The reading characteristics of gifted literacy disabled students

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Abstract

Some gifted students who have learning difficulties have specific literacy disabilities; gifted literacy disabled (GLitD) students. The present study examined the reading characteristics of a group of these students at the primary level of education.

The students displayed a discrepancy in literacy performance of at least 1 standard deviation below the mean for their chronological age in at least one of reading prose accuracy, prose reading comprehension or isolated word reading accuracy. As well, their phonemic awareness (segmentation and blending) and general ability using the WISC-III were assessed.

Scores on the cognitive factors of the WISC-III identified two groups: (1) a group with superior performance on both Verbal Comprehension and Perceptual Organisation and (2) a group with superior performance only on Perceptual Organisation.

The two groups differed in their literacy patterns. The superior PO group showed the greater level of difficulty, with all measures of literacy at least one standard deviation below their expected score. The superior VC + PO group showed lower performance on isolated word reading and spelling. They did not differ in phonemic awareness.

The literacy disability displayed by both groups is attributed to a specific preference for the use of global rather than analytic information processing strategies. This in turn influences phonemic awareness knowledge and consequently orthographic knowledge. The superior VC + PO group are more able to compensate for this cognitive disability.

The implications of this study for the diagnosis and instruction of GLitD students are discussed.

The existence of gifted students who have learning difficulties has been well documented (Brody & Mills, 1997; Dix & Schafer, 1996; Ellston, 1993 ; Fetzer, 2000; Hishinuma & Tadaki, 1996; Rivera, Murdock, & Sexton, 1995). These students display a learning capacity that is characteristic of students who are gifted, in parallel with a specific learning disability in areas of academic performance such as literacy and mathematics.

This leads to the question of what is the nature of knowledge that permits both gifted or superior learning in some areas and learning disability in others. This issue can be conceptualised in terms of the differentiated models of giftedness and talent proposed by Gagne, (2000) and Ziegler and Heller (2000). These models distinguish between giftedness (high level broad-based general ability or competences that are untrained, displayed spontaneously and attributed in part to genetic sources) and talent (outstanding skills or abilities in specific area such as music or science that are developed systematically and emerge gradually as the aptitudes are transformed into skills. The transformation is through personal interests, personality traits and cultural influences.

Literacy knowledge fits within the category of talent. The skills and abilities by which it is characterised are learnt through cultural influences. Literacy teaching transforms the general ability of readers in particular ways. They learn to recognise and use meaning units in written text. They learn to process meaning at the word, sentence, conceptual, topic and dispositional levels of the text. They also have actions that they can use to align their knowledge with the text information.

They use these areas of knowledge in a parallel or 'simultaneous processing' way, with most of the processing relatively automatic. As they read, they integrate the outcomes from the areas into an overall impression of the ‘just read’ text. They match this against their summary of the text they

have read so far and their expectations of what the text might mention in the future. The process is referred to as multiple-level text processing (Hacker, 1997; Hacker, 1998a; Kinnunen & Vauras, 1995). A reader's comprehension at any time is the sum of the processing at the various levels. Information gained at the various levels is compared.

Literacy learning difficulties arise when the acquisition of these areas of knowledge is disrupted. Various psycholinguistic and cognitive processes explain difficulties at each level. At the word level, difficulty learning letter strings has been linked with an immature knowledge of sound patterns in spoken language (phonological and phonemic knowledge), semantic processing, the efficient recall of names from memory (rapid automatised naming difficulties) and the coding of the visual properties of alphanumeric symbols (visual symbolic coding) (Compton, 2002; Metsala, 1999; Siegel, Share & Geva, 1995). At the sentence level, comprehension difficulties have been linked with immature grammar, poor understanding of sentence propositions and immature short term memory process. At the conceptual and topic level, comprehension difficulties have been linked with immature networks of meanings and the ability to predict using them (Siegel & Ryan, 1988).

The causes of the reading disabilities displayed by gifted learners have attracted little empirical attention. Brody and Mills (1997) refer to a 'processing deficit' a concept that has been only vaguely defined (McCoach, Kehle, Bray & Siegle, 2001). The foregoing review provides a framework for examining this; the deficit may be due to cognitive or metacognitive processes that permit knowledge acquisition at each level of text.

Describing general ability The knowledge or general ability of students can be described using scales such as the Wechsler Intelligence Scale for Children. Various indices describe knowledge on this scale; (1) general ability score, (2) verbal and performance score and (3) four information processing factor scores (Carroll, 1993; Keith & Witta, 1997; Prifitera & Weiss, 1993); Verbal Comprehension, Perceptual Organisation, Freedom from Distractibility and Processing Speed. Comparison of the factor scores is often most useful for analysing patterns in learning (Keith & Witta, 1997).

Past reading difficulties for some students mean that the Perceptual Organisation score is a better estimate of general cognitive functioning than the Verbal Comprehension score (Kaufman, 1994). The factors that cause them greatest difficulty are Freedom from Distractibility and Processing Speed (Daley & Nagle, 1996; Sattler, 1988). These comprise the subtests Arithmetic, Digit Span, Symbol Search and Coding. With Information, they have been integrated into learning disability 'profiles'; (1) ACID (Arithmetic, Coding, Digit Span), (2) ACIDS (Arithmetic, Coding, Information, Digit Span, Symbol Search), (3) SCAD (Symbol Search, Coding, Arithmetic, Digit Span) and (4) CAD (Coding, Arithmetic and Digit Span).

The portion of the reading disability population showing the ACID and CAD profiles varies between 30 % and 50 % (Gutkin, 1979; Prifitera & Dersh, 1993; Young & Mollner 1995). The profiles are not unique to students with reading disabilities. While a profile suggests a reading difficulty, it is not sufficient to diagnose the difficulty (Prifitera & Dersh, 1993; McCoach, Kehle & Bray, 2001; Ward, Ward, Hatt, Young & Mollner, 1995).

An alternative description of cognitive profiles is provided by the cognitive style perspective. The analytic - global dimension of cognitive style has been used in a plethora of studies (see Riding & Cheema, 1991 for a review). It is generally agreed that the acquisition of early literacy knowledge requires the use of analytic sequential learning strategies (Rasinski, 1984; Truch, 1993).

The knowledge of gifted learning disabled students The conceptual networks of gifted and talented students are seen as more differentiated with richer sets of conceptual links. They are "able to conceptualize quickly, to see patterns and relationships readily, to reason abstractly, to generalize easily and to enjoy the challenge of autonomously solving novel problems" (Barton and Starnes, 1989, p. 28).

Given the breadth of the constructs of giftedness and learning disabilities, it is unlikely that a single pattern of scores could identify all gifted literacy disabled students. The little reported research supports the existence of three groups; superior knowledge in either one or both of Verbal Comprehension and Perceptual Organisation. The WISC-III profiles of gifted/learning disabled

students show higher discrepancies than those of students who demonstrate giftedness alone (Brody & Mills, 1997; Ferri, Gregg & Heggoy, 1997).

Available analyses support these groups. A higher Perceptual Organization score is consistent with Silverman's (1989) 'gifted visual-spatial' learning profile. A superior Verbal Comprehension score that is either higher than or not different from the Perceptual Organisation score have also been reported (Barton & Starnes, 1989; McCoach, Kehle, Bray & Siegle, 2001). These students show high Comprehension and Similarities scores (Barton & Starnes, 1988; Baum, Owen & Dixon, 1991; Ferri, Gregg & Heggoy, 1997); they have extensive vocabularies, well-developed conceptual abilities, a large general knowledge (Little, 2001), good listening comprehension and express themselves well (Hishinuma & Tadaki, 1996). They reason abstractly, solve problems and may show a sophisticated sense of humor (Rivera, Murdock & Sexton, 1995).

Most investigators agree that the gifted learning disabled group is more likely to show lower performance on the Freedom from Distractibility and Processing Speed factors, that is, versions of the ACID type profile. These profiles suggest comparative difficulties on tasks that require using information in a particular sequence, retaining arbitrary information in order and manipulating symbolic information. They are more likely to learn globally (Brody & Mills, 1997; Little, 2001; McCoach, et.al, 2001). Their difficulties centre on basic automatic skills as graphomotor speed, perceptual scanning, sequencing and organization (Barton and Starnes, 1989)

In the student population at large, those showing this learning profile have been referred to as the global language deficit group or the 'basic phonological processing disorder' group (Rourke, 1998). They operate less analytically and in more global, gestalt ways, have difficulty with verbal associations and verbal sequencing (Leton, Myomoto & Ryckman, 1987) and restricted auditory memory both short- and long-term verbal memory. They often show phonological and recoding difficulties in reading and spelling and difficulties with grammar.

Describing the cause of the literacy learning disability A literacy learning disability can be attributed to inadequate knowledge and strategies at any of the levels of text. The processing deficit mentioned earlier can be examined in terms of patterns in general ability.

The capacities measured by ACID-type profiles may be linked with letter cluster learning. Digit Span performance is mediated by phonological processes similar to those involved in phonemic awareness (Baddeley, 1990). Coding and Symbol Search measure the ability to learn an arbitrary visual-spatial code in a way similar to learning letter-sound relationships. Readers who display ACID-type profiles have difficulty learning to read and to spell words automatically. Difficulties with phonics, rote memorisation and organisation (Brody & Mills, 1997) are consistent with this. It should be noted that while one might expect gifted literacy disabled students to display phonological awareness difficulties, gifted third and fourth graders do not show these difficulties (McBride-Chang, Manis and Wagner, 1996).

Verbal Comprehension scores in the superior range and an ACID type profile suggests verbal knowledge necessary to scaffold reading with difficulty learning letter clusters. When reading aloud, these students may show a higher reading comprehension than word accuracy. Their verbal conceptual knowledge means they need to read accurately only a small portion of the text; their highly elaborated and differentiated conceptual networks compensate for lower letter cluster knowledge.

Verbal Comprehension scores in the average range and an ACID type profile, on the other hand, may lead to both lower reading accuracy and comprehension. A less elaborated and differentiated verbal conceptual network may not compensate to the same extent for lower word reading accuracy.

Variation in Verbal Comprehension suggests differences in the comprehension of word meanings and the relationships between them, the richness of semantic networks and in the repertoire of thinking strategies available for comprehension. GLitD students with superior Verbal Comprehension may interpret text differently from peers with average verbal ability. They may link ideas by semantic inference more effectively and not need to process the written data to the same extent. Advanced imagery knowledge, on the other hand, may lead to a different interpretation of the text. As a consequence, one might predict a greater discrepancy between measures of word accuracy and

comprehension for GLitD students with superior Verbal Comprehension than for those with average Verbal Comprehension.

The observation that these readers use metacognitive strategies in ways more like gifted than average learning peers, for example, engaging in comprehension monitoring, (Hannah & Shore, 1995; McGuire & Yewchuk, 1996), while differing in their use of 'while reading' strategies such as visualising and paraphrasing, is consistent with this interpretation. These studies did not examine other aspects of literacy processing. Their inefficiency in detecting errors may have been due to difficulties reading words efficiently. Their knowledge of letter clusters may have restricted their application of the while reading strategies.

It is reasonable to assume that letter cluster knowledge is learnt in the same ways regardless of whether the individual is gifted and that the causes of word reading disability for gifted students are not different from those for other students. . As noted earlier, difficulties in at least two areas lead to impoverished letter cluster knowledge; (1) phonological abilities such as segmenting spoken words into sounds and phonemic blending and (2) orthographic analogy processes. This similarity may not extend to other aspects of reading

The focus of the present investigation is on how gifted learning disabled students use their superior knowledge (verbal and / or nonverbal) during literacy activities. It examines

(1) the factor profiles of gifted literacy disabled primary level students, in terms of the differences between Perceptual Organization and Verbal Comprehension and the extent of ACID-type profiles.

(2) the reading accuracy and comprehension patterns associated with each Perceptual Organization -Verbal Comprehension pattern; GLitD students with superior scores in both Perceptual Organization and Verbal Comprehension are predicted to show a greater discrepancy in reading comprehension-accuracy than those with a superior score only in Perceptual Organization.

(3) the relationship between lower ACID-type scores and (1) isolated word reading and spelling and (2) phonemic awareness.

Method

Design :

Participants. The participants were 37 primary age students referred from schools in metropolitan Melbourne for a psycho educational assessment because of literacy learning difficulties. Their mean age was 101 months, with a standard deviation of 13 months. Ages ranged from 78 months to 121 months. Of the sample, 65 % of the referrals were initiated by the students' teachers. The participants were selected from a larger group of primary level students according to a number of criteria specified below.

Assessment procedures used. Students' performance was assessed using the procedures specified:

(1) Prose reading accuracy and comprehension were assessed using the Neale Analysis of Reading Ability 3 Form 1 (Neale, 1999).

(2) Individual word reading ability was assessed using the Reading Recognition subtest of the Peabody Individual Achievement Test -Revised (Markwardt, 1997).

(3) Spelling ability was assessed using Spelling (Fryar, 1997).

(4) Phonemic awareness was assessed using Assessing and teaching phonological knowledge (Munro, 1999).

(5) General ability was assessed using the Wechsler Intelligence Scale for Children III (Wechsler, 1992). The 'scaled score for each sub-scale and the fou 'factor' scores were calculated for each participant. Performance was used to compute, for each learner
   (1) the four factor scores
   (2) the ACID profile
   (3) the cognitive style using the procedure recommended by Letteri (1987: Picture Completion + Block Design + Object Assembly - Picture Arrangement -Coding - Symbol Search. An index greater than 5 indicates a global preference and a value less than -5 suggests an analytic preference.

(6) Participants' creative ability was rated by their teachers using the Checklist for Identifying Creative Children (Sattler, 1988).

(7) Participants' display of indicative behaviours of gifted learning disability was rated using a checklist entitled Indicative behaviours of gifted learning disability, compiled from descriptions by McEachern and Bornot , (2001), Ferri, Gregg and Heggoy (1997) and Dix and Schafer, (1996) and rated on a 5 point scale in terms of the comparative frequency of each behaviour. The indicative behaviours were rated by teachers. Items targeted the following areas of learning behaviours:

- preference for whole-part learning strategies, synthesize ideas well rather than stepwise.
- see the big picture; not detail oriented.
- recall non literacy knowledge well from long-term memory .
- generate their own methods of organization in topics of interest.
- develop own methods of problem solving in topics of interest.
- solve problems intuitively.
- learn better through immersion than through being programmed through drill and repetition.
- learn better in untimed situations.
- generate unusual solutions to problems, have very interesting ideas.
- develop quite asynchronously, may uneven scores patterns.
- perform better with more challenging work , prefer complexity.
- reason well in topics of interest.
- extremely curious, asks many questions about topics of interest.
- are intrinsically motivated in areas of interest, have high degree of energy.
- perceptive and insightful (seems "wise").

Procedure

The participants were selected according to a number of criteria

(1) each had an intelligence quotient of at least 130 points on either or both the Perceptual Organization or Verbal Comprehension factors on the WISC III.

(2) each displayed a discrepancy in literacy performance of at least 1 standard deviation below the mean for their chronological age in at least one of reading prose accuracy, prose reading comprehension or isolated word reading accuracy. This is the criterion recommended by Brody & Mills (1997), Marsh and Wolfe (1999) and Mendaglio (1993).

(3) each received a mean rating exceeding 4 on the Checklist for Identifying Creative Children (Sattler, 1988) and on the Indicative behaviours of gifted learning disability..

Following selection, participants were categorised according to differences between the factors Verbal Comprehension and Perceptual Organisation. The criterion used was a difference of at least 12 for a .95 probability level (Sattler, 1998);. Three categories were available:

(1) the 'superior VC + PO' group, for which Perceptual Organization and Verbal Comprehension scores differed by less than 12..

(2) the 'superior PO' group, for which the Perceptual Organization score exceeded the Verbal Comprehension score by at least 12,

(3) the 'superior VC' group, for which the Verbal Comprehension score exceeded the Perceptual Organization score by at least 12.

The prose and individual word reading patterns, spelling ability and phonemic awareness of each group were compared, using MANOVA procedures and the comparison of mean scores.

Results

The cohort of participants was categorised into two groups on the basis of difference between the factor scores for Verbal Comprehension and Perceptual Organisation; a superior Perceptual Organisation category (superior PO) and group for which both the Verbal Comprehension and Perceptual Organisation scores did not differ (superior VC + PO group). No participant displayed higher Verbal Comprehension over Perceptual Organisation. In all, 54 % of the cohort were in the superior VC + PO group.

The broad cognitive 'demographics' of the two groups were described in terms of their scores on the four factors. The mean score and standard deviation for each category and the extent of difference between the groups (2 tailed t-test for independent samples) are shown in Table 1.

Insert Table 1 about here

These data support the categorisation of the cohort; the two groups differ in measures of verbal but not nonverbal or performance ability. The two groups also differ on the Freedom from Distractibility index; the superior VC + PO group achieved a higher score. The data support two of the profiles reported earlier for gifted learning disabled students (Barton & Starnes, 1989; McCoach, Kehle, Bray & Siegle, 2001). A group for which the Verbal Comprehension score is higher than the Perceptual Organisation score did not emerge.

To examine these trends further, the score of the two groups on each subtest was compared. The mean scaled score for each subtest (maximum = 19) and standard deviation for each category of gifted student and the extent to which they differ (2 tailed t-test for independent samples) are shown in Table 2.

Insert Table 2 about here

These data indicate that while the group with superior Verbal Comprehension scores generally achieved a higher score on verbal but not on performance tasks, the two groups did not differ on the Information sub-test or on Digit Span ($p > .05$) . The Information task assesses the ability to remember general knowledge facts and to use verbal general knowledge to explain phenomena. The comparisons for the verbal tasks supports the interpretation that while the two categories are equally able to learn verbal knowledge, they differ in their ability to reason about it. As well, they differed on Block Design ($p < .05$), with the group with Verbal Comprehension scores in the average range achieving a higher score.

The group with Verbal Comprehension scores in the superior range displayed higher retrieval of word meanings. The two groups did not differ in the number of items answered but did differ in the quality of their responses. The group with Verbal Comprehension scores in the average range was more likely to define words with reference to specific contexts while their peers provided more abstract, decontextualised definitions. Similar outcomes were noted for Similarities and Comprehension.

The difference between the two groups on Freedom from Distractibility can be attributed to differences in Arithmetic. The two groups did not differ in their Digit Span score.

Both groups displayed the ACID profile; the discrepancy indices for the superior PO group and the superior VC + PO group were 3.6 and 3.2 respectively. On the analytic - global dimension of cognitive style, the global indices for the superior PO group and the superior VC + PO group were 7.6 and 7.2 respectively.

The standard literacy scores (prose reading accuracy, prose reading comprehension, individual word reading accuracy and spelling accuracy were computed for each GLitD profile. The influence of GLitD profile on each literacy score was examined using MANOVA procedures. The mean reading scores (z scores) and the mean deviation spelling score (chronological age - spelling age) for each profile are shown with the relevant univariate F values and individual univariate t values (.95 confidence intervals) in Table 3.

Insert Table 3 about here

The level of literacy performance depended on the group. The superior PO group showed the greater level of difficulty, with all measures of literacy at least one standard deviation below their expected score, based on their grade level. The superior VC + PO group showed lower performance on isolated word reading and spelling.

The two groups did not differ in prose comprehension. They did, however, differ on the measures of word level reading; in isolated reading accuracy and in prose reading accuracy and also in spelling ability (($p < .05$). This suggests that the group with Verbal Comprehension scores in the superior range had better developed orthographic knowledge than the group with Verbal Comprehension scores in the average range.

The two groups also differed in the patterns they displayed between the three reading scores:

(1) the superior PO group showed higher prose comprehension than prose word reading accuracy ($t(16) = -2.40$, $p < .05$) and reading accuracy for prose and isolated words at a similar level ($p > .05$).

(2) the superior VC + PO group displayed prose comprehension and prose reading accuracy at a similar level ($p > .05$) and reading accuracy for prose higher than isolated word reading accuracy ($t(19) = -2.31$, $p < .05$).

A major cause of word reading disabilities is phonemic awareness. The mean span scores for phonemic segmentation and blending, the mean z score and the difference between the two groups on each measure (t-value for independent samples) are shown in Table 4.

Insert Table 4 about here

These data indicate that both groups showed immature phonemic development in both segmentation and blending. A segmentation span of approximately 4.5 indicates a severe difficulty learning letter cluster patterns of more than five sounds (Munro, 1999). As well, the two groups did not differ in either segmenting or blending ability ($p > .05$).

Discussion

Taken together, the data in Tables 2 and 3 suggest that while the two groups differed in their level of verbal reasoning, their comprehension of word meanings and the relationships between meanings and in their repertoire of thinking strategies that permit comprehension, this did not contribute to differences in reading comprehension. The predicted claim of a higher reading comprehension performance over prose word reading accuracy for the group with superior knowledge in both verbal

and nonverbal areas was not supported by the data. The expectation that their superior Verbal Comprehension would allow them to interpret text differently from peers with more average verbal ability was not supported.

It is possible that the reading comprehension tasks used did not permit the emergence of advanced ways of verbal thinking. A characteristic of gifted knowledge and reasoning is the capacity for far transfer of ideas. The tasks used to assess reading comprehension in the present study did not discriminate between those items intended to assess inferential versus literal comprehension. Of the 28 comprehension questions for the four easiest texts, five at most could be judged to assess other than literal comprehension. It is possible, therefore, that the tasks did not provide optimal opportunity for the display of gifted literacy knowledge.

As noted, the two groups differed in the trends between reading comprehension and accuracy. This finding is counter to the prediction that the superior VC + PO group show a greater discrepancy in reading comprehension-accuracy than those who display a superior score only in Perceptual Organization. The data suggest that both groups accessed their verbal conceptual knowledge with similar facility and differed in their use of letter cluster knowledge.

This interpretation is supported by comparing word reading accuracy under the various conditions for each group. The superior VC + PO group read words more accurately in prose than when isolated ($p < .05$), while for the superior PO group, the two conditions did not differ. This difference could be due either to better developed orthographic knowledge or to the extent to which the existing verbal knowledge of each reader scaffolded the reading accuracy. This was examined by investigating whether the difference between the two groups in prose reading accuracy remained when the influence of word reading accuracy was removed. Analysis of covariance procedures indicated that this difference between the two categories did not remain ($p > .05$). This suggests that the difference in word reading accuracy during prose is attributed to differences in orthographic knowledge rather than to differences in a verbal knowledge of context that scaffolds the reading accuracy.

These data are consistent with the claim that for both groups of GLitD readers, the component of literacy knowledge that was least well developed was their letter cluster or orthographic knowledge. Of the two groups this was lower for those with superior nonverbal knowledge and average verbal knowledge. The highly elaborated and differentiated verbal conceptual network knowledge of the GLitD group with superior Verbal Comprehension scores seemed to compensate for lower letter cluster knowledge and led to higher prose word reading accuracy.

The claim that the group with superior knowledge in both verbal and nonverbal areas had better developed letter cluster knowledge is supported by a comparison of spelling accuracy for the two profiles. This group achieved a higher spelling score, even through their mean spelling accuracy age was approximately one year below their chronological age.

Difficulties learning letter cluster knowledge and spelling patterns was predicted to be associated with the ACID - type profiles. For the superior VC + PO group the ACID profile emerged, due to comparatively lower scores on Coding and Digit Span. The superior PO group also showed the ACID profile, but due to lower scores on Arithmetic and Digit Span. The ACID scores for the two groups are lower comparatively because of the higher scores on the remaining subtests.

In terms of a preference on the analytic - global dimension of cognitive style (Letteri, 1987), the emergence of a positive global index for both GLitD groups suggests a reduced tendency to process information in analytic sequential ways. The importance of this processing strategy for early literacy acquisition has already been noted. These findings provide empirical evidence for the claim that gifted learning disabled students generally are more likely to show comparative difficulties on tasks that require using information in a particular sequence, retaining arbitrary information in order and manipulating symbolic information and a tendency to learn globally (Brody & Mills, 1997; Little, 2001; McCoach, et.al, 2001). Students showing this learning profile generally have been referred to as the 'basic phonological processing disorder' group (Rourke, 1998). They have difficulty with verbal associations and verbal sequencing (Leton, Myomoto & Ryckman, 1987).

Consistent with a lower tendency to use analytic sequential processing strategies, both groups showed delayed phonological awareness knowledge. Their difficulty learning letter cluster

knowledge is explained, at least in part, by this. This finding runs counter to the finding by McBride-Chang, Manis and Wagner (1996) that grade 3-4 students identified as gifted achieved a higher score on phoneme segmentation, deletion and sound position analysis than did students in the average reasoning range.

The present findings do not indicate definitively an explanation for the difference in letter cluster knowledge between the two GLitD groups. For the texts read, the two GLitD groups did not differ in reading comprehension. Nor did they differ in phonemic awareness knowledge. While both groups showed lower letter cluster knowledge, the superior PO group showed lower letter cluster knowledge. One can only speculate on the cause of this difference.

Given that the two groups have similar phonemic knowledge, it is possible that the word level reading difference is due in part to variation in earlier exposure to text. The frequency of exposure to written text influences word reading accuracy independently of phonemic knowledge (Cunningham & Stanovich, 1998; McBride-Chang, Manis, Seidenberg, Custodio & Doi, 1993). It is possible that the GLitD students with superior Verbal Comprehension were more able to engage in early reading and to develop a positive self efficacy as a reader than those whose Verbal Comprehension was lower. As a consequence, they may have had a more frequent early exposure to text. An outcome of more frequent reading is that one's existing knowledge is increasingly programmed in more linguistic type ways that match the organisation of concepts in text and that in turn, facilitate subsequent reading. Future research may examine whether early reading habits influence differences between the two groups

The findings of the present study assist in clarifying the nature of the processing deficit is used to distinguish gifted literacy disability from other causes of under-achievement. It is an analytic sequential processing difficulty that influences the acquisition of sub-word phonological and phonemic knowledge necessary to build an effective knowledge of letter cluster patterns. The global processing preference may also influence the specific types of metacognitive knowledge students learn and the influence of these on early literacy learning. This processing preference is likely to lead to difficulties learning to analyse words to produce sounds and to phonics difficulties.

The use of metacognitive strategies by these students while reading has already been noted (Hannah & Shore, 1995; McGuire & Yewchuk, 1996). Metacognitive processes are domain specific. Metacognitive strategies for manipulating verbal information differ from those used to manipulate nonverbal imagery knowledge. It is possible that the two groups in the present study, while engaging the same types of metacognitive strategies, differ in their knowledge of each strategy and the extent to which the use them to compensate for word level reading difficulties.

This knowledge can be used at three phases during reading; the initial linking of existing knowledge with the text, the on-going alignment of knowledge during meaning construction while reading and the post reading consolidation and synthesis of what has been read. It is possible that the GLitD students with superior Verbal Comprehension were more proficient in these areas. This would account for their ability to read words in prose more accurately than when presented in isolation or when required to spell words.

These findings raise the possibility that the two GLitD categories may display literacy learning disabilities for slightly different reasons. While the data in Table 2 indicate that they do not differ on either the Digit Span or Coding sub-tests, the synthesis of differences in Verbal Comprehension with comparatively lower ACID profiles may contribute to variations in the capacity to acquire orthographic knowledge.

Implications for teaching

The findings of the present investigation have direct implications for the education of students who are both gifted and have specific literacy disabilities. First, they indicate yet again the existence of students whose general ability is superior in various areas and who have difficulty learning to be literate. Second, they indicate that these students differ in their general learning ability and therefore in the entry knowledge they bring to the literacy learning context. They suggest that these students may differ in the causes and reasons for their literacy learning difficulty.

The findings also suggest the need for the identification of trends in literacy performance when these students have their reading capacity diagnosed. Teachers need to be aware of those students who have access to superior verbal or nonverbal knowledge. Diagnostic procedures need to pinpoint those aspects of reading that are in place and those that may be accounting for the difficulty.

Fourth, they identify the need for differential instruction that targets the specific literacy learning needs of each student. Students who are able to comprehend text adequately but who have difficulty with word level reading accuracy need different instructional support from those who have difficulties in both accuracy and comprehension areas. Subsequent studies may examine the value of teaching students who display superior Perceptual Organisation knowledge to recode their knowledge to a verbal form prior to reading. It is possible that the recoded knowledge can better scaffold reading.

Fifth, and perhaps most important, the literacy teaching program needs to ensure that the student's superior knowledge is recognised and valued. Many GLitD students report that their areas of gifted knowledge are often ignored in instructional support programs. Teachers need to ensure that these students perceive that their knowledge is appropriately recognised and valued.

Two categories of GlitD based on WISC profiles were observed

	PIQ only superior	PIQ, VIQ superior
Reading comprehension vs reading accuracy	Both depressed	reading accuracy depressed
Literal vs inferential comprehension	Literal > inferential	No difference
Intrinsic motivation as a reader	Lower, only when comprehending text	Only when comprehending text
Think creatively about comprehension outcomes	Only when outcomes relate to specific contexts, not bound by literacy criteria (reader doesn't tap into context of text or align thinking with context of text	When outcomes relate either to specific contexts or more abstract, (reader taps into context of text, aligns thinking with context of text
Capacity to engage in far transfer during comprehension	Specific contextual ways, show far transfer after visualise but lack accurate vocabulary and grammar	More general, contextual appropriate ways
Self efficacy as a reader	lower	higher
Effect of cueing strategies on comprehension	when cued to visualise, contextualise, more able to show higher level comprehension	can show higher level comprehension without being cued to visualise

Types of teaching strategies that were most successful:

	PIQ only superior	PIQ VIQ superior
Recode imagery knowledge to verbal knowledge, talk about imagery	Y	N
Teach metacognitive strategies for using verbal knowledge while reading	Y	Y
Teach paraphrasing, summarising strategies while reading	Y	N
Teach contextualising strategies	N	Y
Teach letter cluster –sound patterns	Y	Y
Teach phonemic / phonological strategies	Y	Y

Conclusion

The present study has identified groups of students who are both gifted learners and who have literacy learning disabilities. These students are prevented from using their superior knowledge to comprehend and reason about content they read by their difficulty learning to read words relatively automatically. They have access to average or above average networks of verbal concepts but are restricted in using these to maximum advantage because they cannot identify the verbal concepts effectively. Many of these students are highly talented and have the potential to contribute substantially to the creative and innovative capital of their cultures. While they continue to experience literacy learning disabilities, the likelihood that they will have the opportunity to make such contribution is low.

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Table 1: The mean score and standard deviation for each category of students on each factor and the extent of difference between them (t value).

	superior PO group (n = 17)	superior VC + PO group (n = 20)	t-test (df = 35)
Verbal Comprehension	105.8 16.5	125.7 9.5	3.08 **
Perceptual Organisation	129.6 7.0	125.0 7.6	-1.22
Freedom from Distractibility	92.3 10.7	108.7 15.6	2.25 *
Processing Speed	103.8 16.5	98.9 16.2	.97

* $p < .05$ ** $p < .01$

Table 2: The mean score and standard deviation for each category of students on each WISC III subtest and the extent of difference between them (t value).

	superior PO group (n = 17)	superior VC+PO group (n = 20)	t-test (df = 35)
Information	12.2 (4.2)	13.8 (2.3)	1.01
Similarities	12.0 (3.1)	16.4 (2.6)	3.03 **
Arithmetic	9.0 (2.8)	13.6 (2.6)	3.33 **
Vocabulary	10.3 (1.9)	13.5 (2.5)	2.67 *
Comprehension	9.3 (4.8)	14.3 (2.4)	2.78 *
Digit Span	8.0 (2.1)	9.1 (3.8)	.64
Picture Completion	15.5 (2.0)	13.9 (2.0)	-1.57
Coding	10.3 (2.3)	8.9 (4.0)	-.80
Picture Arrangement	13.8 (2.3)	14.2 (1.9)	1.30
Block Design	16.0 (2.4)	13.5 (2.3)	-2.37 *
Object Assembly	15.0 (2.2)	14.6 (2.5)	-.32
Symbol Search	10.9 (2.7)	10.6 (3.1)	-.43

* $p < .05$ ** $p < .01$

Table 3: The mean score and standard deviation for each category of students on each measure of literacy and the extent of difference between them (univariate F, t value).

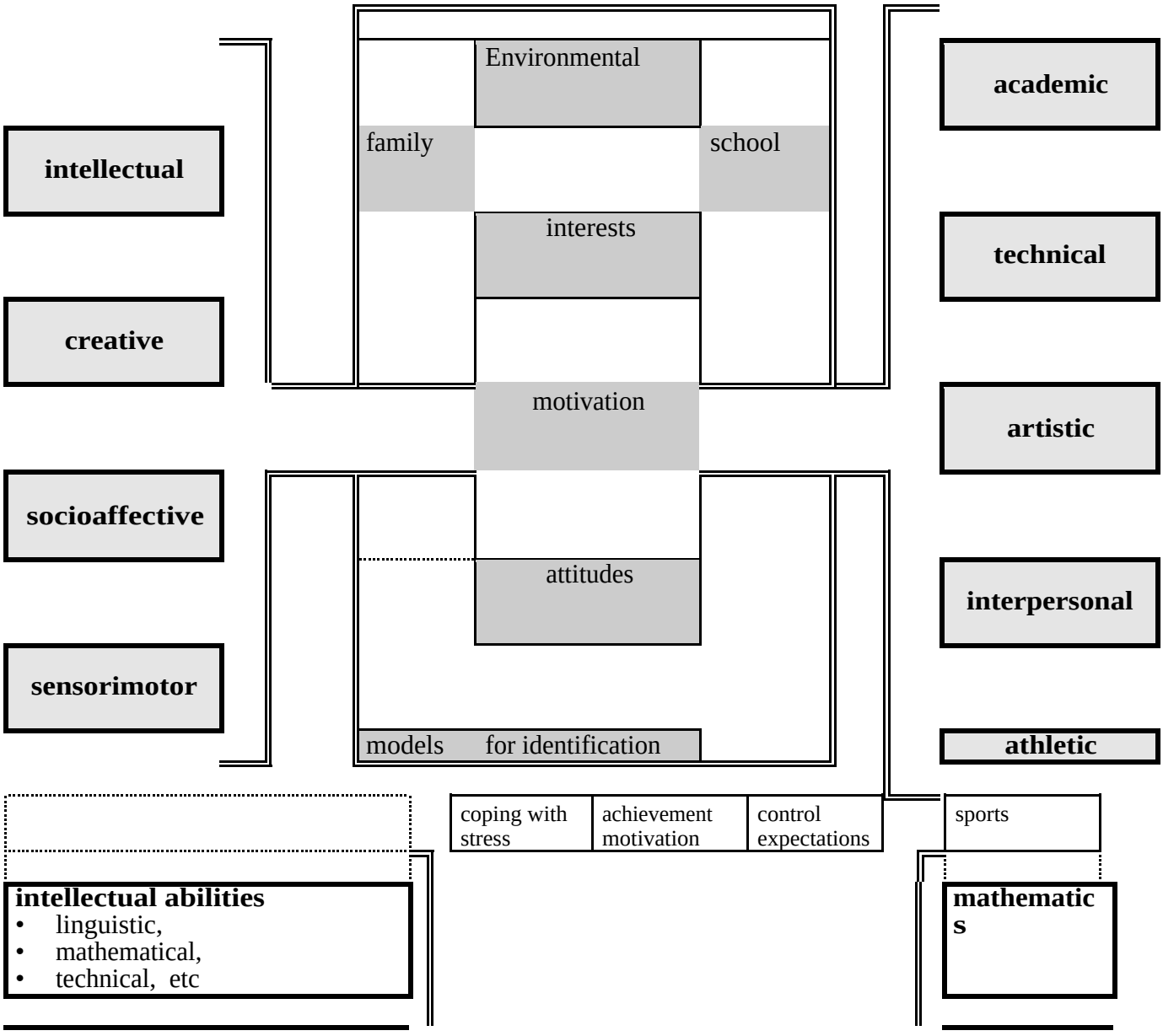
z score	superior PO group (n = 17)	superior VC + PO group (n = 20)	univariate F (1,36)	t test (df = 35)
prose reading accuracy	-1.49 .40	-0.43 .37	8.46 **	2.91 **
prose reading comprehension	-0.90 .65	-0.29 .48	4.31	1.38
individual word reading accuracy	-1.76 .45	-0.65 .53	6.42 *	2.67 *
#spelling deviation score	-29.66 12.09	-12.33 10.87		2.28 *

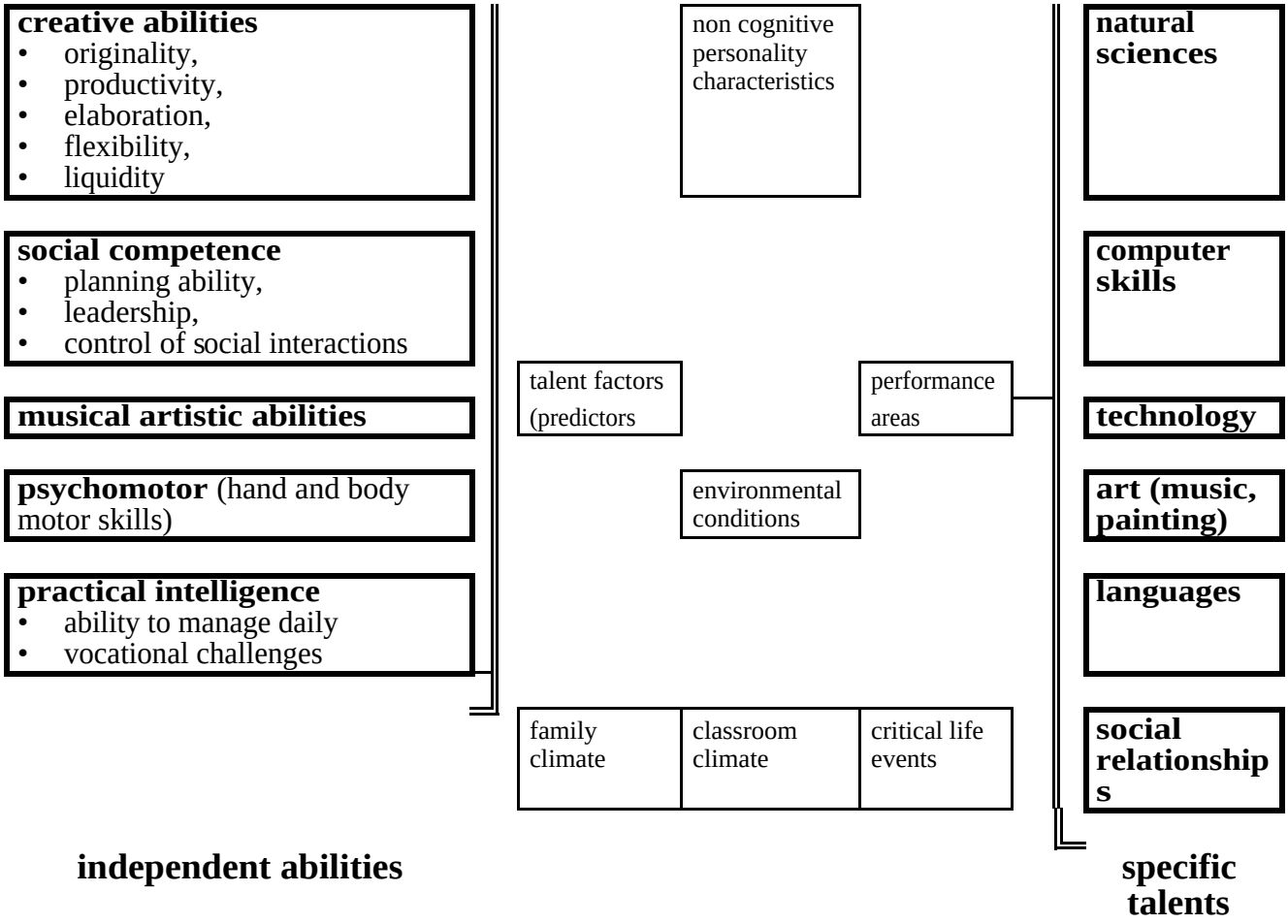
* $p < .05$, ** $p < .01$.

The spelling score is not a z score but a discrepancy or deviation score.

Table 4: The mean span scores for phonemic segmentation and blending for each group and the matching z score.

phonemic task	superior PO group (n = 17)		superior VC + PO group (n=20)		t test (df = 35)
	mean span score	z score	mean span score	z score	
phonemic segmentation	4.66 1.36	- 1.74	4.50 1.069	- 1.83	-.26
phonemic blending	4.66 1.50	- 2.18	5.25 .707	- 1.43	.97




creative abilities
• originality,
• productivity,
• elaboration,
• flexibility,
• liquidity
social competence
• planning ability,
• leadership,
• control of social interactions
musical artistic abilities
psychomotor (hand and body motor skills)
practical intelligence
• ability to manage daily
• vocational challenges
non cognitive personality characteristics
talent factors (predictors
performance areas
environmental conditions
family climate
classroom climate
critical life events
natural sciences
computer skills
technology
art (music, painting)
languages
social relationships
independent abilities
specific talents