366	_	0.706	1.078	_	_	54	_	57	61	_	_	11	_	12	13	_
71	_	_	_	0.753	1.149	_	_	_	_	58	61	_	_	_	_	12	13	_
72	_	_	_	0.800	_	1.074	_	_	_	58	_	61	_	_	_	12	_	13
73	_	_	0.569	_	_	_	_	_	56	_	_	_	_	_	12	_	_	_
74	_	_	0.611	0.894	_	1.177	_	_	56	59	_	62	_	_	12	13	_	14
75	_	0.571	0.652	_	_	_	_	56	57	_	_	_	_	12	12	_	_	_
76	_	_	0.694	_	_	_	_	_	57	_	_	_	_	_	12	_	_	_
77	_	_	_	_	_	1.331	_	_	_	_	_	63	_	_	_	_	_	14
78	0.553	_	0.777	_	_	_	56	_	58	_	_	_	12	_	12	_	_	_
79	_	_	0.818	_	_	_	_	_	58	_	_	_	_	_	12	_	_	_
80	0.620	_	_	1.176	_	_	56	_		62	_	_	12	_	_	14	_	_
81	_	_	0.901	_	1.859	_	_	_	59	_	69	_	_	_	13	_	16	_
82	0.686	_	_	_	_	_	57	_	_	_	_	_	12	_	_	_	_	_
83	_	_	_	_	2.000	_	_	_	_	_	70	_	_	_	_	_	16	_
84	_	_	1.025	1.364	_	_	_	_	60	64	_	_	_	_	13	14	_	_
85	_	0.980	1.067	1.411	_	_	_	60	61	64	_	_	_	13	13	14	_	_
86	_	_	1.108	1.458	_	_	_	_	61	65	_	_	_	_	13	15	_	_
87	_	_	_	1.505	_	1.844	_	_	_	65	_	68	_	_	_	15	_	16
88	_	_	1.191	_	_	_	_	_	62	_	_	_	_	_	14	_	_	_
89	_	_	1.232	_	_	_	_	_	62	_	_	_	_	_	14	_	_	_
90	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
91	_	_	1.315	_	_	_	_	_	63	_	_	_	_	_	14	_	_	_
92	1.020	1.266	1.357	_	_	_	60	63	64	_	_	_	13	14	14	_	_	_
93	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
94	_	_	_	1.834	_	_	_	_	_	68	_	_	_	_	_	16	_	_
95	_	1.389	1.481	_	_	_	_	64	65	_	_	_	_	14	14	_	_	_
96	_	_	_	1.928	_	_	_	_	_	69	_	_	_	_	_	16	_	_
97	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
98	1.221	_	_	_	_	_	62	_	_	_	_	_	14	_	_	_	_	_
99	1.254	_	1.647	_	_	_	63	_	66	_	_	_	14	_	15	_	_	_
100	1.288	_	_	_	_	2.512	63	_	_	_	_	75	14	_	_	_	_	17
101	1.321	_	_	_	_	_	63	_	_	_	_	_	14	_	_	_	_	_
102	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
103	_	1.716	_	_	_	_	_	67	_	_	_	_	_	15	_	_	_	_
104	1.421	_	_	_	_	_	64	_	_	_	_	_	14	_	_	_	_	_
105	1.455	1.798	_	_	_	_	65	68	_	_	_	_	14	15	_	_	_	_
106	1.488	_	_	_	_	_	65	_	_	_	_	_	14	_	_	_	_	_
107	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
108	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_

	z						*t*						Scaled score					
Raw score	1st	2nd	3rd	4th	5th	6th	1st	2nd	3rd	4th	5th	6th	1st	2nd	3rd	4th	5th	6th
109	1.588	_	_	_	_	_	66	_	_	_	_	_	15	_	_	_	_	_
110	_	2.002	_	_	_	_	_	70	_	_	_	_	_	16	_	_	_	_
111	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
112	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
113	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
114	_	2.166	_	_	_	_	_	72	_	_	_	_	_	16	_	_	_	_