

**Catering for the Needs of Intellectually Gifted Children in Early Childhood:
Development and Evaluation of Questioning Strategies to Elicit Higher Order
Thinking**

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Abstract

Young intellectually gifted children differ from their age peers in their cognitive and socio-affective development. It is important that early childhood educators respond appropriately to these children's characteristics. The literature in gifted education contains descriptions of promising curriculum practices that foster young gifted children's intellectual development in early childhood, but few of these have been evaluated empirically to assess their effectiveness. Furthermore, few early childhood educators have any specific training in meeting the needs of young gifted children.

In the current research, the effectiveness of a researcher-developed higher order questioning intervention was evaluated using a single-subject research design. Eight preschool-aged children, who had been assessed as gifted on standardised measures of intellectual ability, were asked lower order and higher order questions during storybook reading sessions. Their responses were recorded and analysed for linguistic complexity and abstract thinking.

The results indicated that the young intellectually gifted children often used more linguistically complex responses when answering higher order questions than when answering lower order questions. Additionally, the children's responses demonstrated more abstract thinking when higher order questions were asked.

The implications of these findings for early childhood educators are twofold. They demonstrate that young intellectually gifted children have the cognitive capacity to respond to higher order questions, despite their reported infrequent use in the early childhood classroom. Furthermore, young intellectually gifted children who are asked the lower level questions typical of the early childhood classroom may not demonstrate their ability to function at a higher level unless challenged to do so. Changes to questioning

practices and effective professional development are recommended for early childhood educators. Further research is needed to investigate the application in early childhood settings of questioning techniques used in the study.

Statement of Candidate

I certify that the research in this thesis entitled “Catering for the needs of intellectually gifted children in early childhood: Development and evaluation of questioning strategies to elicit higher order thinking” is my original work and it has not been previously submitted as part of the requirements for a degree to any university or institution other than Macquarie University.

I also certify that the thesis is an original piece of research and it has been written by me. All the help and assistance that I have received in my research work and the preparation of the thesis itself have been appropriately acknowledged.

In addition, I certify that all information resources and literature used are indicated in the thesis. The research presented in this thesis was approved by Macquarie University Ethics Review Committee, reference no 5201000630 (June 2010)

.....

Rosalind Lee Walsh (Student No. 41167805)

Date

University Requirements for Thesis by Publication

Extract from “Guidelines for Thesis by Publication” Macquarie University

A thesis by publication may include relevant papers, including conference presentations, which have been published, accepted, submitted or prepared for publication for which the research has been undertaken during enrolment. The papers should form a coherent and integrated body of work, which should be focused on a single thesis project or set of related questions or propositions. These papers are one part of the thesis, rather than a separate component (or appendix).

Contribution Co-Authors

These papers may be single author or co-authored. The candidate must specify his/her specific contribution. The contribution of others to the preparation of the thesis or to individual parts of the thesis should be specified in the thesis Acknowledgments and/or in relevant footnotes/endnotes. Where a paper has multiple authors, the candidate would usually be the principal author and acknowledgement of this should be referenced in the appropriate manner for the discipline. Examiners can then assess if the quality and extent of the candidate’s contribution warrants the award of the degree based on the specified criteria.

Number and Presentation of Papers

Each discipline will have a different number of publications that are acceptable as the substantive foundation for a thesis by publication. As a general rule a candidate will need to have enough papers to support the important findings from the research, presented in a logical and coherent way. These papers will normally form thesis chapters and the chronological publication order may be quite different from the way they are sequenced

in the thesis. The length of the papers will reflect discipline requirements and journal guidelines.

Most theses by publication have between 2 and 8 papers in combinations of sole and co-authored papers. Although it is not necessary to reformat published works in a thesis, it is not enough simply to bind these publications together. The candidate needs to include a critical introduction to the work, sections that link the papers together, and a concluding section that synthesises the material as a whole. In some cases a larger exposition component can provide the framework for location or ordering of the papers. Above all, candidates must consider the coherence of the thesis as a whole, and the way in which each paper contributes to the overall thesis.

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My darling family. Thanks to Arnie, Grace and Theo who put up with me telling them to “Go and watch TV while Mummy reads about quality early childhood education”, who begged me every night to “ask questions” as we read a bed time story, and who kept asking “What is it that you do, Mum?” I hope I have finally answered your questions.

And Steve, the best husband a PhD student could ask for, unfalteringly accommodating and unconditionally supportive.

Chapter 1: Introduction

Young gifted children have been labelled one of the most neglected groups in education. The aim of the research presented in this thesis was to develop, trial and evaluate strategies by which early childhood educators might better be able to cater to the unique characteristics of these children using the flexibility and strengths of the early childhood approach to education.

In this introductory chapter, I have presented an overview of the work contained in this thesis and discussed conceptions of giftedness, provisions for young gifted children, and early childhood teacher education. The theoretical orientation, including the definitions of giftedness and talent underpinning this thesis, are introduced and the rationale for the research presented, followed by the overarching structure of the thesis.

Introduction

Young intellectually gifted children have a range of characteristics, both cognitive and socio-affective, that set them apart from their age-peers. Cognitive characteristics such as a fast pace of learning, well-developed memory, ability to comprehend complex concepts, and heightened observational ability may become apparent in the early years (Gross, 1993a; Harrison, 2003; N.M. Robinson, 2008; Sutherland, 2008). Likewise, socio-affective characteristics such as an advanced sense of humour, heightened sensitivity, social maturity, ability to empathise and advanced play patterns have also been documented in young children (Clark, 2013; Harrison, 2003). Typically, early childhood teacher education provides little information about how these characteristics may manifest in the early childhood setting, or how to meet the needs of these children educationally, socially or emotionally (Hodge, 2013). It is perhaps for this reason that

young intellectually gifted children have been called one of the most neglected groups in education (Koshy & Robinson, 2006).

Appropriate educational provision for young gifted children is important for a range of reasons. First, all children, regardless of level of ability, are entitled to a stimulating and challenging early childhood education (Department of Education, Employment & Workplace Relations, 2009). Second, young gifted children who are not challenged intellectually risk boredom from repetition of tasks they have already mastered, which can lead to underachievement (Gross, 1999). Furthermore, young gifted children are a valuable natural resource. There should be an emphasis on nurturing their abilities for the future benefit of society (Schwartz, 1994).

Koshy and Robinson (2006) attributed the paucity of research conducted with gifted children to perceptions that such children will be catered for once they reach school, the idea that giftedness in early childhood is not a stable trait, and a focus in education on children with disabilities as the only group with special educational needs. The authors also contended that there were political reasons influencing the lack of funding and provision for young gifted children in the UK and USA.

Conceptions of Giftedness in Early Childhood

The field of gifted education has its roots in the early 1900s in the work on intelligence by Binet and Simon (1916), Terman (1925) and Spearman (1927). Spearman's (1927) concept of general intelligence or 'g' and issues related to how 'g' could be measured in young children meant that there was a perception that giftedness in early childhood could not be validly predicted or measured (Roedell, Jackson & Robinson, 1980). Therefore, there was little research conducted in the area. Until the early 1980s the study of giftedness in early childhood relied largely on retrospective

studies (N.M. Robinson, 2000). In these studies, the childhood traits of eminent people were analysed retrospectively and the characteristics of gifted children in early childhood extrapolated from that evidence.

Robinson (2000) reported that as concepts of giftedness broadened to include domain specific aptitudes (e.g., Gardner, 1983; Guilford, 1967; Thurstone, 1938), it became apparent to researchers that young gifted children could be more reliably identified as there were clear indicators of the presence of domain specific abilities such as early or self-taught reading. This opened the way for research into the identification of younger gifted children.

Provisions for Gifted Children in Early Childhood Education

Despite the general lack of provision for young gifted children in early childhood education, the out-of-home early childhood environment has the potential to be one of the most responsive educational contexts for these children (Sutherland, 2008). Porter (2005) suggested three reasons why this may be so. First, in early childhood settings there is a narrower span of mental ages and abilities than would be found in regular school classrooms of older children; second, the child-focused and naturalistic nature of early childhood education is better equipped to cater for individualised programming since there is no prescribed curriculum to be followed as there is at school; and third, early childhood educators typically use naturalistic and authentic observation of children's interests and abilities as a basis for educational programming and planning, a process that is ideal for the meeting the needs of young gifted children.

Surveys of early childhood provision in the USA have revealed a lack of programs for gifted children in preschool and kindergarten (Stile, 1996). Most of the literature relating to giftedness in early childhood has focused on the identification, rather than the

education, of young gifted children (N.M. Robinson, 2000). There has been some descriptive information about types of programs used with gifted preschoolers but little quantitative information or program evaluation (N.M. Robinson). The situation appears to be similar in the Australian context (Grant, 2004; Hodge & Kemp, 2002; Morelock & Morrison, 1999).

Programs designed for gifted children in prior-to-school settings have made use of a range of educational models including developmentally appropriate curriculum (Grant, 2004; Hertzog, Klein, & Katz, 1999; Meador, 1996; Morelock & Morrison, 1999; Snowden & Christian, 1998; Walker, Hafenstein, & Crow Enslow, 1999), and the Reggio Emilia approach (Barbour & Shaklee, 1998; Hertzog, 2001). Although many of these programs are described in detail and positive outcomes for the children are often reported in case study or anecdotal form, empirical evidence of their effectiveness with young gifted children has not been provided for any program.

Roedell, Jackson and Robinson (1980) identified methodological difficulties when investigating interventions with very young gifted children. These difficulties may also serve to explain the paucity of empirical research in the field. There appears to be a lack of clarity amongst researchers and program developers as to which program objectives are relevant for young gifted children. If, like early intervention programs for children who are disadvantaged or have disabilities, the programs are used to develop intellectual and academic readiness for school, how can gains be measured for children who, in many cases, are already significantly advanced in these areas? If longer-term gains in other areas are relevant, what are these and how can they be measured? Roedell, Jackson and Robinson (1980) further suggested that even the process of better identification of gifted children in early childhood may have a positive effect on the later schooling experience of these children since children whose educational needs are recognised and met early

develop more positive attitudes towards school. Gifted preschoolers whose needs are not met in the early childhood classroom may become bored, experience an early disenchantment with education or seek to gain teachers' attention in inappropriate ways (Wofle, 1989).

Early Childhood Teacher Training in Gifted Education in Australia

Teachers with training in gifted education are known to be more effective teachers of the gifted than those who are untrained, and they are better able to foster higher level thinking skills and promote creative thinking (Hansen & Feldhusen, 1994). Australian research has confirmed the effectiveness of training teachers in gifted education (Rowley, 2002). However, there is very little training in gifted education provided at the tertiary level for early childhood teachers in the state of NSW, the site of the current research (Falls, 2002). Furthermore a recent survey of current gifted education courses at tertiary level indicated that the offerings in this area across education degrees (early childhood, primary and secondary education) Australia-wide were, at best, marginal (Fraser-Seeto, Howard, & Woodcock, 2013).

The current *Early Years Learning Framework for Australia* (Department of Education, Employment & Workplace Relations, 2009) states that the early childhood curriculum should follow the interests and abilities of the children in the setting. The Australian Children's Education and Care Quality Authority's (ACECQA) *National Quality Framework*, an agreement that covers all states and territories in Australia, makes specific mention of children with additional needs and, within this category, has included children who "are gifted or have special talents" (Australian Children's Education and Care Quality Authority, 2013, p. 196). In 2013 the Victorian State Government introduced an online policy and support documents for educators in the early childhood

years, entitled: *Making a Difference for Young Gifted and Talented Children* (Morrissey & Grant, 2013). Despite these national initiatives, there has been little recognition of the importance of training early childhood teachers to recognise and respond to the characteristics and needs of young gifted children. This appears to be a serious omission, given the critical importance of the early childhood years for later development (Gallagher, 2007).

Theoretical Orientation

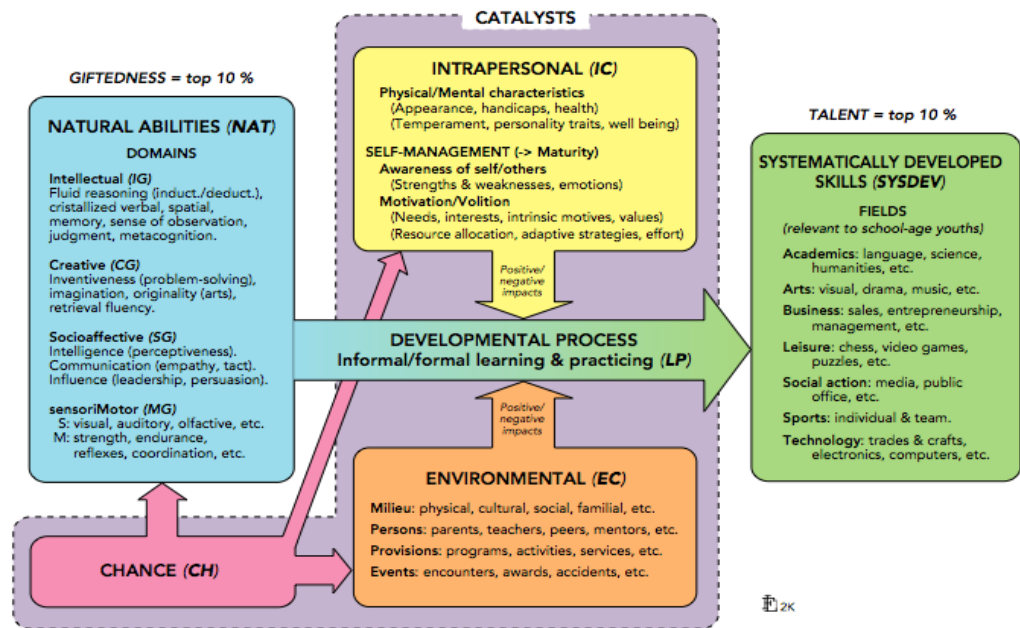
Definitions of Giftedness and Talent

Two definitions of giftedness and talent have informed the research in this thesis: Gagné's (2003) *Differentiated Model of Giftedness and Talent* (DMGT) and Harrison's (2003) statement about the needs of gifted young children. Gagné made a distinction between the terms *gifted* and *talented*, which are often used synonymously. Gagné (1985) defined giftedness as "competence which is distinctly above average in one or more domains of ability" (p. 108) and talent as "performance which is distinctly above average in one or more fields of human performance" (p. 108). The progression from gifted to talented involves a developmental process of formal and informal learning and practice mediated by intrapersonal and environmental catalysts that can have both positive and negative impacts (Gagné, 2003) (see Figure 1).

The value of Gagné's model is that it provides a structure in which educators can operate effectively. That is, the role of the educator is to facilitate the developmental process (informal/formal learning and practising) that assists in the transition of children from gifted to talented. Furthermore, prior-to-school settings can play a pivotal role in the environmental catalysts that Gagné contended are essential to talent development.

Gagné's model is used in the Australian Curriculum (Australian Curriculum, Assessment

and Reporting Authority, n.d.), in the current NSW Department of Education and Communities Policy on the Education of Gifted Students (New South Wales Government, 2004), as well as by the Sydney Catholic Education Office (Catholic Education Office, 2006). This research, therefore, aligns with current federal and state policies in its conception of giftedness.



Gagné's Differentiated Model of Giftedness and Talent (DMGT.US.2003)

Figure 1: Gagné's Differentiated Model of Giftedness and Talent

The second definition pertinent to this research is that of Harrison (2003), which states that a gifted child is:

one who performs or has the potential to perform at a level significantly beyond his or her age peers and whose unique abilities and characteristics require special provisions and social and emotional support from the family, community and educational context. (p. 8)

This definition serves to highlight the special needs that young gifted children have in terms of their social and emotional development and support, as well as for special provisions to meet their intellectual needs. In an early childhood setting the interplay and relationships among family, educational context and community are paramount for healthy development (Commonwealth of Australia, 2009; Sylva, Melhuish, Sammons, Siraj-Blatchford & Taggart, 2011).

Curriculum Design for Gifted Children in Early Childhood

Wofle (1989) stressed that a developmentally appropriate response to the needs of young gifted children should not merely be a “watered-down kindergarten program” (p. 42). Likewise, Porter (2005) suggested that the challenge lies in “how to advance children’s skills beyond [school] entry level without imposing on such young children the structured, academic teaching that characterises the schooling of their older counterparts” (p. 119). There appears to be a general philosophical agreement that early entry into formalised schooling is not the most appropriate intervention for the majority of young gifted children (Harrison, 2003, 2004; Porter, 2005; Sutherland, 2006). Early entry to school may be appropriate for some exceptionally gifted 4-year-olds, but finding ways to cater for gifted children by using the flexibility of the early childhood setting remains a priority in the literature (Falls, 2006; Lewis, 1984, 2002).

Models of Gifted Education

Two models of intervention in Gifted Education underpin the research undertaken in this thesis: that of C. June Maker and the strategies of Frank E. Williams. Maker (1986) proposed a set of principles that should guide preschool curriculum for gifted children. First, the curriculum for the gifted should differ in quality and type from the regular curriculum, and second, the curriculum should build on the characteristics of the

gifted children for whom it is designed. Maker (1986) suggested that the curriculum could be modified in four different ways: “the content (what is learned), the process (the teaching methods used)... the learning environment (the physical and psychological setting in which the learning occurs)... [and] the product (the tangible or intangible results of instruction)” (p. 64).

In this thesis a higher order questioning strategy for young gifted children was trialled. This questioning strategy was based on the cognitive and affective characteristics of young gifted children and was able to utilise the features of the early childhood setting that are conducive to meeting the needs of gifted children.

Maker (1986) recommended that content modifications for gifted preschoolers might include the following factors: abstractness, complexity, variety, organisation, economy, comprehensiveness, and relevance for the future. According to Maker, modifications in the process area should include employing systematic questioning strategies, open-ended questions and activities, use of discovery learning, a focus on reasoning, freedom of choice, and interaction in real and simulated situations. One of these recommended process modifications, the use of systematic questioning strategies, was chosen as a focus for the research in this thesis as a way to encourage higher level thought in young gifted children. This particular modification was chosen as it was believed that this type of strategy was less likely to be used already in early childhood settings than some of the other recommended modifications.

Maker and Nielson (1996) linked the need for curriculum modifications to known characteristics of gifted children (see Table 1). Maker and Nielson stated that a shift toward higher order thinking was of benefit to all gifted students but in particular to those who possessed exceptional memory and the ability to retain and manipulate information.

They suggested that exceptional memory allowed gifted children to spend less time on memorising facts and more time on developing higher order thinking strategies.

Table 1: Gifted Student Behaviours as Linked to Curriculum Modifications

Modification	Characteristic of gifted children
Higher level thought	Reasoning: Outstanding ability to think things through and consider implications or alternatives; rich, highly conscious goal-oriented thought Inquiry: Probing exploration, observation, or experimentation with events, objects, ideas, feelings, sounds, media Humour: Exceptionally keen sense of the comical, bizarre, absurd Learning: Ability to acquire sophisticated understandings with amazing speed and apparent ease

(Maker & Nielson, 1996, pp. 25-27)

The questioning strategy employed in this thesis is designed to encourage higher order thinking and thereby links to the characteristics of gifted students that Maker and Nielson (1996) outlined in the table above.

The second model applied in this thesis is that of Frank E. Williams' *A Total Creativity Program for Individualizing and Humanizing the Learning Process* (Williams, 1972). Although Williams freely admitted that his model was not designed specifically for gifted learners, it is a recommended model for teaching higher order and divergent thinking skills in many texts on curriculum development for the gifted (Gross, MacLeod Drummond, & Merrick, 2001; Maker & Nielson, 1995; Maker & Schiever, 2005; VanTassel-Baska, 1994). One aspect of the model is the application of 18 teaching strategies that have been gleaned from research on effective teaching (a full list of the teaching strategies is presented in Appendix 4). In addition to its research base, Williams' model was chosen for the current research because the teaching strategies recommended

appeared to be novel in the early childhood setting. These involved presenting children with paradoxical questions, posing provocative questions, and asking children to draw analogies between two different items or concepts.

Purpose of the Research

The aim of the research reported in this thesis was to develop and evaluate a theory-based teaching strategy that could be implemented in early childhood settings to cater for the needs of young intellectually gifted children. The strategy consisted of the presentation of higher order thinking questions during shared storybook reading and was based on the theoretical constructs of Maker's (1986) process modifications and William's teaching strategies (1972). Its effectiveness was investigated in relation to (a) children's ability to respond appropriately to higher order questions, (b) the linguistic complexity of child response to stimulus questions, and (c) the cognitive level (quality) of child response to stimulus questions.

Research Questions

The research questions addressed were:

1. Are intellectually gifted children of preschool age able to answer higher order thinking questions appropriately?
2. Do intellectually gifted children of preschool age give more linguistically complex responses to higher order thinking questions than to lower order thinking questions?
3. Do intellectually gifted children of preschool age give more cognitively complex responses to higher order thinking questions than to lower order thinking questions?

The research conducted for this thesis is designed to contribute to the evidence base of potentially effective strategies to promote higher order thinking in young gifted children. It is also designed to trial the use of a relatively rarely-used research design with gifted children—single-subject design—which has great potential for research with low incidence populations. A third contribution is to the knowledge base on questioning as a way to encourage thinking in the early childhood years.

Structure of the Thesis

The thesis comprises six chapters, each containing a journal article, in addition to this general Introduction chapter and a Discussion and Conclusions chapter. At the time of submission of the thesis, three journal articles have been published, and three are under review. Each article is prefaced by a title page with the publication status of the article, the contribution of each of the authors and any citations that the article has received. As each article is self-contained, there is some repetition of content, particularly in the literature review and methodology sections of the articles. Where an article has been submitted to a North American journal, US spelling and grammar conventions have been adopted. Additionally, the references for each article appear at the end of the article rather than at the end of the thesis. The reference list at the end of the thesis contains references from the Introduction and Discussion and Conclusions chapters.

The first article, “Same Age, Different Page: Overcoming the Barriers to Catering for Young Gifted Children in Prior-to-School Settings”, is a position paper in which the interactions between the fields of Gifted Education and Early Childhood—and their overlap—are discussed. Given the paucity of research about young gifted children (Jolly & Kettler, 2008), it seemed timely to write about the reasons that may have influenced the perceived tensions and contradictions between the two fields. Additionally, there are many pedagogical issues on which researchers and practitioners in the two fields are in

agreement. These issues of contention and shared beliefs are examined in the article. This article sets the context for the articles that follow.

The second article, “Searching for Evidence-Based Practice: A Review of the Research on Educational Interventions for Intellectually Gifted Children in the Early Childhood Years”, is a review of the studies conducted in Gifted Education with children in prior-to-school settings. Only eleven empirical studies published over a 30-year period were located, suggesting that research in the field has been severely limited. In the article, possible reasons for this lack of research with young gifted children are discussed, and some solutions are proposed for strengthening research in the field. This article establishes the need for the kind of empirical research with young gifted children that was undertaken in this thesis.

Research conducted on the role of questioning in Shared Book Reading (SBR) with young children was investigated in the third article, “Are We Asking the Right Questions? An Analysis of Research on the Effect of Teachers’ Questioning on Children’s Language during Shared Book Reading with Young Children”. Again, there were few studies found that had looked specifically at questioning in preschool settings. The research conducted has mainly been with low socio-economic status groups and children at-risk of, or already experiencing, language and literacy delays. In this article the accumulated knowledge about questioning during SBR was brought together and analysed, highlighting the need for further research on questioning interventions, especially for young gifted children.

The use of single-subject methodology and its potential application in the field of gifted education are explored in the fourth article, “Evaluating Interventions for Young Gifted Children Using Single-Subject Methodology: A Preliminary Study”. Single-

subject designs are frequently used in Special Education research to assess the effectiveness of an intervention for a particular group of individuals, but the design has been rarely used in the field of Gifted Education. The pilot study completed for this thesis is reported in detail as an example of the application of single-subject methodology in research with young gifted children. This article contributes to an emerging body of research using this methodology in the field of Gifted Education.

The main study conducted for this thesis is reported in the fifth article, “The Effect of Higher Order Questioning on the Complexity of Gifted Preschoolers’ Language”. Results of this study, using the single-subject methodology with five young intellectually gifted children, found that for three of the five there was a treatment effect for higher order questioning with regard to the complexity of the children’s responses.

In the sixth article, “Why Would You Say Goodnight to the Moon? The Response of Young Intellectually Gifted Children to Lower and Higher Order Questions during Storybook Reading”, data collected for the main study were reanalysed focusing on the issue of cognitive correspondence (i.e., do higher order questions actually elicit higher order responses from young gifted children?). Differences in the effectiveness of different types of questions were also examined.

In the Discussion and Conclusions chapter the research conducted in this thesis is summarised and reviewed in light of the research questions posed in the Introduction. The contribution of the research to the fields of Early Childhood Education and Gifted Education is presented. Limitations of the research and implications for practice are discussed. The chapter concludes with directions for future research.

Chapter 2

Publication No. 1: Same Age, Different Page: Overcoming Barriers to Catering for Young Gifted Children in Prior-to-School Settings

Publication Status: Published

Walsh, R. L., Hodge, K. J., Bowes, J. M. & Kemp, C. R. (2010) Same age, different page: Overcoming the barriers to catering for young gifted children in prior-to-school settings. *International Journal of Early Childhood*, 41(2), 43-58. doi: 10.1007/s13158-010-0004-8

Statement of Candidate Contribution: This paper was co-authored with my doctoral supervisors. I took the lead in writing, with contributions and revisions to subsequent drafts made by my supervisors.

Article Citations

Mooij, T. (2013). Designing instruction and learning for cognitively gifted pupils in preschool and primary school. *International Journal of Inclusive Education*, 17(6), 597-613. doi: 10.1080/13603116.2012.696727

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Same Age, Different Page: Overcoming the Barriers to Catering for Young Gifted Children in Prior-to-School Settings

Rosalind L. Walsh · Kerry A. Hodge ·
Jennifer M. Bowes · Coral R. Kemp

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Abstract Despite well-articulated social inclusionist and anti-bias agendas in early childhood, the needs of young gifted children in prior-to-school settings appear to have been neglected. The purpose of this paper is to examine the tensions and contradictions that seem to exist between educators working in the fields of early childhood education and gifted education. Areas in which misunderstandings may occur regarding the education of young gifted children are discussed: the identification of young gifted children, the labelling of young gifted children, the application of appropriate gifted education strategies in the early childhood context, the application of current early childhood approaches to meeting the needs of young gifted children, and the socialisation of young potentially gifted children in the educational setting. Recommendations are offered regarding ways in which educators in the two fields might collaborate more effectively to cater appropriately to the unique characteristics of young gifted children.

Résumé Malgré qu'il y ait des orientations sociales inclusives et sans préjugés bien articulées en petite enfance, les besoins des jeunes enfants doués paraissent avoir été négligés dans les services préscolaires. Le but de cet article est d'examiner les tensions et contradictions qui semblent exister entre éducateurs travaillant dans les champs de l'éducation de la petite enfance et de l'éducation des enfants doués. Des dimensions susceptibles d'incompréhension relativement à l'éducation des jeunes enfants doués y sont discutées : l'identification des jeunes enfants doués, la socialisation des jeunes enfants doués, le recours à des stratégies de l'éducation des enfants doués appropriées au contexte préscolaire, le recours aux approches

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actuelles en éducation de la petite enfance pour satisfaire les besoins des jeunes enfants doués, et la socialisation des jeunes enfants potentiellement doués en contexte scolaire. Des recommandations sont faites eu égard à la façon dont les éducateurs des deux champs pourraient collaborer pour tenir adéquatement compte des caractéristiques propres aux jeunes enfants doués.

Resumen A pesar de que existen buenos programas de inclusión social y anti-discriminatorios en la primera infancia, las necesidades de los niños dotados en ámbitos preescolares parecen haber sido desatendidas. El propósito de este trabajo es examinar las tensiones y contradicciones que existen entre los educadores especializados en la primera infancia y los especializados en la educación de niños dotados. Este trabajo se focaliza en áreas en las que pueden producirse malentendidos respecto de la educación de niños dotados en la primera infancia: la identificación y etiquetamiento de estos niños, la aplicación de enfoques actuales sobre la primera infancia para satisfacer sus necesidades, y la socialización de los niños dotados en el ámbito educacional. El trabajo ofrece recomendaciones acerca de cómo los educadores de ambos campos podrían colaborar con mayor eficacia para atender apropiadamente las singulares características de estos niños.

Keywords Gifted education · Early childhood · Preschool

The needs of gifted preschoolers have been largely overlooked by educators working in the fields of gifted education and early childhood. In fact, some argue that the area of giftedness in early childhood is one of the most neglected areas in education (Barbour and Shaklee 1998; Chamberlin et al. 2007; Jolly and Kettler 2008; Koshy and Robinson 2006; Robinson 2000, 2008). Given that the period from birth to 5 years of age is viewed as crucial in the development of children's intellect, self-esteem and social functioning (Shore 1996), it is perplexing that so little attention has been paid to the needs of young gifted children. Robinson (2008) has attributed this lack of interest to a combination of factors: children attending a variety of non-parental early childhood education and care settings (e.g., day care or preschool) with educators untrained in gifted education, educators' beliefs that abilities at this age cannot be identified reliably, and an assumption that the formal school system will cater for young gifted children.

There are numerous definitions of giftedness (Sternberg and Davidson 2005) and their diversity can give rise to confusion. In some definitions a child's current level of achievement is the focus (e.g., Renzulli 1978), whereas in others it is the potential to perform at a level significantly beyond that of chronological-aged peers that is emphasised (e.g., Gagné 2003; Harrison 2003; Tannenbaum 1997). In his Differentiated Model of Giftedness and Talent, Gagné (2003) stated that the term *giftedness* refers to spontaneous untrained abilities (potential) that place the individual in the top 10% of same-age peers in that particular domain. Through a developmental process of formal and informal learning, these abilities or gifts may

be transformed into *talents* or systematically trained abilities (achievement). Gagné proposed that both the characteristics of the individual (interpersonal traits such as motivation and temperament) and the environment were important catalysts in the process of talent development.

For educators in the field of early childhood, definitions that rely on standardised testing, such as those used historically to determine placement in school programs for the gifted, are unlikely to be helpful due to the unreliability of a child's scores in the early years (Robinson 2000). Definitions that draw attention to the asynchronous development of young gifted children, and emphasise potential over performance, may be more usefully operationalised by early childhood educators.

While it is acknowledged that there is a range of domains in which a child may manifest giftedness, the focus in this paper is on the intellectually gifted child in prior-to-school settings. For the purposes of this paper, Gagné's Differentiated Model of Giftedness and Talent (2003) has been adopted as it incorporates environmental aspects and early learning experiences that, it will be argued, are pivotal in the development of talent and the prevention of underachievement.

There is an extensive literature around the identification of young gifted children (Robinson 2008). Research into the traits associated with characteristics of young potentially gifted children has suggested that they are likely to demonstrate some of the following cognitive behaviours: fast pace of learning, exceptional memory (quick and accurate recall), extended concentration span, ability to understand complex concepts, heightened observational ability, curiosity, and an advanced sense of humour (Freeman 1985; Harrison 2003; Lewis and Michalson 1985; Sankar-DeLeeuw 1997; Silverman nd; White 1985). Silverman (nd) has suggested that not only is giftedness associated with advanced cognitive behaviours, but there may be affective traits that are displayed by gifted children including heightened sensitivity, early concern with moral issues and ability to empathise, perfectionism, social maturity, and aesthetic appreciation. When the behaviours and characteristics of children remarkably exceed expected development for their chronological age they may be considered gifted.

Two arguments are frequently cited to justify educational programming for the gifted (Schwartz 1994). The first is that all children deserve to have their individual needs met and therefore, as a matter of equity, we should not ignore the unique needs of the gifted (Borland 1989). Reinforcement for this argument comes from the United Nations Declaration of the Rights of the Child: "[The child] shall be given an education which will... enable him, on a basis of equal opportunity, to develop his abilities" (Office of the High Commission for Human Rights 1959, p. 2).

The second justification cited is that gifted children are an important national resource and we should pay special attention to developing their abilities as an investment in our own future (Colangelo et al. 2004). Interestingly, funding and support for the early childhood sector in Australia has also been based on this second "national resources" argument. Governments view early childhood initiatives as important because they are seen as a way of supporting parents in the workforce, securing an educated workforce for the future, and as a means to reduce future spending on welfare and the criminal justice system (Arthur et al. 2008).

Those working in the early childhood field have been less comfortable with the idea that the purpose of early childhood education is purely economic, believing that it is just as important to value the benefits that quality early childhood care and education bring to individual children and their families in the present (Arthur et al. 2008). Similarly, Grant and Piechowski (1999) have called for gifted education to become more child-centred and to value children for their inherent worth rather than for their accomplishments. In a similar way to those in the movement to reconceptualise early childhood (e.g., Cannella 1997), Grant and Piechowski (1999) critiqued current definitions of giftedness that focus on talent development, suggesting that children need to find their own path to self-actualisation rather than being moulded to fit adult perceptions of success.

The focus on social inclusion and an anti-bias approach in early childhood (Dau 2001) has emphasised the needs of children experiencing disadvantage due to disability, language barriers, and socio-economic status. It appears that giftedness has been viewed as an advantage, with only the positive aspects being acknowledged, and no account taken of the research that has demonstrated that young gifted children whose needs are not met in the early childhood context may become bored, experience an early disenchantment with education, or seek to gain educators' attention in inappropriate ways (Clark 2002; Lewis and Louis 1991; Roedell 1985; Wolfe 1989). Unrealised potential has both a cost to the individual and to society as a whole. The provision of appropriate services to gifted children has been seen as important in developing a healthy self-concept (Gross 1993), preventing underachievement (Whitmore 1986), and enhancing motivation to learn (Wolfe 1989).

Barbour (1992) outlined the possible areas of intersection between the fields of gifted education and early childhood education, focusing on the importance of early intervention, integrated curriculum, the need to involve parents and caregivers in early education, and the need for methods of assessment that are developmentally appropriate. Despite this call for collaboration between those working in both fields, limited interest has been shown by early childhood educators in catering for gifted children (Porter 2005; Stile 1996), and little research has been conducted by those in gifted education regarding young gifted children in prior-to-school settings (Jolly and Kettler 2008; Robinson 2000, 2008). Why, 17 years after Barbour's (1992) paper was published, does it appear that little progress has been made in acknowledging the needs of young gifted children?

Building on Barbour's (1992) general observations of the differences and similarities between the two fields, and her suggestion that collaboration is needed, this paper addresses possible causes of the tensions and contradictions that may have led to the needs of young gifted children being overlooked in prior-to-school settings, with particular reference to current early childhood practices in Britain, the USA, and Australia where the majority of research into young gifted children has been conducted. Suggestions are given for ways in which educators working in the fields of early childhood and gifted education might collaborate, using the strengths of each discipline to develop fruitful linkages between the two fields in the interests of young gifted children.

Tensions and Contradictions

Misunderstandings between those working in the fields of early childhood education and gifted education appear to remain in a number of areas in relation to meeting the needs of young gifted children. These concerns lie in the areas of (a) the identification of young gifted children, (b) the labelling of young gifted children, (c) the application of appropriate gifted education strategies in the early childhood context, (d) the application of current early childhood approaches to meeting the needs of young gifted children, and (e) the socialisation of young potentially gifted children in the educational setting. In each section the current understandings in the field of gifted education are presented and suggestions about the possible tensions that may exist for early childhood educators are offered.

The Identification of Young Gifted Children

Potential areas for tension and misunderstandings in the identification of young gifted children revolve around three central issues. The first issue is whether identification at such a young age is appropriate or necessary. Second, concerns exist about the reliance of those in gifted education on formalised testing and the validity of the use of such instruments with young children. The third issue involves the reliability of parents as identifiers of young gifted children.

Early identification is important in that it can assist parents and educators in understanding better the behaviours of young gifted children. While educators may be familiar with the positive traits displayed by gifted children, they tend to be less aware of negative behaviours that gifted children may display (Diezmann and Watters 1997; Hall 1983). Without an understanding of these characteristics and how they may be expressed, teachers may regard gifted children's behaviour as irrational and immature and use interventions that will not address the fundamental issue that caused the behaviour. For example, young gifted children may react to a lack of appropriate intellectual stimulation with aggressive frustration that can be misinterpreted as behavioural difficulties (Mares 1991).

Scholars in gifted education acknowledge that formal assessment of young gifted children, using measures such as IQ tests, can be problematic (Hodge and Kemp 2000; Robinson and Robinson 1992; Roedell et al. 1980). The attention span of young children may make them difficult to assess and means that underestimates of ability are more likely to occur due to test fatigue (Silverman 1998). The potential unreliability of scores in the early years highlights the importance of not relying on a single test result to define giftedness or to determine placement in a gifted program. However, formalised testing should not be entirely discarded as it is useful in providing additional information about the child's abilities as compared to same-age peers (Gross 1999; Robinson and Robinson 1992). This is particularly important in cases where a child is suspected of having a dual diagnosis (e.g., gifted and dyslexic) or where evidence is required for early entry to school (Feldhusen et al. 1986).

Parent nomination of gifted children in the early years has been shown to be reliable and effective (Louis and Lewis 1992; Roedell et al. 1980; Silverman 1998;

Silverman et al. 1986). However, despite a focus on the importance of the family in early childhood education, some early childhood educators remain sceptical about parents' abilities to correctly identify young gifted children (Wellisch 1997). Gross (1986) has suggested that, despite a widely held but false perception that all middle-class parents believe their child is gifted, gifted children are found in every social stratum and in every cultural group, and parent perceptions are usually accurate.

Multicriteria identification, taking into account the observations of parents and educators as well as test results, is considered to be best practice in gifted education (Robinson et al. 2007). It is also more effective in identifying children from culturally diverse backgrounds who may not emerge as gifted in testing practices that are biased towards the majority culture (Richert 2003). Hodge and Kemp (2002) have suggested the use of observation in an invitational environment as a naturalistic way in which young gifted children might be identified. Children are observed taking part in activities designed specifically to allow them to demonstrate their advanced abilities.

The Labelling of Young Gifted Children

In general, early childhood educators appear to be uncomfortable with any type of labelling of children, especially that based on formalised testing (Harrison 2003; National Association for the Education of Young Children 2008; Sankar-DeLeeuw 1999). Many early childhood professionals believe that formal testing can mask children's level of learning by focusing on deficits and that more can be gained from the educational methods of observing and conversing with children to learn about their strengths and needs (Arthur et al. 2008). This focus on informal testing and observation matches, in part, the views of many in gifted education (e.g., Harrison 2005; Porter 2005; Wright and Borland 1993) who acknowledge as essential the use of methods by which the child is observed in an authentic environment and make use of the information that parents can provide about their child. There are, however, limitations to this approach in that it relies on the skill of the observer. Unless educators have training in recognising the positive and negative characteristics of gifted children, they tend to identify only those who fit the positive stereotypes of gifted children (Hall 1983), overlooking gifted children with challenging or non-conformist behaviours. Furthermore, our expectations of children's capacities can be a powerful predictor of their achievements and if children are only exposed to low level tasks and never presented with more challenging materials, they may not demonstrate their advanced development (Whitmore 1982). There have been cases of gifted children modifying their behaviour and abilities to meet the expectations of a prior-to-school setting and producing, for example, "age-appropriate" drawings at preschool while drawing with more skill and detail at home (Harrison 2005).

Research into the effects of labelling on gifted children and their families has produced varied findings with some researchers reporting children labelled as gifted to be less well adjusted and more anxious, especially if incorrectly labelled as gifted by parents (Freeman 2000). Others such as Porter (2005) and Mares (1991) have pointed out that anxiety and lack of social adjustment may have been present

regardless of the application of the label and have further argued, that when the label is used to determine appropriate programming, the outcomes for children and families are positive. Freeman (2000) acknowledged that there is no evidence to support the view that gifted children as a group are less emotionally stable than children of average ability.

The Application of Appropriate Gifted Education Strategies in the Early Childhood Context

Early childhood professionals' apparently ambivalent attitude toward gifted education may well spring from two sources of confusion: a perception that gifted education is equated with acceleration, and concerns about hothousing and early exposure to academic learning. Acceleration is an educational response to the cognitive characteristics of gifted children, including their ability to learn and process knowledge at a greater pace and with greater depth and complexity than their age peers (Feldhusen and Feldhusen 1998). Hothousing, on the other hand, is "the process of inducing infants to acquire knowledge that is typically acquired at a later developmental level" (Sigel 1987, p. 212) and typically relies on rote learning with no real depth of understanding. The purpose of acceleration in the context of gifted education is not to push gifted children to achieve more than they are capable of achieving nor to give them an advantage over children of average ability. Acceleration aims to allow gifted children to progress at the rate at which they are able to learn, and at a level appropriate to their intellectual development (Colangelo et al. 2004; Feldhusen and Feldhusen 1998).

Even within the early childhood field, Elkind (1986, 1988, 2007), frequently cited as a critic of a strong academic focus in early childhood education, nevertheless viewed the acceleration of intellectually gifted students as appropriate:

Promotion of intellectually gifted children is another way of attaining the goal we have been arguing for at the early childhood level, namely, developmentally appropriate curriculum... [it] is simply another way of attempting to match the curriculum to the child's abilities, not to accelerate those abilities. (1988, p. 2)

There has been little research specifically targeting the educational strategies that might be of benefit to young gifted children in prior-to-school settings. For school-aged gifted students, there is evidence of the intellectual, social and emotional benefits of educational practices including enrichment (Renzulli and Reis 1994), acceleration (Rogers 1992), ability grouping (Kulik 1992; Rogers 1991), and social and emotional support (Robinson et al. 2002; Silverman 1993).

Academic acceleration in the form of early entry to school has been found to be an effective intervention with positive academic and social outcomes for young gifted children (Diezmann et al. 2001; Rankin and Vialle 1996; Robinson 2004; Rogers 1992) provided that established guidelines are followed, such as careful consideration of the child's characteristics and abilities and selection of the receiving teacher. Some educators have suggested that a year in a responsive preschool environment followed by entry directly into the second year of formal schooling is another

accelerative option well suited to gifted young children (Saunders and Espeland 1991). However, as yet no research has fully investigated the benefits of this option. While early entry to school may be appropriate for some gifted preschoolers, finding ways to cater for gifted children by using the inherent flexibility of the early childhood environment remains a priority (Falls 2006; Lewis 1984).

Enrichment can be defined as “the provision of broader, deeper or more varied educational experiences” (Porter 2005, p. 148). Traditionally this has been a strength of early childhood educators who, as part of the emergent curriculum approach, observe and build on the interests of the children in their care. Implementing enrichment strategies is therefore unlikely to be problematic in an early childhood context.

Ability grouping, where children of similar intellectual ability are grouped together for instruction, is rarely found in prior-to-school settings with the exception of specialised programs for gifted preschoolers, such as the Hollingworth Preschool in New York. The social inclusionist agenda of current early childhood practice has meant that many educators feel uncomfortable about grouping children of similar ability. This is despite the fact that it is common practice to group children chronologically in preschools and day care centres on the basis of their similar developmental stages. Researchers in gifted education have argued that gifted children, even young gifted children, need to have opportunities to mix with other children of like-ability in order to develop healthy self-concept (Harrison 2004). Opportunities for young gifted children to work together for a period of the day have been suggested as a potentially responsive intervention (Porter 2005).

The Application of Current Early Childhood Approaches to Meeting the Needs of Young Gifted Children

It is apparent that some early childhood professionals feel a conflict between the dominant philosophy of early childhood education and their beliefs about the special needs of gifted children. Falls (2006) concluded that early childhood educators in the Australian context found it difficult to reconcile their use of special provisions for gifted students that focused on more “school-like” activities within the current approach of emergent curriculum and child-centred approaches to early childhood learning. The educators in Falls’ study were concerned that using formalised academic activities, while enthusiastically received by the children, might lead to children becoming bored when they started school. Falls also found that early childhood educators were concerned about the amount of one-on-one time needed to engage effectively with young gifted children. While educators liked working with young gifted children and felt an obligation to do something for them, there was an overwhelming feeling that to do so was difficult in the context of the competing needs of other children.

Surveys of early childhood provisions (e.g., Stile 1996) have revealed that there have been few programs for gifted children in preschool and kindergarten settings. The programs that do exist appear to be based mainly in private, user-pays institutions, which further exacerbates equity issues if young gifted children come from socially disadvantaged backgrounds.

Programs that have published descriptions of early childhood provision for young gifted children (e.g., Gould et al. 2003; Grant 2004; Hodge and Kemp 2002; Meador 1996; Morelock and Morrison 1999; Snowden and Christian 1998; Walker et al. 1999) have used the principles of Developmentally Appropriate Practice (DAP) as recommended by the American National Association for the Education of Young Children (NAEYC; Bredekamp and Copple 1997). Other educators have reported using an integrated thematic approach (Gould et al. 2001) or the Montessori approach to education (Phillips 1997; Tittle 1984) with young gifted children. The work of the educators of the Reggio Emilia region of Italy has been suggested as being suited to young gifted children because of its open-ended nature (Barbour and Shaklee 1998; Hertzog 2001). Similarly, emergent curriculum (Jones and Nimmo 1994) and the project approach (Katz and Chard 2000) are potentially beneficial approaches for young gifted children (Harrison 2005). While instances in which these methods have been used to design programs for gifted children are described in detail and positive outcomes for the children are often outlined in case study or anecdotal form, none of these publications reports empirical evaluation of the programs' effectiveness for young gifted children (Koshy and Robinson 2006).

Effective implementation of the current dominant educational approach focuses on meeting the needs of all children through a recognition and affirmation of individual differences and interests. Its effective implementation relies heavily on the expertise of the individual professional (Coates et al. 2008; Hertzog et al. 1999) and a willingness to validate the gifted child (Harrison 2005). Even with a focus on a diverse and rich child-centred curriculum, there remain aspects of giftedness (as of delayed development) that simply cannot be met by a focus on individual needs. These include the gifted child's need to interact with like-minds, which Harrison (2005) has termed a need for *connection* and has considered important for developing a healthy self-concept.

Harrison (2005) has argued for giftedness to be viewed as an anti-bias issue and has urged early childhood professionals to question the ways in which they work with young gifted children. Harrison further claimed that inclusivity and affirmation of gifted children in the early childhood setting might mean providing additional and more advanced resources, assisting children to develop independent research skills and providing an environment that is responsive to their social and emotional needs.

The Socialisation of Young Gifted Children in the Educational Setting

Early childhood educators place a great emphasis on the development of social skills (Sankar-DeLeeuw 1999) and learning through social play (Arthur et al. 2008). This can be problematic for those young gifted children who do not interact with their same-age peers because of a lack of intellectual connection. An understanding of the characteristics of gifted children can, however, place a different perspective on these behaviours. Harrison (2003) suggested that gifted children with unusual interests may appear socially isolated if they can find no like-minded peer with whom to share their passions. In addition, their advanced cognitive skills may make the play of children of average ability seem to them crude and unsophisticated. They

may therefore withdraw from socialising with children of their chronological age (Harrison 2003), thereby experiencing intense loneliness, isolation and underachievement (Harrison 2003, 2005; Whitmore 1986).

Young gifted children may gravitate more towards interaction with the educator or older children than with same-age peers (Clark 2002; Dalzell 1998; Harrison and Tegel 1999; Silverman nd). If a perceived lack of social skills and a preference for solitary play (Wellisch 1997) and the company of adults are used as reasons to encourage parents to delay a child's entry to school beyond usual entry age or to discourage early entry (Diezmann et al. 2001; Rankin and Vialle 1996), this could mistakenly work against the needs of young gifted children.

Good social adjustment for gifted children can occur when there is a supportive and appropriate environment (Roedell 1985). Early childhood provisions that encourage social development, that is, the development of the individual as an accepted member of a social group, are appropriate for gifted children (Harrison 2003). This is in contrast to socialisation (conforming to social norms) which may result in gifted children hiding their abilities to fit in with the peer group (Roedell 1989). Gross (1998) suggested that children who are forced to modify their behaviour to conform to a peer group of lesser ability are at risk of experiencing frustration both intellectually and emotionally.

Recommendations for Collaboration

There are many opportunities for educators in the fields of gifted education and early childhood education to work together in ways that fit with the traditions and beliefs of each field. According to Gagné's (2003) model, a child's environment is thought to be a critical catalyst in the development of giftedness (potential) into talent (achievement). Prior-to-school settings, including the home, preschool and childcare centres, have an important role in providing a nurturing and enriching environment in which the talents of young gifted children can begin to develop.

There are a number of reasons why early childhood environments are potentially the most responsive of all educational settings for young gifted children (Harrison 2005; Porter 2005). The child-focused and naturalistic nature of most approaches to prior-to-school early childhood education is better equipped than schools to cater for individualised programming since there is no prescribed curriculum (Harrison 2003; Porter 2005). This allows educators to follow the interests of the gifted child, interests that can often be unusual and esoteric (Cohen 1998). The use in the early childhood sector of naturalistic and authentic observation of children's interests and abilities should allow early childhood educators to identify and respond more easily to young gifted children than school teachers, who are less likely to routinely use observation of individual children as a basis for educational planning (Harrison 2005; Porter 2005). Training in recognising both the positive and negative behaviours that young gifted children can display would help to strengthen the ability of early childhood educators to identify and respond to these children (Hansen and Feldhusen 1994).

An additional advantage of prior-to-school settings in catering for the needs of young gifted children is that there is a narrower span of mental ages and abilities in a prior-to-school setting than would be found in a regular school classroom (Porter 2005). For example, a moderately gifted 3-year-old child with an IQ of 130 (top 2% among same-age peers) is approximately 1 year ahead cognitively of her chronological peers. This difference increases with age, meaning that by the time the same child is 6 the difference is closer to 2 years, and at age 9 the difference will have increased to around 3 years (Gross 2000). One study of Australian grade 3 students found a 5-year achievement gap between children in the top and bottom 10% of the year in literacy skills (Australian Council for Educational Research 1997). Educators in prior-to-school settings are less likely to need to cater to this wide spread of abilities due to the younger age of the children in their care (Porter 2005).

Play and discovery learning, along with the encouragement of creativity, interdependence and autonomy, are highly valued by early childhood professionals (Harrison 2005; Harrison and Tegel 1999), giving those working in the prior-to-school environment the potential to be very responsive to the characteristics of young gifted children. Programming for young gifted children should focus on their strengths and interests, as well as providing enrichment through exposure to challenging ideas and concepts (Maker 1986). Wolfle (1989) has stressed that a developmentally appropriate response to the needs of young gifted children should not merely be a “watered-down kindergarten program” (p. 42). Provisions for gifted preschoolers should be based on the cognitive and affective characteristics that they possess (Maker 1986). Porter (2005) suggested that the challenge lies in “how to advance children’s skills beyond [school] entry level without imposing on such young children the structured, academic teaching that characterises the schooling of their older counterparts” (p. 119). Providing opportunities for young gifted children to spend some time with like-minded or older children by removing the traditional age barriers between groups in centres and preschools may also assist with social and emotional development (Porter 2005).

Educators in the early childhood field have long recognised the importance of the family context in catering for the needs of young children (Harrison 2005). Likewise, those working in gifted education understand that the family environment can be a positive catalyst in the development and nurturing of talent (Gagné 2003). Families are an important source of information in the process of identifying young gifted children as they can often provide examples of advanced behaviours and have observed their children in a variety of settings and situations (Hodge and Kemp 2000). Finding ways to engage and collaborate with parents to enhance and support the prior-to-school experience for gifted children may assist in providing some of the additional support that these children require.

There needs to be a better understanding between those working in the fields of early childhood education and gifted education and an acceptance of the diversity of provisions and philosophies within each field. This range of programming options and philosophies should be viewed as a strength rather than as a divisive issue. Since gifted children themselves manifest a complex variety of intellectual, social and emotional traits, our responses to their learning characteristics through a

diversity of play-based methods, both accelerative and enriching, should be encouraged. Parents and educators need to work together to find the optimal prior-to-school match for individual children from the options available.

There is a need for training of early childhood educators about gifted children, at both the pre-service and in-service levels. Research has demonstrated that educators with training in gifted education are significantly better at identifying children with intellectual promise than those who have not undertaken training (Hansen and Feldhusen 1994). This training should address ways in which giftedness can be integrated into the anti-bias and social inclusion agendas of early childhood education (Harrison 2005), thereby building on the strengths that exist in this field.

The ideal prior-to-school setting for young gifted children would include the following elements:

1. A well-articulated, multicriteria identification plan that combines the observational skills of early childhood professionals (trained in recognising the characteristics of young gifted children) with information provided by parents. The identification process should use naturalistic activities that allow all children to demonstrate their strengths, interests, and abilities so that those children with exceptional abilities compared with their chronological-aged peers can be recognised. Access to relevant and culturally sensitive standardised testing should be available as a supplementary option when required.
2. A thoughtful and well-planned curriculum that builds on the unique learning characteristics of young gifted children, incorporating play and elements of accelerated content and lateral enrichment based on the interests and strengths of each child.
3. Opportunities for young gifted children to experience connection either by grouping gifted children for some part of the day or allowing gifted children to interact with older children. In centre-based care, this may entail dismantling structures and routines that prevent young children from mixing with older children or assisting parents to find other gifted children in the community.
4. An environment that provides acceptance and validation of the abilities and skills that a young gifted child brings to the early childhood context.

Conclusion

Despite calls for those in the fields of gifted education and early childhood education to work together, it appears that barriers still impede successful collaboration. These barriers are not insurmountable, but they require understanding, education and thoughtful interaction between educators in both fields. The intention of this paper is to begin that conversation by highlighting where potential difficulties lie and how solutions can be found.

Early childhood educators' focus on individual differences and meeting the needs of all children through curriculum that is based on their interests already provides the potential to cater for young gifted preschoolers. An additional awareness of the traits and characteristics, both intellectual and socio-affective, positive and negative,

of gifted children is needed. Regardless of the curricula adopted, all young gifted children need opportunities to mix with children of similar ability and to experience connection with like-minded peers (Harrison 2005). A failure to provide this can result in negative self-concept and the concealment of abilities.

There is an exciting opportunity for those in the fields of gifted education and early childhood education to work collaboratively to create an environment that caters effectively for the unique characteristics of young potentially gifted children. This collaboration could be better promoted if early childhood educators received training about gifted children at the pre-service and in-service levels. The strengths, traditions and research bases of each field have the potential to contribute to creating a place where young gifted children are welcomed, valued and celebrated as well as nurtured intellectually.

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Chapter 3

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Abstract

A search of the literature from the past 30 years reveals that there is a dearth of research surrounding effective interventions for intellectually gifted children in the early childhood years. The findings of 11 empirical studies of educational provisions for young gifted children were located and the methodological rigor of the studies examined. Aspects problematic to research with young gifted children are discussed, including issues relating to sample sizes, definitions of giftedness, difficulties in conducting experimental studies, finding appropriate standardized measures for use with gifted children, and measurement of program outcomes. Suggestions are made for strengthening future research in the field of early childhood gifted education.

Keywords

gifted education, early childhood, evidence-based practice, educational interventions

Young gifted children have been described as one of the most underserved groups in education (Barbour & Shaklee, 1998; Chamberlin, Buchanan, & Vercimak, 2007; Jolly & Kettler, 2008; Karnes & Johnson, 1987a; Karnes, Shwedel, & Linnemeyer,

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1982; Koshy & Robinson, 2006; N. M. Robinson, 2000, 2008). While there appears to be consensus that these children can be identified in the early years (N. M. Robinson, 2008; N. M. Robinson, Abbott, Berninger, Busse, & Mukhopadhyay, 1997; Smutny, 1999) and that they need to have access to a curriculum that meets their unique learning characteristics (Maker, 1986; Maker & Schiever, 2005; N. M. Robinson, Reis, Neihart, & Moon, 2002), there has been very little research to date that addresses the types of educational interventions that are most successful with young gifted children (Jolly & Kettler, 2008; N. M. Robinson, 2000, 2008). The research that has been conducted with this group has focused mainly on their identification rather than on the teaching techniques that are most effective to develop and nurture their talents (Meador, 1994; N. M. Robinson, 2000).

The purpose of this article is to examine the research on effective educational provisions for gifted children in the early childhood years. An analysis of the methodological rigor of the research conducted with these children seeks to determine which educational interventions have a solid evidence base for their effectiveness with young gifted children. In their book *Best practices in gifted education: An evidence-based guide*, A. Robinson, Shore, and Enerson (2007) highlighted the urgent need for educators and parents to have access to, and knowledge of, the practices in gifted education that have a firm research base. Yet, despite calling for early identification of giftedness, they described few educational practices related specifically to gifted children in the early years.

Previous reviews of research on gifted education have reported a dearth of empirical studies (Johnsen & Ryser, 1996; Jolly & Kettler, 2008; White, Fletcher-Campbell, & Ridley, 2003; Ziegler & Raul, 2000), particularly in the early childhood years. In a review of gifted education research articles published between 1994 and 2003, Jolly and Kettler (2008) found that only 5.5% were experimental or quasiexperimental studies, with the majority of studies (83.6%) presenting descriptions of educational approaches with no supporting efficacy data. In that review, only 1.75% of the studies addressed children in the preschool years. Similarly, Johnsen and Ryser (1996) found only 39 references in the period 1989 to 1996 that examined the effectiveness of educational practices with gifted students in general education settings. Of these, only 39% reported using experimental or quasiexperimental methodology.

Jolly and Kettler (2008) concluded that for practice in gifted education to improve, a shift was needed in the research base from merely describing giftedness to evaluating and verifying the most effective practices. White et al. (2003) stated that the lack of evidence-based practice and policy in gifted education and the scarcity of empirical studies meant the majority of literature reflected practitioner experience only. They acknowledged that while practitioner experience was useful, the absence of empirical research meant there was a danger that the field would be dominated by the ideas of an influential few, become self-perpetuating, and not consider other possible educational options.

Current practice in early childhood gifted education suggests that educational interventions that should be successful with young gifted children include enrichment, the

process of broadening the curriculum options offered to these children; acceleration, including the presentation of intellectually demanding material at an earlier age and/or early entry to formal school; and ability grouping, that is, placing children of similar intellectual ability together for both instructional and socio-affective purposes. The current state of early childhood education would suggest that there are many opportunities for those working in the fields of gifted education and early childhood to collaborate constructively to deliver these types of interventions to young gifted children (Walsh, Hodge, Bowes, & Kemp, 2010).

In this article, an overview of studies of interventions undertaken with gifted children in early childhood is presented, and the strengths and limitations of their research designs are identified. Such a critique is needed because increasing calls for evidence-based educational practice mean those working with young gifted children should be able to justify their programs with reference to research that demonstrates program effectiveness. Educators and policy makers also need to be able to make informed judgments about the rigor and credibility of research pertaining to young gifted children. Often research can be found to support diametrically opposed points of view on a particular intervention, for example, research relating to the ability grouping of children, and only careful examination of research methodology can determine possible flaws in the research. To date, there have been no reviews focusing exclusively on educational interventions for gifted children in the early childhood years.

Method

Search Procedures

Database searches of ERIC (Educational Resources Information Center) and PsycInfo (the American Psychological Association database) were carried out using the descriptors *gifted*, *talented*, *high ability*; *early childhood*, *preschool*, *kindergarten*, *prior-to-school*; and *training*, *instruction*, *teaching*, and *intervention*. In addition, manual searches of the principal international journals in gifted education—*Gifted Child Quarterly (GCQ)*, *Journal for the Education of the Gifted (JEG)*, and *Roeper Review (RR)*—were undertaken.

Selection Criteria

For inclusion in this review, a publication had to meet certain criteria. First, it had to be a primary research paper published in a peer-reviewed journal over the past 30 years. The use of peer-reviewed articles increased the likelihood of quality research being selected. It was decided to include publications as far back as 30 years as there were few recent articles.

Second, the reported research had to have a focus on children in the early years prior to school and those in the first year of formal schooling. Studies for which the upper age range exceeded 6 years were not included, with the exception of

longitudinal research following up on early childhood interventions. This was to ensure that issues pertinent to conducting research with young gifted children were addressed.

Third, the study had to include efficacy or effectiveness data on the educational intervention used with gifted children. Papers that described interesting and potentially effective interventions but provided no effectiveness data (e.g., Coates, Thompson, & Shimmin, 2008; Diezmann & English, 2001; Diezmann & Watters, 1997; Hensel, 1991; Hertzog, Klein, & Katz, 1999; Morgan, 2007; Rosenbusch & Draper, 1985) were excluded.

In all, 11 studies were located that met the specified criteria (see Table 1 for publication details and details relating to the participants, interventions, intervention outcomes, and major findings). These studies are marked with an asterisk in the reference list.

Overview of the Studies

The selected studies reported a wide variety of interventions (see Table 1). Some studies provided instruction in a specific subject area such as mathematics (N. M. Robinson et al., 1997), synectics (Meador, 1994), and analogies (Castillo, 1998). Others employed programmatic and ability grouping interventions such as a full-time or part-time, self-contained preschool program (Karnes & Johnson, 1987a, 1987b; Karnes, Shwedel, & Lewis, 1983a, 1983b; VanTassel-Baska, Schuler, & Lipschutz, 1982) or early entry to elementary school (Gagné & Gagnier, 2004; Obrzut, Nelson, & Obrzut, 1984).

A total of 10 studies were conducted in the United States and 1 in Canada. The studies ranged in length from 20-min interventions (Castillo, 1998) to full-time self-contained classes for gifted preschoolers over a period of 2 years (Karnes & Johnson, 1987a) to longitudinal studies of early entry to school over 4 years (Obrzut et al., 1984).

All studies included children in the early childhood age range (see Table 1). In all, six of the studies involved children in prior-to-school settings. A wide variety of measures was employed to assess giftedness (see selection criteria in Table 2). These included IQ testing, other forms of norm-referenced ability and achievement testing, and parent and teacher nomination. Studies varied greatly in the instruments used and the score/level at which a child was considered to be gifted. Castillo (1998) did not report selection criteria and indicated that a sample already designated as gifted by the school had been used.

Sample sizes ranged from 14 children (VanTassel-Baska et al., 1982) to 1,821 children (Gagné & Gagnier, 2004) as presented in Table 2. Only two studies (Castillo, 1998; N. M. Robinson et al., 1997) reported using some form of random sampling.

A myriad of instruments was used to measure dependent variables (see Table 1). These included traditional IQ tests, such as the Stanford–Binet IV (Thorndike, Hagen, & Sattler, 1986); tests of creativity and divergent thinking, such as the Torrance Test

Table 1. Selected Features of Studies Included in the Review

Author/s and journal	Age of children	Focus of intervention	Dependent variables	Measures	Major findings
Castillo (1998) <i>Roeper Review</i>	5-6 years	Analogies	Analogy explanation, response justification, and metaphor interpretation	Author-devised tests of analogy explanation, response justification, and metaphor interpretation	Analogy training intervention significantly improved children's understanding of metaphors
Gagné and Gagnier (2004) <i>Roeper Review</i>	Kindergarten and Grade 2	Early entry to school	Socio-affective adjustment and academic achievement	Teacher ranking using an author-devised instrument based on problem behaviors identified by Quay (1979)	No substantial differences between early entrants and regularly admitted students on measures of conduct, social integration, academic maturity, and academic achievement. Semiqualitative analysis revealed that teachers judged a significant proportion of the early entrants to have adjustment difficulties
Hanninen (1984) <i>Journal for the Education of the Gifted</i>	3-5 years	Concept assessment and curriculum plan	Creativity	PIAT, Torrance Test of Creativity (TTC)	Significant results in PIAT category of General Information but not Mathematics and Reading Recognition. Higher creativity, fluency, and originality scores for preschool participants

(continued)

Table 1. (continued)

Author/s and journal	Age of children	Focus of intervention	Dependent variables	Measures	Major findings
Karnes and Johnson (1987b) <i>Gifted Child Quarterly</i>	Not stated, but children were in the year prior to school	BOHST	Creativity	Thinking Creatively in Action and Movement (Torrance, 1981), four subtests from the K-ABC (Kaufman & Kaufman, 1982; Magic Circle, Face Recognition, Gestalt Closure, and Expressive Vocabulary) and the Self-Concept and Motivation Inventory (Milchus, Farrah, & Reitz, 1967)	Better performance for children in the intervention than for comparison groups. Biggest gains made by children who were part of the intervention group but were not identified as potentially gifted. Intervention group teachers described their classes more positively than comparison group teachers
Karnes and Johnson (1987a) <i>Journal for the Education of the Gifted</i>	3-5 years	Full-time self-contained preschool using Guilford's SOI and the British Infant School open framework	Reading and mathematics	Achievement and Education Abilities Series (Science Research Associates Inc, 1985). Teacher and parent report	Measurable gains for the children involved in each program
Karnes, Shwedel, and Lewis (1983a) <i>Journal for the Education of the Gifted</i>	Preschool age (followed up at K-Grade 4)	RAPYHT	Reading and mathematics	Standardized national achievement tests, teacher survey	On all measures, the RAPYHT children were rated as superior to their regular classmates, except for willingness to try new activities

(continued)

Table 1. (continued)

Author/s and journal	Age of children	Focus of intervention	Dependent variables	Measures	Major findings
Karnes, Shwedel, and Lewis (1983b) <i>Exceptional Children</i>	M = 4.4 years (gifted) M = 4.3 years (nongifted)	RAPYHT	Talent area functioning, self-concept, creativity, and task persistence	Two subtests from Animal Crackers (Adkins & Ballif, 1973), Thinking Creatively in Action and Movement (Torrance, 1981), and the Talent Assessment Checklist (Karnes, Brown, Shwedel, & Svoboda, 1980)	Treatment group of gifted children performed higher than would be expected without the intervention
Meador (1994) <i>Journal for the Education of the Gifted</i>	M = 5.7 years	Synecotics	Creativity, self-concept, and verbal skills	TTCT, MZSCS, and PPVT	No significant differences for experimental and control groups on PPVT or MZSCS. Experimental groups scored statistically significantly better than control groups on TTCT, indicating that training in synectics had improved creative thinking. No differences found between gifted and nongifted children, indicating that training had a similar effect on both groups

(continued)

Table 1. (continued)

Author/s and journal	Age of children	Focus of intervention	Dependent variables	Measures	Major findings
Obrzut, Nelson, and Obrzut (1984) <i>Psychology in the Schools</i>	4.8-5.11 years at entry to school	Early entry to school	Academic achievement (reading, spelling, mathematics) and school adjustment	WRAT, school records, health records, Parent-Teacher Academic Sentiment Questionnaire, and interviews	Children admitted early to school performed significantly better on measures of reading, spelling, and mathematics. No significant differences between the groups on measures of social maturity. In all, 28% of the early entrants had been retained in the first 4 years of school, as compared with only 2% of regular entry children
N. M. Robinson, Abbott, Berninger, Busse, and Mukhopadhyay (1997) <i>Gifted Child Quarterly</i>	M = 5.5-8.0 years (over 2 years of the study)	Mathematics enrichment	Visual-spatial reasoning and mathematical ability	Stanford-Binet IV (Number Series, Quantitative, Vocabulary, Comprehension, Memory for Sentences, Pattern Analysis and Matrices subtests), Key Math Test-Revised (Geometry, Numeration, Problem Solving Subtests), Woodcock-Johnson Achievement Test-Revised (Calculation Subtest), Word Problems Test, Number Knowledge Test, Counting Span Test, Visual Spatial Span Test	Higher mean score for the intervention group in the quantitative domain, as well as significantly higher correlation between verbal and quantitative factors at the end of the intervention

(continued)

Table 1. (continued)

Author/s and journal	Age of children	Focus of intervention	Dependent variables	Measures	Major findings
Van Tassel-Baska, Schuler, and Lipschutz (1982) <i>Journal for the Education of the Gifted</i>	4.1-4.10 years	Individualized academic program	Mathematics and reading, receptive vocabulary	WRAT, PPVT, Raven's CPM, Parent Interviews	Increases in WRAT subtest scores by 1 year or more (35% in reading, 85% in math). Increase in PPVT score by 10 percentile points or more (64%). Scores at 80th percentile or above on Raven's CPM (64%). Parents' narrative evaluation indicated development of positive student attitudes (100%)

Note: PIAT = Peabody Individual Achievement Test; BOHST = Bringing Out Head Start Talents; K-ABC = Kaufman Assessment Battery for Children; SOI = Structure of the Intellect; RAPIHT = Retrieval and Acceleration of Promising Young Handicapped and Talented; MZSCS = Martinek-Zaichkowsky Self-Concept Scale; PPVT = Peabody Picture Vocabulary Test; WRAT = Wide Range Achievement Test; CPM = Colored Progressive Matrices.

Table 2. Research Design of Studies Included in the Review

Study	Sample size	Research design	Control/ comparison group	Definition of giftedness	Selection of children
Castillo (1998)	N = 63	True experimental	Yes—nongifted children	Not reported	Enrolled in a school for gifted children—Specific criteria not reported
Gagné and Gagnier (2004)	n = 98 (early entrants), n = 1,723 (regularly admitted students)	Nonexperimental	Yes—Regularly admitted students	Not reported	Mental age of 5 years 9 months for early entrants. Equivalent to IQ 117 for children with an October birthday
Hanninen (1984)	N = 66	Mixed methods	No—But a sample of 3 children not in the preschool program were matched on basis of Slosson IQ	“A preschool child who functions significantly above age level in any number of areas such as language development, cognitive ability, social skills, physical adaptability, creativity and leadership may be considered as gifted and talented” (p. 193)	Multicriteria: 1.5 standard deviations above the mean on PPVT, CMMS, and/or Goodenough-Harris Draw-A-Person Test, Parent Interview
Karnes and Johnson (1987b)	N = 446	Mixed methods	Yes	Not reported	Multicriteria: Teacher checklist, parent checklist, and talent identification summary
Karnes and Johnson (1987a)	N = 31	Mixed methods	Children compared with similar ability peers based on expected outcomes on educational ability quotient	1.5 standard deviations from norm	Multicriteria: Parent questionnaire and assessment of intellectual, fine motor, and creative functioning
Karnes et al. (1983a)	N = 30	Mixed methods	No, but children were compared with classmates and national norms	Marland (1972)	Talent Screening Checklist, Activities for Talent Identification, follow-up with psychologist if required

(continued)

Table 2. (continued)

Study	Sample size	Research design	Control/ comparison group	Definition of giftedness	Selection of children
Karnes et al. (1983b)	n = 28 (experimental), n = 8 (control)	Mixed methods	Yes	Marland (1972)	Teacher ratings on Talent Identification Checklist
Meador (1994)	n = 23 (experimental), n = 41 (control)	Quasiexperimental	Yes—Both gifted and nongifted experimental and control groups	Not reported	Two-stage screening process conducted by school district. Student interview, parent questionnaire, KBIT, and Einstein Readiness Test administered
Obrzut et al. (1984)	N = 68	Nonexperimental— ex post facto	Yes—Children who did not qualify for early entry and children who qualified but did not enter school early (latter group omitted due to small numbers)	Not reported	IQ \geq 132 and above average performance on other developmental variables (perceptual, psychomotor, achievement, and affective). Social-emotional maturity assessed informally through interview by school psychologist
N. M. Robinson et al. (1997)	N = 276	True experimental	Yes—But not nongifted children	Not reported	98th percentile or above on arithmetic subtest of WPPSI-R, WISC-III, or K-ABC
Van Tassel-Baska et al. (1982)	N = 14	Mixed methods	No	Not reported	Children functioning 2-year levels above the norm on either reading or math subtests of WRAT

Note: CMMS = Columbia Mental Maturity Scale; PPVT = Peabody Picture Vocabulary Test; KBIT = Kaufman Brief Intelligence Test; WISC-III = Wechsler Intelligence Scale for Children—Third Edition; K-ABC = Kaufman Assessment Battery for Children; WRAT = Wide Range Achievement Test.

of Creative Thinking (Torrance, 1998); norm-referenced tests of academic achievement; and researcher-devised instruments.

Each study was classified according to its research design using the categories suggested by McMillan and Schumacher (2006). Of the 11 studies included, 3 used an experimental research design (true experimental or quasiexperimental), 6 used a mixed-methods approach, and 2 used nonexperimental approaches (see Table 2).

Six studies reported using a control or comparison group in their design (see Table 2). In the case of N. M. Robinson et al. (1997), a control group that consisted of similarly gifted children was used; in other cases, the performance of gifted children was compared with that of nongifted children (Castillo, 1998; Gagné & Gagnier, 2004; Obrzut et al., 1984), and in two cases, both gifted and nongifted control groups were used (Karnes & Johnson, 1987b; Meador, 1994).

Results

The criteria for evaluating the quality of the studies were based on the work of Troia (1999), as well as the *Standards for Reporting on Empirical Social Science Research in AERA Publications* (American Educational Research Association, 2006). The set of criteria used for evaluation is presented in Table 3. Two broad categories of internal and external validity were established. Within the category of internal validity, issues of general design characteristics, measurement and analysis, and interpretation were examined. The category of external validity was divided into research hypotheses, and participant selection and description.

In Tables 4 and 5, each study in this review is evaluated against the quality criteria. Cases in which a criterion was deemed to not be applicable to a particular research design were recorded as *n/a*. Cases in which insufficient information existed in the publication to determine if a criterion had been met were evaluated negatively. The purpose of this review is not to criticize individual studies but to stimulate discussion about the quantity and quality of early childhood research being conducted within the field of gifted education.

Internal Validity

General design characteristics. Randomized experimental designs are considered the “gold standard” in educational research and offer procedures by which intersubject differences can be eliminated (McMillan & Schumacher, 2006). Two studies reported using some form of random sampling (Castillo, 1998; N. M. Robinson et al., 1997).

It is generally accepted that rigorous research designs will include a control group (McMillan & Schumacher, 2006). Ideally, interventions should be trialed with both gifted and nongifted control groups for two reasons. The first reason is to eliminate the possibility that an intervention is merely a good teaching technique that is suitable for use with all children. Karnes and Johnson (1987b) noted that their intervention with potentially gifted Head Start children also resulted in gains in higher order thinking

Table 3. Criteria for Evaluating Quality of Studies

Criterion	Definition
Internal validity criteria	
General design characteristics	
Random assignment	Participants were randomly assigned to interventions.
Control group present	A control group was used.
Intervention conditions explicitly described	Intervention conditions were described in sufficient detail to allow replication.
Length of intervention stated	The length of time the intervention took was stated.
Measurement	
Operationalized measures	Dependent variables were described in enough detail so that the task demands and underlying variables of interest were clearly evident.
Suitability of dependent variables	Dependent variables were relevant to the research hypothesis.
Reliability of measures reported	Appropriate measures of reliability for the dependent variables were present.
Treatment fidelity	A procedure was in place to ensure that the intervention was being implemented faithfully.
Analysis and interpretation	
Sufficiently large <i>N</i>	The number of participants was appropriate to the research design chosen.
Analysis techniques described	Analytical techniques were described in sufficient detail to permit an understanding of how the data were analyzed.
Satisfactory statistical analysis	Statistical tests appropriate to the research hypotheses were carried out and appropriately reported.
Effect size reported	Effect sizes were reported.
Evidence of triangulation of data	Data were triangulated.
External validity criteria	
Research hypotheses	
Problem formation	A clear and defensible research hypothesis was provided.
Contribution to knowledge	A clear statement as to the rationale for the research was provided.
Review of relevant scholarship	A review of the relevant scholarship was provided.
Design description	A clear description of the study design and methods of data collection were included.

(continued)

Table 3. (continued)

Criterion	Definition
Participant selection and description	
Participant selection	The manner in which the participants were selected for the study was described.
Age	The mean chronological age of the participants in each group was provided.
Sex	The number of male and female participants in each group was provided.
SES	The socioeconomic status of the participants' families was reported.
Definition of giftedness	The definition of giftedness applied to the participants was reported.
IQ	IQ or some other standardized measure of ability was reported.
Multiple criteria selection	A multiple-criteria approach using subjective and objective data was used in selecting participants.

Note: SES = socioeconomic status.

skills for the children not identified as gifted. In fact, these children experienced larger gains than those of the gifted children in the intervention group, calling into question whether the treatment is really appropriate only for use with gifted children. The second reason is that if strategies and curriculum appropriate for all children are reserved for the gifted, educators leave themselves open to justifiable accusations of elitism (Borland, 1989; Carter, 1992; Passow, 1982).

The replicability of an intervention depends on it being described in sufficient detail. In eight of the studies reported, there was adequate description for replication.

Measurement. In all studies, the outcome measures were operationalized, that is, the dependent variables were described in sufficient detail so that the task demands and underlying variable of interest were clearly evident. Only three studies (Karnes et al., 1983a, 1983b; N. M. Robinson et al., 1997) reported the reliability of the dependent variables.

Treatment fidelity ensures that all participants receive the same intervention. Without it, there is no certainty that the effect on the dependent variables is made by the intervention and not some extraneous factor such as a difference in the teacher delivering the intervention. Only two studies appeared to have any measures of treatment fidelity (Castillo, 1998; Meador, 1994), and in both instances the intervention was administered by the same person. In no study was the issue of treatment fidelity overtly addressed, although one larger study reported using manuals and staff training (N. M. Robinson et al., 1997).

Table 4. Studies Cross-Referenced With Internal Validity Criteria

Study	Intervention				Length of intervention stated	Operationalized measures	Suitability of dependent variables	Reliability of measures reported
	Random assignment	Control group present	Intervention conditions explicitly described	Satisfactory statistical analysis				
Castillo (1998)	Y	Y	Y	Y	Y	Y	Y	N
Gagné and Gagnier (2004)	N	N	N	Y	Y	Y	Y	N
Hanninen (1984)	N	N	Y	Y	Y	Y	Y	N
Karnes and Johnson (1987b)	N	Y	Y	Y	Y	Y	Y	N
Karnes and Johnson (1987a)	N	N	N	Y	Y	Y	Y	Y
Karnes et al. (1983a)	N	N	N	Y	Y	Y	Y	N
Karnes et al. (1983b)	N	Y	Y	Y	Y	Y	Y	Y
Meador (1994)	Y	Y	Y	Y	Y	Y	Y	N
Obrzut et al. (1984)	N	Y	Y	Y	Y	Y	Y	N
N. M. Robinson et al. (1997)	Y	Y	Y	Y	Y	Y	Y	Y
Van Tassel-Baska et al. (1982)	N	N	Y	Y	Y	Y	Y	N

Study	Treatment fidelity	Sufficiently large N	Analysis techniques described	Satisfactory statistical analysis	Effect size reported	Evidence of triangulation of data
Gagné and Gagnier (2004)	N	Y	Y	Y	N	Y
Hanninen (1984)	n/a	Y	Y	Y	N	N
Karnes and Johnson (1987b)	N	Y	Y	Y	N	Y
Karnes and Johnson (1987a)	N	N	Y	Y	N	Y
Karnes et al. (1983a)	n/a	N	Y	Y	N	Y
Karnes et al. (1983b)	n/a	N	Y	Y	N	Y
Meador (1994)	Y	Y	Y	Y	N	Y
Obrzut et al. (1984)	N	Y	Y	Y	N	Y
N. M. Robinson et al. (1997)	N	Y	Y	Y	N	N
Van Tassel-Baska et al. (1982)	N	N	Y	Y	N	Y

Table 5. Studies Cross-Referenced With External Validity Criteria

Study	Problem formation	Contribution to knowledge	Review of relevant scholarship	Design description	Participant selection	Age	Sex	SES	Definitions of giftedness	IQ	Multiple criteria selection
Castillo (1998)	Y	Y	Y	Y	N	Y	Y	Y	N	N	N
Gagné and Gagnier (2004)	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y
Hanninen (1984)	Y	Y	Y	Y	Y	N	N	N	Y	N	Y
Karnes and Johnson (1987b)	Y	Y	Y	Y	Y	N	N	Y	Y	N	Y
Karnes and Johnson (1987a)	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y
Karnes et al. (1983a)	Y	Y	N	Y	Y	N	N	N	Y	Y	Y
Karnes et al. (1983b)	Y	N	N	Y	Y	Y	Y	N	N	N	Y
Meador (1994)	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y
Obrzut et al. (1984)	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y
N. M. Robinson et al. (1997)	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N
Van Tassel-Baska et al. (1982)	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y

Note: SES = socioeconomic status.

Analysis and interpretation. In most studies, the number of participants was small. No studies reported effect size, despite broad acceptance that practical significance of results is based on its calculation (McMillan & Schumacher, 2006). All studies showed evidence of triangulation of data through using multiple data sources.

External Validity

Research hypotheses. All studies included a clear and defensible research hypothesis, and all, with the exception of one (Karnes et al., 1983b), stated the contribution that their research made to the knowledge of the field. Two studies did not include a review of scholarship relevant to the field (Karnes et al., 1983a, 1983b). This omission could be attributed to the fact that these articles were reporting on different aspects of the same study, and a review of the literature had been included in an early article. All studies had clear descriptions of the design used and the ways in which data were collected.

Participant selection and description. One study (Castillo, 1998) did not include sufficient information on the way in which participants in the study had been selected. In this particular case, it was reported that the children were deemed to be intellectually gifted because they had been placed in a program for gifted children, but no detail was given on how the children had been selected for that program.

Many studies did not include information as basic as the mean age for the cohort being studied or the gender distribution. Only 4 of the studies stated the definition of giftedness that underpinned the intervention and selection of students. In all, 7 studies reported the IQ of the children involved in the study. Multiple criteria selection was used by 9 of the 11 studies.

Discussion

The small number of studies, varying methodologies, and quality of those reviewed suggest that early childhood researchers in the field of gifted education still have much work to do before it can be claimed that true evidence-based practice exists. Admittedly, there are many difficulties in conducting empirical research in gifted education, and this may account for the paucity of research and the variability in quality. These difficulties relate to issues with sample sizes, problems with sampling, definitions of giftedness, finding and selecting appropriate dependent variables to use with gifted children, and the measurement of these outcome variables in programs for young gifted children.

Samples

The size of the target population (i.e., gifted students in early childhood years) is, by definition, small (Ziegler & Raul, 2000), with definitions ranging from the top 10% of the population (Gagné, 2003) to more conservative estimates of the top 2%

(Terman, 1925). This means that finding samples of sizes that will provide sufficient external validity is difficult, especially when adding a specific age range into the mix. In addition, finding suitable children is more difficult in the prior-to-school years because of the variety of care arrangements that exist; for example, children may be cared for by their parents on one day, a grandparent on another, and attend preschool or day care for the other 3 days a week (N. M. Robinson, 2008). This problem is further exacerbated when conducting research with very young children because both parents and educators have an understandable impetus to protect their children. Most of the studies related to prior-to-school settings had very small samples, that is, less than 30. The one exception to this rule was the study by Karnes and Johnson (1987b) where an already-established program (Retrieval and Acceleration of Promising Young Handicapped and Talented [RAPYHT]) was able to be expanded and replicated using participants from the Head Start Program. The question that needs to be asked is why other preschool programs that have appeared to be successful with young gifted children have not been replicated and studied with larger sample sizes.

Control and Comparison Groups

Although it is acknowledged that a control and/or comparison group is fundamental to a good experimental design, few of the studies included in this review reported the use of a control group. Some of the reviewed studies made attempts to control variables using other methods. Unable to find a suitable comparison group, Karnes and Johnson (1987a) compared children's grade level achievement tests with the scores that would have been expected based on their educational ability quotient. They found that only 3% of the students were performing below expectation, although whether this can be attributed to the intervention is difficult to determine without a valid control group.

Karnes et al. (1983b) used a regression-discontinuity analysis, where the effectiveness of an intervention is assessed using the "correlation between ratings on the entry criteria and post-test scores to obtain estimates of performance for each group" (p. 106). They used a comparison group of children who were enrolled in the same classroom but did not qualify for RAPYHT to determine whether gains made in the program were educationally significant or merely due to maturation, the regular educational program, or the testing process. They found that, even with small sample sizes, the children in the intervention performed better on tests of their talent area, creative functioning, and school-related achievement motivation than those who did not take part.

Random Sampling

There are ethical issues regarding random assignment of students to treatment and control groups in research with gifted children. Is it educationally responsible, for example, to withhold a potentially beneficial intervention from an individual child to

ascertain whether the program is effective (Borland, 1989; Carter, 1992; Kitano & Perez, 1998)? It has been suggested that research designs allowing for the intervention to be subsequently administered to the control or nonintervention groups provide a way to circumvent this dilemma. This is not always possible, however, and greatly increases the length and cost of a study. None of the studies reviewed here were able to offer their intervention to the control group, where one existed, after the experimental phase.

Definitions of Giftedness

A surprising aspect of the review was the number of studies that did not define the intended meaning of “giftedness.” Only two studies referred to a formally recognized definition of giftedness, perhaps reflecting the difficulty practitioners may have in operationalizing formal definitions in the early childhood context. The preponderance of definitions of giftedness and a heated debate around these has made comparing studies of interventions for gifted children difficult (Carter, 1991; Ziegler & Raul, 2000). For example, if the model used by one study defines giftedness as high achievement whereas another uses ability scores, then the data collected may be different, making comparison of the studies problematic.

Multiple Criteria Identification

One area in which the studies appeared stronger was an acknowledgment that multidimensional identification procedures were essential (A. Robinson et al., 2007), with most studies employing a range of measures to select gifted participants. Interestingly, VanTassel-Baska et al. (1982) reported using a multicriteria approach to screen candidates but found that parent information was not a good discriminator of ability, with all parents in their study reporting that their child was functioning at a high level. VanTassel-Baska et al. concluded that test scores were a better measure of potential success in their highly academic program than data obtained from parents. This is perhaps unsurprising given the outcomes for the study were measured by the use of test scores.

Dependent Variable Measures

A wide range of dependent variable measures were used across the studies. Kitano and Perez (1998) suggested that research with children in the early childhood years is particularly challenging because of the difficulties researchers encounter in finding suitable instruments for measuring intellectual gains in young children following educational interventions. In some instances, a tool may not have a normative sample of young children, thereby rendering a comparison with the normal population problematic. In addition, the advanced ability of the young gifted child may mean a ceiling effect is encountered when using instruments that are age appropriate (Borland, 1989;

Carter, 1991). For example, has a child who enters a program with scores at the 99th percentile and leaves the program in the same percentile range really made no gains during the year, or does the postintervention score reflect the limitations of the measure at its upper limit? Furthermore, there are no established criteria as to what the size of gain should be to determine whether a program or intervention has been successful. Measures of effect size, in addition to statistical significance, can assist in alleviating this problem. However, none of the interventions reported here included any effect size measures.

VanTassel-Baska et al. (1982) reported setting measurable objectives for their program, including such outcomes as “Program students will increase their vocabulary concept mastery by 10 percentile points as measured by the PPVT pre and post” (p. 47). They reported the mean score gains for the cohort but not individual scores or gains, despite mentioning that some individual results were outstanding. With such a small and exceptional sample, a single-subject design might prove a further option for experimental research in this area.

Some researchers (Mathews & Burns, 1992; Morgan, 2007) suggested that using quantitative measures of program effectiveness is simply too difficult and that qualitative measures such as parent, teacher, and student surveys and interviews provide rich data for program evaluation. Hertzog et al. (1999) noted that it is often “difficult to ‘see’ learning as it is happening, or to document the processes of thinking” (p. 44). They concluded that even without traditional pre- and posttest measures, teachers could report on student growth by documenting the experiences of children before, during, and after the intervention.

While the perceptions of participants and their parents are an important factor in a program’s success and effectiveness, curriculum decisions should not be based solely on perceived benefits without attempting to measure real gains in knowledge and skills. To be able to do this, a clear idea of what is being measured needs to be established. Conducting research that measures the effectiveness of interventions requires these interventions to have clearly articulated goals and outcomes. With gifted children, goals and outcomes can be difficult to define. Educators are working to extend and challenge children who are likely to have, in their areas of strength, already mastered and moved beyond the curriculum outcomes suitable for same-aged peers. Kitano and Perez (1998) suggested that the goals that are appropriate for young gifted children are often long term, individual, and hard to define operationally, such as prevention of later underachievement or development of intellectual risk taking. The measurement of gains or success in these areas and over such a period presents a challenge for researchers.

Karnes and Johnson (1987a) suggested that rather than cognitive goals, suitable objectives for gifted preschoolers include

- (a) a healthy self-concept and good self-esteem;
- (b) appropriate interpersonal skills;

- (c) a high level of curiosity and motivation to learn;
- (d) ability to persist at task;
- (e) willingness to take risks;
- (f) ability to engage in creative and productive thinking;
- (g) acquisition of higher level thinking process; and
- (h) ability to work independently and in groups. (p. 198)

Implications for Future Research

Effective delivery of interventions for young gifted children requires educators who understand the theory behind the particular intervention. The current gap between research in the field of gifted education and the day-to-day practice of educators was highlighted in a survey of practitioners conducted by Wadlington and Burns (1993). They found that although educators acknowledged that exposure to materials and concepts that would usually be deemed inappropriate for young children may be valid for the gifted, most were neither using such advanced materials nor teaching concepts that research had indicated were within the grasp of young mathematically advanced students, such as time and measurement. The ease with which interventions can be adopted in the regular early childhood setting should be a fundamental concern to researchers developing and trialing new interventions for young gifted children.

Karnes and Johnson's (1987a) evaluation of the three programs for young gifted children at the University of Illinois and an earlier review of conceptual models for young gifted children (Karnes et al., 1982) found that, despite differences in approach, each program showed measurable gains for the children involved. Karnes and Johnson (1987a) concluded that the differences in approach clearly supported the notion that there was no single best way to cater to the needs of gifted children. They did, however, suggest a number of common factors such as the importance of appropriate multicriteria identification of the children, parental involvement, ongoing assessment, linking of programming to assessment, programming that builds on strengths and promotes higher level thinking, and an emphasis on divergent thinking.

Surprisingly, only two studies relating to early entry to elementary school were located (Gagné & Gagnier, 2004; Obrzut et al., 1984), despite a number of well-known and oft-cited reviews and meta-analyses supporting its use with young gifted children (Kulik & Kulik, 1984; Proctor, Black, & Feldhusen, 1986; Rogers, 1992). It would appear that much of what we know about the effectiveness of early entry is based on studies conducted in the 1950s and 1960s. Given significant changes in early years educational strategies and pedagogy, coupled with Rogers' (1992) finding that the effect sizes for acceleration on the whole appeared to be declining in the period 1966-1988, this could well be an area ripe for further investigation.

It is also interesting to note that, with only one exception (Obrzut et al., 1984), the studies reported in this article appeared in gifted education journals rather than mainstream early childhood education or special education journals. Perhaps those working in the field of early childhood gifted education need to draw more fully on the experiences and research methods of colleagues working with young children in early childhood settings and young children with other special needs. If not, as White et al. (2003) suggested, we risk “the danger that practice remains limited by the particular ideas of those who are influential in the field and is self-perpetuating, and that other options are not considered” (p. vii). There were, for example, no single-subject designs reported in the research included in this review despite the design’s popularity with special populations and in disability research. A further search of gifted education publications revealed only one published single-subject design (Simonsen, Little, & Fairbanks, 2010). Swassing and Amidon (1991), Foster (1986), and most recently Simonsen and Little (2011) suggested that this design has particular appeal for research in gifted education.

Conclusion

It is clear that establishing evidence-based practice in early childhood gifted education is a challenging undertaking. Too much of what is written in the field is based on well-meaning opinions, attempts to extrapolate early childhood practice from research carried out on older children, or poorly designed studies. It would appear that one of the greatest shortcomings of gifted programs for young children is a lack of well-articulated and measurable goals. Past researchers have provided many suggestions as to what may constitute the most effective types of programs for young gifted children. The challenge now is to critically evaluate these suggestions. There is clearly a need for rigorous research that investigates the types of interventions and programs that deliver the best outcomes for young gifted children. Program philosophy, conception of giftedness, target population, and environmental factors will all influence the exact nature of these outcomes.

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Chapter 4

Publication No. 3: Are We Asking the Right Questions? An Analysis of Research on the Effect of Teachers' Questioning on Children's Language during Shared Book Reading with Young Children

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Abstract

A review of 20 experimental, shared book reading (SBR) interventions using questioning strategies with preschool children was conducted. The studies were analyzed in terms of their quality, focus, and the questioning strategies employed. Although there were few methodological concerns about the studies conducted, treatment fidelity and replicability of the reported interventions are raised as issues needing attention in future research. The impact of questioning strategies on language and pre-literacy skills tended to be a focus of the reported studies, with little investigation of the development of children's thinking skills through questioning, and there were few attempts to analyze children's responses to different types of questioning techniques. Across the reported studies, there was also a lack of consistency around the terminology associated with different kinds of questioning. The article concludes with discussion of implications for the use of questioning techniques in early childhood education practice and argues for research into the impact of different questioning techniques on children's cognitive development.

Keywords: open and closed questions, shared book reading, early childhood education, young children, early childhood teachers

Are We Asking the Right Questions? An Analysis of Research on the Effect of Teachers' Questioning on Children's Language during Shared Book Reading with Young Children

In early childhood education, a regular educational activity is shared book reading (SBR) in which teachers read aloud to children individually or, more commonly, in a group. SBR has been shown to have positive effects on children's vocabulary development (Sénéchal, LeFevre, Hudson, & Lawson, 1996), their emergent literacy (Rosenhouse, Feitelson, Kita, & Goldstein, 1997), and their later reading achievement (Bus, van IJzendoorn, & Pellegrini, 1995). A focus of the research on SBR has been on the ways teachers read in preschools to encourage young children to extend their vocabulary and comprehension as well as their knowledge of literary conventions (Teale, 2003). Although it has been demonstrated that frequent SBR by adults has positive outcomes for children (Sénéchal et al., 1996; Sénéchal, Thomas, & Monker, 1995; Teale, 2003), increasingly researchers are arguing that it is not just the frequency of shared book reading that is important; the quality of book reading, that is, how teachers read with children, also matters (Morrow, O'Connor, & Smith, 1990; Sénéchal, 1997; Teale, 2003).

Two important aspects of SBR that impact on outcomes for children relate to the amount and type of discussion initiated by the teacher during reading and the way in which a teacher reads, including the use of different types of questions (Teale, 2003). Teale suggested that questions should keep children engaged with the reading and that the best types of questions invited a variety of responses that required children to go beyond literal comprehension.

Danis, Bernard, and Leproux (2000) found that children were dependent on adults to drive the conversation during SBR towards higher levels of abstract thinking. The researchers suggested that the teachers were, in effect, creating a "zone of proximal

development” (ZPD; Vygotsky, 1978) for the children. Consequently, questions and children’s responses become particularly important as they are pivotal in gaining an understanding of a child’s current level of development and moving the child to the next level of cognitive challenge. The act of questioning is especially important in SBR with young children because questions, by their very nature, require responses, and through verbal responses children learn, practice and engage with language (Blank, Rose, & Berlin, 1978a; Zucker, Justice, Piasta, & Kaderavek, 2010).

Studies that have examined teachers’ questioning techniques during SBR fall into two broad categories: descriptive studies that focus on the ways in which teachers currently read storybooks to children, and experimental studies in which researchers evaluate reading styles in order to determine how teachers can read most effectively with young children. The findings from descriptive studies of SBR (e.g., Dickinson & Keebler, 1989; Dickinson & Smith, 1994; Hansen, 2004; Hindman, Wasik, & Erhart, 2012; Martinez & Teale, 1993; Zucker et al., 2010) have demonstrated overwhelmingly that early childhood teachers tend to ask lower order, literal questions that elicit one-word responses from children (Beck & McKeown, 2001).

With respect to questioning during SBR, Dickinson, McCabe and Anastopoulos (2003) found that teachers were focusing on less cognitively challenging questions and on the management of the story reading experience (children should sit, raise their hands when asking questions etc.). However, the percentage of higher order questions teachers asked, those requiring more than literal recall (Barden, 1995), increased with child age. Hindman, Connor, Jewkes and Morrison (2008) concluded that, although preschool teachers were more likely than parents to use higher order recalling, predicting, and inference-making talk, their levels of higher order questioning remained low. Similarly, Hindman et al. (2012) found substantial variation in the amount of decontextualized

(higher order) questions teachers used with Head Start children during SBR. Zucker et al. (2010) also found a considerable range in the number of questions asked during SBR, with 32% of teachers in their sample asking three or fewer questions. However, the proportion of lower order to higher order questions in their study was approximately equal. Together these findings present a pattern of inconsistent use of higher order questioning across the early childhood sector.

Although there have been previous reviews of the research related to SBR and emergent literacy (Bus et al., 1995; Gunn, Simmons, & Kameenui, 1998; Lennox, 2013; National Early Literacy Panel, 2008; Scarborough & Dobrich, 1994; Schickedanz & McGee, 2010), picture book reading with children aged 0 to 3 (Fletcher & Reese, 2005), and inferencing strategies (Dunst, Williams, Trivette, Simkus, & Hamby, 2012), to date no reviews of SBR have focused exclusively on the findings related to questioning interventions with children in the preschool years. The purpose of the current paper is to review the extant research on questioning strategies that teachers use during SBR, in particular research on the outcomes of those questioning strategies for children's language and cognitive development. The implications for early childhood teachers of using different kinds of questions when reading to young children are discussed, and directions for future research are suggested.

Method

Search Procedures

Searches of ERIC (Educational Resources Information Center) and PsycInfo (The American Psychological Association) databases were carried out using the following descriptors: "shared book reading", "joint book reading", "question*" and "early

childhood”, “preschool”, and “prior-to-school”. The reference lists of articles included in this review were also used to find additional published research in the field.

Selection Criteria

A publication had to meet certain criteria to be included in this review. First, the study had to be a primary research report and not a review of research or a description of an instructional approach. To increase the likelihood of quality research being selected, the research paper had to be published in a peer-reviewed journal. Second, the reported research had to have a focus on children aged 3-5 years as previous research had demonstrated that adults read differently to children under 3 years of age (Fletcher & Reese, 2005). Third, the intervention described in the research had to involve adults reading books with children and include a specific form of questioning technique. Fourth, the research had to be experimental in nature. Studies that reported naturalistic reading and questioning styles were not included. Finally, the studies that were focused on parents were eliminated, as the aim was to examine research that was conducted with teachers in order to evaluate the research and to make recommendations to teachers. Where a study included both teachers and parents, the findings for the research with teachers is reported. Twenty studies (three articles reported on two studies) were located that met the specified criteria (see Tables 1 and 2 for publication details and details relating to the participants, interventions, intervention outcomes and major findings). The selected studies have been marked with an asterisk in the reference list.

Analysis of Results and Discussion

A total of 17 articles that included 20 studies are reviewed here. Rather than report on results in a separate section, we have integrated the results and discussion in order to offer guidance for early childhood educators based on the available research. In the

reviewed studies, several important features, many of which are thought to be problematic, have been identified for analysis and discussion. These include (a) the focus of the research in relation to research participants, aspects of language outcomes targeted, and child responses; (b) the use of questioning including type of questioning and the terminology used to refer to question type, frequency of questioning, placement of questions and cognitive demand of questions; (c) group size; and (d) important quality features such as treatment integrity and study details enabling the replication of research. Also included in the discussion are the implications of the research findings for practice and suggestions for future research.

Focus of the Studies

There was a range of recurring themes that emerged during the analysis of the studies for this review. These included the focus on vocabulary and language development, the focus on children at-risk, and the relative lack of focus on the quality of children's responses.

Vocabulary and language development. In 18 of the 20 studies reviewed, questioning strategies were investigated as a means of improving language skills (e.g., expressive and/or receptive vocabulary, general language ability). This supports a similar finding by Lennox (2013) that the research on SBR has an emphasis on a narrow set of quantifiable skills.

The studies in which language skills were investigated can be divided into two distinct groups: studies in which the learning of specific novel words was measured (e.g., Ard & Beverley, 2004; Blewitt, Rump, Shealy, & Cook, 2009; Justice, 2002; Opel, Ameer, & Aboud, 2009; Sénéchal, 1997; Sénéchal et al., 1995; Strasser, Larraín, & Lissi, 2013; Walsh & Blewitt, 2006; Walsh & Rose, 2013), and studies where researchers were

concerned with overall increases in language skills (Hargrave & Sénéchal, 2000; Reese & Cox, 1999; van Kleeck, Vander Woude, & Hammett, 2006; Wasik & Bond, 2001; Wasik, Bond, & Hindman, 2006; Whitehurst, Epstein, et al., 1994). Studies concerned with specific vocabulary learning tended to rely on lower order questioning techniques aimed at providing a situation for the child to either say or hear the word in context. Researchers in these studies investigated the following: the most effective types of questions, eliciting and noneliciting questions, question placement, adult comments, and the cognitive demand level of the questions. These studies also tended to be shorter, tightly controlled, one-off experiments. Studies concerned with overall vocabulary development were, on the whole, longer interventions and used a greater variety of questioning techniques.

The majority of studies analyzed in this review had a clear emphasis on children's vocabulary acquisition for which the outcome measures were mostly of receptive and expressive vocabulary. The choice of measures used in particular studies is extremely important, not only from a measurement point of view, but also from the perspective of what they tell us about the researcher's underlying beliefs about children's language development (Morrow et al., 1990). In the case of the studies reported in this review, it is clear that SBR is viewed primarily as a way in which children can expand their vocabulary and develop pre-literacy skills. There is a lack of focus on thinking skills and even comprehension of the ideas presented in stories.

Children at-risk. Of the studies included, 13 (65%) focused on children described as at-risk of developing learning difficulties or from low SES backgrounds. This focus on children at-risk is understandable from the standpoint that research needs to support the development of effective language and literacy interventions for these children, especially given the importance of early literacy and language development for later success in school. However, given how little we know about questioning, it is

curious that more studies have not examined its effects on a broader range of children. An understanding of the development of typical, and even advanced, children might assist in isolating the effects of questioning and the learning environment.

Perhaps one reason for the focus on children at-risk is the incidence of Matthew effects reported in the research. The Matthew effect (Stanovich, 1986), whereby the more children know the more they learn, has been found in many of the studies related to vocabulary acquisition in shared reading (Justice, Meier, & Walpole, 2005; Penno, Wilkinson, & Moore, 2002; Sénéchal et al., 1995). That is, children who commence a study with a high level of vocabulary tend to learn more new vocabulary than children who have lower levels at the commencement of the intervention. In their review of SBR, the National Early Literacy Panel (NELP) suggested that there was a larger benefit found in studies with children who were not at-risk (NELP, 2008). Within the studies analyzed for this review there were mixed findings. Some studies (e.g., Sénéchal et al., 1995; Strasser et al., 2013) reported very evident Matthew effects and others (e.g., Blewitt et al., 2009; Walsh & Blewitt, 2006) reported none. In many cases SBR interventions are as seen as a way of “leveling the playing field” for children at-risk (Callaghan & Madelaine, 2012).

Children’s responses. One of the most surprising aspects of this review was the lack of analysis of children’s responses to adult questions. This seems particularly perplexing, given that the aim in most of the studies was to increase the children’s expressive language skills. Three studies analyzed children’s responses to questions during interventions, rather than measuring their language ability with a standardized instrument following the interventions. Examples of children’s responses or exchanges between adults and children were not provided in any study. Only Walsh and Rose (2013) examined the validity of the responses that the children gave to questions during the

intervention (i.e., did the children answer the questions correctly?) rather than administering a test of the new vocabulary at the end of the intervention

Some studies reported methodological problems, such as single camera positioning, that did not allow responses from individual children to be collected and analyzed. Other studies, such as those investigating vocabulary learning, reported the number of times a child produced a particular word but did not report the child's full response to a question. Further analysis of children's responses would allow researchers to better understand children's level of comprehension of different types of questions and of the story.

The Use of Questioning

A wide variety of terms was used when describing types of questioning techniques utilized in the studies. For example, some studies employed *dialogic reading*, as defined by Whitehurst, Epstein, et. al. (1994), as "an interactive style of adult-child shared picture book reading" (p. 544). The acronym CROWD (completion prompts, recall prompts, open-ended prompts, wh-prompts, and distancing prompts) was used to describe questioning techniques that form part of dialogic reading. Other terms used included the following: eliciting and noneliciting questions, high demand and low demand questions, perceptual and conceptual questions, open-ended and closed questions, and coherence and open-ended questions. Hindman et al. (2012) linked contextualized and decontextualized questions to Bloom's Taxonomy (Anderson et al., 2001) and stated that contextualized questions are lower order questions and decontextualized questions are higher order. Definitions of these terms are provided in Table 3.

In nine of the studies only lower order questioning strategies were used, with a combination of higher and lower order questions being reported in nine other studies.

Two studies focused exclusively on higher order questioning: Strasser et al. (2013) compared open-ended questions (those with more than one possible response) with coherence questions (cause and effect questions) in one experiment, and Blewitt et al. (2009) included a condition in which only high demand questions were asked. In five studies specific reference was made to using dialogic reading. Blewitt et al. defined dialogic reading as “a reading style in which adults ask low demand questions” (p. 295). However, Whitehurst, Epstein, et al. (1994) made specific mention of distancing prompts and open-ended questions as more complex forms of questioning in dialogic reading. Strasser et al. also referred to using a “dialogic style”, but their application of open-ended and coherence questions again appears more complex than some of the other applications of the dialogic intervention.

Definitional Issues. A problematic element that was revealed in this review was the variety of terms used to describe the questions employed in the studies. Some of these can be divided into a lower order and higher order dichotomy (see Table 3 for definitions of cognitive demand), whereas other terminology, such as eliciting and noneliciting questioning, focused on the responding child’s language production.

Higher order and lower order questioning. A wide variety of terms was used to refer to the cognitive demand of the questions used in the studies. These are defined in Table 3 and, although the definitions differ slightly, there is a uniformity in the way in which the dichotomous terms describe the concepts of low cognitive demand versus high cognitive demand: literal versus inferential, perceptual versus conceptual, contextualized versus decontextualized. All of the higher order questioning techniques rely, to some extent, on children using the top three levels of the revised Bloom’s Taxonomy (Anderson et al., 2001): analyzing, evaluating and creating.

One particular area of difficulty is the categorization of prediction questions, to which there is frequent reference (e.g., Strasser et al., 2013; van Kleeck et al., 2006; Wasik & Bond, 2001; Wasik et al., 2006). Typically these questions required children to predict, prior to reading, what the story was going to be about, or what was going to happen next in the story. These questions were cited as examples of higher order questions. However, if a child is already familiar with a book, then this type of prediction question elicits a simple recall of the story, which requires a much lower cognitive demand.

Open and closed questioning. Many of the studies referred to *open* and *closed* questioning. However, there was little consensus on how each was defined. In some studies closed questioning referred to those questions that elicited only a yes/no response (Wasik & Bond, 2001). In other studies closed questions were those that elicited only a single word response (Wasik et al., 2006). Other researchers refer to closed questions as those that have a limited range of answers and have a high level of constraint (Lee, Kinzie, & Whittaker, 2012). Open questions were defined as any question that was not a closed question (e.g., “questions that require more than a yes-no or a one-word response”; Wasik et al., 2006, p. 67), those that elicited extended language production (allowing more than a ‘yes’ or ‘no’ response, according to Wasik & Bond, 2001, p. 245); and “a question to which a number of different answers would be acceptable” (Lee et al., 2012, p. 569).

The differences in these definitions create ambiguity around the categorization of some questions. For example, *How is the girl feeling?* could be a closed or an open question, depending on the definition adopted and the response given by the child. If a child responded with *Sad*, then the question would be closed under the definitions of one-word or a limited range of answers. However, if a child responded *She’s feeling really*

sad because she lost her doll, then the response indicates that this is not a closed question. This is further complicated when the stimulus material is considered. For example, if the text in the book read: *The girl was feeling sad*, then the question is clearly a lower order and closed question. However, if the text read *She closed her eyes and sobbed*, then the question *How is the girl feeling?* becomes an open and higher order question because the child is required to infer the feelings of the girl from her actions. This ambiguity creates difficulties when comparing the outcomes of the studies and attempting to interpret findings across the field.

Strasser et al. (2013) investigated the difference between open-ended questions and coherence questions, with the latter defined as “questions about causality, goals, feelings and thoughts” (p. 630). Open-ended questions in the Strasser et al. studies were those that allowed the child to “make predictions, interpret pictures and make connections to their own lives and experiences” (Strasser et al., p. 633). However, Strasser et al. did acknowledge that coherence questions were, in fact, only one kind of open-ended question.

Other terminology. In studies investigating vocabulary learning (e.g., Walsh & Blewitt, 2006; Walsh & Rose, 2013), the terms *eliciting* and *noneliciting* questions are used. Eliciting questions are defined as those “that require children to respond using new vocabulary from the story” (Walsh & Blewitt, p. 274). For example, *What are the penguins gliding on?* (correct response/target word: *iceberg*), would be considered an eliciting question, whereas *Who is gliding on the iceberg?*, where *iceberg* is the target word, would be considered a noneliciting question as it does not require the child to produce the new word *iceberg*.

Differences in terminology reflect the differing aspects of questioning that researchers are examining. However, a common understanding of the cognitive levels of questioning and the ways in which questioning affects a child's language production would make comparison and evaluation of questioning techniques and their relative effectiveness much easier.

Level of cognitive demand. Where level of cognitive demand was employed as a variable, a ratio of approximately 70:30 lower order to higher order questions was used. The justification for this ratio comes from the ratio reported when parents read to children (van Kleeck, Gillam, Hamilton, & McGrath, 1997), but there appears to be no experimental research demonstrating whether this ratio is in fact effective, or whether other ratios might have an effect on children's language or cognitive development. It may be that different ratios are appropriate for different levels of ability.

Some researchers have linked level of cognitive demand in teacher questions to child age or ability (Blewitt et al., 2009; Reese & Cox, 1999), suggesting that younger and less able children needed more lower demand questions in order to learn new words. A "scaffold-like" condition, in which the cognitive demands of the questions moved from lower order to higher order, has proved more successful in developing deeper knowledge of the words than interventions that used higher or lower order questioning (Blewitt et al.). It is possible that the success of dialogic reading might be attributable to the dialogic reading style mimicking the scaffolding style (Blewitt et al.). That is, dialogic reading moves from low demand questioning about the book through to higher demand tasks such as asking the child to retell the story. Again, further research is needed to conclude whether this is the case.

Placement of questions. Some studies examined the placement of questions from the perspective of *interrupting* and *noninterrupting* questions (Reese & Cox, 1999; Strasser et al., 2013), or questions occurring before, during and after the story (Wasik et al., 2006). Findings were that the children who benefitted most from the noninterrupting questions were older preschoolers or those with more advanced initial skills (Reese & Cox). Interrupting the flow of the story to explain new words did not detract from story comprehension (Strasser et al.), and correlations have been found between question placement and vocabulary skills (Wasik et al.). However, other studies have found no effects for placement of questions and have even suggested that there is no theoretical reason to expect placement effects (Blewitt et al., 2009). Again, further research is needed to determine whether such a relationship does exist.

Frequency of questioning. No researchers investigated the number of questions as a variable, despite Karweit and Wasik's (1996) conclusion that asking too many questions may actually impede children's attention to the vocabulary and content of the story. As a result of their review of preschool reading studies, Karweit and Wasik called for research to examine the effects of variations in the types and number of questions asked during storybook reading.

Group Size

The size of the group during SBR is a contentious issue, with some researchers stating that smaller groups are more effective (Wasik, 2008). However, the social validity of small groups in early childhood settings has been questioned. Previous research (Dickinson et al., 2003) has suggested that whole group reading tends to be the norm and that this strategy is sometimes used as a transitional activity to engage children while

other activities are being prepared. This approach potentially detracts from the educational value of SBR and relegates reading to a management technique.

In eleven of the studies children were read to in a one-on-one condition. In four studies the effects of whole class readings were examined, and small group settings were used in another five studies. One-on-one interventions were more likely to be shorter, one-off experiments, with the whole class interventions and small group sessions typically being conducted over a longer period.

Milburn, Girolametto, Weitzman, and Greenberg (2014) questioned the generalizability of their study because their research had employed a ratio of 4:1, whereas all teachers in their sample worked in educational settings with an 8:1 ratio. In line with the mandated teacher-child ratios for their jurisdiction at the time, Hargrave and Sénéchal (2000) deliberately increased the group size in their dialogic reading interventions from 5:1 to 8:1, which was also recommended by Whitehurst, Arnold et al. (1994). Hargrave and Sénéchal found that the increased group size did not appear to have a detrimental effect. In fact, the children in the dialogic reading condition increased their expressive language by average gains of 4 months in the space of 4 weeks.

On the other hand, Whitehurst, Epstein, et al. (1994) had found previously that an increase in group size had made their dialogic reading intervention less effective. Their conclusion was that in-class reading was only effective in enhancing language skills for children from low-income homes when supplemented by frequent one-on-one reading with an adult.

In terms of optimal group size for reading, it may depend on the purpose of the reading. If the purpose is to elicit language from the children, then smaller groups in which all children have a chance to respond individually are likely to be more effective.

With regard to questioning at higher levels there is no research available on the early childhood years, but research in primary classrooms suggests that teachers tend to overestimate the number of children who are actually engaging in the questioning process, especially when a whole class approach is used (Wragg & Brown, 2002). This would suggest that smaller groups would be more advantageous; again, further research is needed. The degree to which children listen and learn from the responses of their peers in small groups also needs to be investigated.

Quality of the Studies

Two areas of concern were located within the reviewed studies. The first was the standard of treatment fidelity, that is, how we know that the teachers (or those administering the intervention) were actually doing what was required of them. The second, related concern involves the lack of sufficient detail reported to enable the intervention to be replicated.

Treatment fidelity. The importance of treatment fidelity is paramount in intervention research. It is crucial that the independent variable is manipulated exactly in the manner described in the research so that the effects of interventions can be fairly compared (Moncher & Prinz, 1991). Ways in which treatment fidelity can be increased include having a precise and operationalized definition of the independent variable, providing documented training in the implementation of the independent variable, using a treatment manual to ensure accurate implementation, and demonstrating systematic monitoring of the compliance of those implementing the treatment (Moncher & Prinz). Although explicit mention of treatment fidelity was made in 14 of the 20 studies, this was reported in different ways, and merely reporting attention to treatment fidelity does not ensure that the issue has been adequately addressed.

In the case of dialogic reading, Whitehurst, Epstein, et al. (1994) examined the application of the teacher behaviors described in the method (correction, completion prompts, labelling, praise, repetition, recall questions, ‘what’ questions, open-ended prompts, and distancing prompts) and found that teachers tended to use less of the more complex (open-ended and distancing) questioning strategies. This research was conducted through classroom visits by the researchers once every two weeks and a videotaped shared reading session. Although Whitehurst, Epstein, et al. addressed the issue of compliance extensively in their study, they did conclude that more systematic monitoring of the teachers would generate more consistent use of the strategies and higher teacher compliance.

Hargrave and Sénéchal (2000) also studied dialogic reading in the classroom. In their study the frequency of teacher “yes/no” questions, “wh” questions, fill-in-the-blanks questions and pointing requests were reported. Despite stating that dialogic reading also includes open-ended questions and expansion, the researchers did not report teacher use of these strategies. Likewise, Opel et al. (2009) reported on the application of dialogic reading but only mentioned training teachers in the use of “wh” questions. No data were reported about the frequency of use of different types of question. So, although dialogic reading was stated as the intervention used by the teachers in these three studies, it would appear that the method was applied in three quite different ways.

Moncher and Prinz (1991) stated that when treatment fidelity is not ensured then it is difficult to exclude potential contaminants as the cause for the intervention effect. For example, Whitehurst, Epstein, et al. (1994) suggested that as the dialogic reading intervention was teamed with a sound foundations program, it was difficult to determine the extent to which each of the interventions was responsible for the changes observed in children’s language skills. It may be that there are certain aspects of dialogic reading that

are more effective than others, but without further monitoring of the implementation of this style of reading, it is difficult to determine which aspects of dialogic reading are the most effective.

Ten studies reported using a training manual or some other sort of training for those who would be administering the intervention. In the cases where no training was reported, it was usually the case that a single experimenter, usually the first author, had administered the intervention. The studies that reported the most extensive training (videotape, manual, role play and monitoring) were those that employed dialogic reading.

Scripting the questions and comments made during an intervention is one way in which the likelihood of achieving treatment fidelity can be increased. Ten of the studies reported using scripted interventions. There was variation in how the application and measurement of adherence to the script was conducted. Seven of the studies reported no measures of adherence to the script. For example, Strasser et al. (2013) reported using a script, videotaping an unspecified number of scripts, and concluding that all readers followed the script “while at the same time reading in a natural manner” (p. 622). Similarly Ard and Beverley (2004) reported that the sessions had been reviewed by the second author and found to be “highly congruent” (p. 21) with the scripts. These vague descriptions do not allow the reader to make informed judgments about the degree to which the independent variable has been faithfully implemented.

More sound examples of the measurement of treatment fidelity were found in three of the studies. For example, Reese and Cox (1999) prepared reading protocols that included questions and comments for each of the three reading styles they examined. A sample of 96 readings (5% of readings) was recorded and compared against the scripts. Treatment fidelity was found to be $\kappa = .99$. Similarly, Walsh and Rose (2013) analyzed a

sample of recorded sessions, recording percentage agreement for the placement of the questions and adherence to the script, presentation of the novel words, and adherence to the predetermined comments. Justice (2002) employed an independent trained observer to code 24% of the recorded sessions for the presentation of new vocabulary and to ensure that novel words were not employed in commentary.

Treatment fidelity obviously remains a concern in this type of intervention research. Although there would appear to be some use of training as a method of promoting fidelity, adherence to the protocols of the training need be measured in order to ensure a high level of fidelity and confidence in the validity of the research outcomes.

Replicability of intervention. Interventions should be described in sufficient detail to allow replication (Wiersma, 1995). In the case of the dialogic reading interventions, the variability in the implementation of dialogic reading makes it difficult for the method to be reliably replicated. Indeed, the researchers in three studies mentioned above (Hargrave & Sénéchal, 2000; Opel et al., 2009; Whitehurst, Epstein, et al., 1994) appear to be applying differing interventions in terms of their application of dialogic reading. This in itself makes the effect of the questioning techniques applied in dialogic reading difficult to separate from other aspects of the dialogic reading method, such as encouraging the children to speak, repeating the child's utterances and providing the child with feedback. Hargrave and Sénéchal (2000) discussed this in their study, commenting that although "wh" questions were the most frequently used dialogic reading tool, there was a need for future research to disentangle the individual components of dialogic reading in order to determine their efficacy.

In the case of other interventions described in the target studies, those involving very discrete vocabulary appear to be the best described for replication. For example,

Walsh and Blewitt (2006) examined the difference between conditions of eliciting questions, noneliciting questions, and no questions on the vocabulary acquisition of young children. The experiment was tightly controlled with the exact number of presentations of each word reported.

Implications for Practice

In light of the literature, then, are we asking children the right questions? It would appear from the descriptive studies that early childhood teachers, without training, do not often question children in the most effective ways to support their language learning. Although there is only a small body of research, it would appear that some tentative implications for practice can be drawn. First, the ways in which teachers read to children during SBR need to be carefully planned if they are to be effective. Second, teachers need to consider the outcomes they are aiming for when planning their reading style and questioning strategies. Finally, greater understanding by teachers of the effects of different questioning practices on language learning will assist them to modify their SBR strategies to develop language abilities of children in their care.

As Reese and Cox (1999) remind us, the way in which we question children when reading with them depends on our aim. If learning and acquiring new vocabulary is the aim, then the research suggests that teachers should start with low demand questions and move to higher order questions. Both lower order and higher order questioning help children to learn new vocabulary, and the scaffold-like condition described by Reese and Cox appears to promote more in-depth learning and understanding of the words.

The way in which teachers employ questioning needs to fall within the child's ZPD. That is, if the questioning technique is too difficult then the child may feel anxious and frustrated, whereas if the questions are too easy the child may feel bored and disengaged,

with less learning taking place. Therefore, children with a low level of ability may gain more benefit from easier (lower order) strategies, whereas children with a high level of ability may need more higher order and cognitively challenging strategies (Reese & Cox, 1999). Lack of engagement, as reported by Strasser et al. (2013), needs to be addressed for children with both low and high levels of ability.

The best ways to read with—and question—young children may in fact be related to the characteristics and skills of the child (Hindman et al., 2008). Individualizing questions can become difficult when reading to a large group, so teachers could take advantage of the flexibility of the early childhood classroom to read with small groups of children with similar levels of cognitive development. The reading style and aim could then be tailored to individual needs.

The findings of studies in which teachers' questioning behaviors were changed suggest that training can assist teachers to develop a wider and more effective range of questioning techniques (Hargrave & Sénéchal, 2000; Lee et al., 2012; Milburn et al., 2014; Wasik et al., 2006). Developing these skills requires time, planning and feedback. Teachers aiming to move their questioning to a higher level should plan some higher order thinking questions before reading with children. Additional benefits were found for the children in the classrooms where teachers modified their questioning techniques to include higher order questions. Children appeared more engaged in the book reading experience (Milburn et al.), used more vocabulary and more complex syntax (Lee et al.) and performed better on tasks of receptive language (Wasik et al.).

Directions for Future Research

In the studies reported here, many aspects of questioning were investigated, including level of demand, placement of questions, group size, and frequency of questioning. In many cases, too few studies have been conducted to allow reliable

conclusions to be made about the existence of relationships between specific aspects of questioning and outcomes for children. Often questioning has been included as one part of an intervention and, therefore, the precise effects of the questioning intervention are lost among the effects of other parts of the intervention (Lee et al., 2012). Further research that disentangles the effects of questioning from other aspects of story reading would assist teachers in choosing the most effective questioning procedures.

Two thirds of the studies reported in this paper focused on remediating and preventing future difficulties, especially for children with delayed language or those living in poverty. Although some of the reported research suggests these children should be read to in a specific way that focuses on developing their language abilities, there is still much to be learned from research conducted with typically developing children and those from more enriched backgrounds. There is also a need for research with children whose language abilities are advanced, because it may be that the cognitive needs of these children are not being met by teachers' tendency to ask lower level questions. Hindman et al. (2008) hinted at this when speculating that a lack of increase in vocabulary scores for children in the top quartile might mean that children with advanced skills had not received sufficient advanced instruction to move their skills forward.

Reference to the children's behaviors during the reading process was made in few of the studies. However, Strasser et al. (2013) measured the attentiveness of children to SBR in two different reading styles by analyzing the children's gaze at regular intervals throughout the story reading sessions. They found that children in their coherence (cause and effect) question condition were paying significantly less attention than children in the open-ended (prediction, interpretation and connection questions) condition, despite the fact that children in the coherence condition demonstrated significantly better story comprehension skills on a posttest of the story content. The authors suggested that the

open-ended questions, which they thought were more typical of the types of questions asked in early childhood contexts, were more intrinsically interesting to the children.

Further research would be needed to see whether or not this is the case.

The only other study to mention issues of child attentiveness during SBR was that conducted by van Kleeck et al. (2006). These researchers reported difficulty in engaging children in the questioning process, although they suggested that this was not uncommon when working with children with learning difficulties. This study reinforces the need for further research into the interaction between children's abilities, attentiveness and type of questioning technique in SBR.

There appears to be no research investigating how preschoolers respond to higher and lower order questions during SBR. Are preschoolers able to comprehend and answer higher order questions? And if they can, are the responses more complex than their responses to lower order questions? Common sense would suggest so, but research with older children has produced curiously contradictory findings, indicating that level of question matches level of response only about 50% of the time (Dillon, 1982; Mills, Rice, Berliner, & Rousseau, 1980). The lack of experimental research that investigates children's actual responses to different questioning styles is a serious gap in the current literature. It is, perhaps, time that we started to listen to and examine the responses that children are giving in response to teacher questioning.

Conclusion

In conclusion, there appear to be too few studies to allow any generalizable comments about the optimal level of demand, placement of questions, frequency of questioning or group size. However, the research would tend to support the idea that different questioning strategies need to be employed based on the children's age, ability

and the outcomes sought by the teacher. One component to helping early childhood teachers to generate and ask the most effective types of questions during SBR is professional development. Having an awareness of the range of questioning types that exist and their relative merits and applications can assist early childhood teachers to choose and ask the right questions.

The current body of research in the field has focused on language skills to the exclusion of thinking skills and comprehension of the ideas presented in storybooks. This gap in the literature needs to be addressed.

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Table 1
Overview of Reviewed Studies in Chronological Order

Author/s & Journal	Research Design	Dependent Variable/s	Measures	Question Types	Major Findings
Whitehurst, Epstein, et al. (1994), <i>Journal of Educational Psychology</i>	QE	Receptive vocabulary; Expressive Language	PPVT-R; EOWVT; expressive subscale of the ITPA; 18 subscales from the DSC.	Dialogic reading (low demand)	Dialogic reading (at home and school) led to better language outcomes for children whose parents were also involved in the program.
Sénéchal, Thomas, & Monker (1995), <i>Journal of Educational Psychology</i>	QE	Targeted vocabulary	Researcher-devised tests of comprehension vocabulary and production vocabulary	Lower order (labeling), what/where questions related to target words	Study 1: Children produced more target words when questioning was used, regardless of initial ability. Children were more likely to correctly identify a target word when they had spoken it in the SBR session. Children with higher initial vocabularies learned more words than children with lower vocabularies. Study 2: Pointing to new words was as effective as labelling words. Children in the labeling condition were better at producing the words.

Sénéchal (1997), <i>Journal of Child Language</i>	QE	Targeted word learning	Researcher-devised tests of expressive and receptive language – related to the target words	Lower order (labeling), What/Where questions related to target words	Children’s vocabulary increased more with repeated exposure to stories. Use of questioning to elicit the target word increased both expressive and receptive scores.
Reese & Cox (1999), <i>Developmental Psychology</i>	TE	Receptive vocabulary	PPVT-R; adaptation of comprehension test from Beals & Temple (1993)	Low demand (describer style); Higher demand (comprehender style); High demand (performance-oriented style)	Describer style appeared to have more benefit for receptive vocabulary. Children with high initial vocabulary scores increased vocabulary with a performance-oriented style.
Hargrave & Sénéchal (2000), <i>Early Childhood Research Quarterly</i>	QE	Vocabulary	PPVT-R; EOWPVT-R; researcher-designed test of new words	Wh-questions, open-ended questions (dialogic reading)	Children in dialogic reading intervention made larger gains on expressive and specific vocabulary measures.
Wasik & Bond (2001), <i>Journal of Educational Psychology</i>	QE	Targeted vocabulary	PPVT-III; researcher-devised receptive language measure using target words; a measure of expressive language using different target words to the	Open-ended questions and questions designed to elicit the target vocabulary	Children in interactive SBR experience learned more new words than children in control group.

Justice (2002), <i>Reading Psychology</i>	TE	Receptive and expressive vocabulary	Researcher-devised expressive and receptive measures of target words	Perceptual and conceptual questions about novel words	Children in labelling condition able to correctly identify more novel words than children in questioning condition. No difference in expressive ability. No differences between perceptual and conceptual questioning conditions.
Ard & Beverley (2004), <i>Communication Disorders Quarterly</i>	QE	Novel words	Researcher-devised expressive and receptive measures of nonsense words	Questions designed to elicit the target words	SBR interventions with questions, comments, or questions and comments resulted in children learning more nonsense words than repeated book readings without comments or questions. No differences between questioning and commenting interventions were found.
van Kleeck, Vander Woude, & Hammett (2006), <i>American Journal of Speech-Language Pathology</i>	TE	Language	PPVT-III; PLAI	70% literal questions; 30% inferential questions	Children in intervention demonstrated greater growth in literal language and inferential language skills than children in control group.
Walsh & Blewitt (2006), <i>Early Childhood Education Journal</i>	TE	Receptive and expressive vocabulary	PPVT-III; NWCT; NWPT	Questions to elicit target words; questions using target word, but not	Vocabulary eliciting questions did not appear to be more effective than noneliciting questions in increasing receptive and expressive vocabulary.

Wasik, Bond, & Hindman (2006), <i>Journal of Educational Psychology</i>	QE	Receptive and expressive vocabulary	PPVT-III; EOWPVT-III; alphabet knowledge measure	Open-ended questions designed to elicit conversation	Children in intervention had significantly larger vocabularies than children in control at the end of intervention period.
Blewitt, Rump, Shealy, & Cook (2009), <i>Journal of Educational Psychology</i>	TE	Targeted word production and comprehension	Study 1: PPVT-III; EOWPVT-III; NWPT; NWCT Study 2: PPVT-III; NWCT; (NWDT)	Study 1: Low and high demand questions; interrupting and noninterrupting questions. Study 2: High demand only, low demand followed by high demand (67% low demand to 33% high demand)	Study 1: More advanced children retained more vocabulary than less able children. No effect for level of demand or placement (interrupting vs. noninterrupting) of questions. Study 2: No effect on comprehension scores for any condition. Low demand questions followed by high demand questions resulted in better elaborated understanding of meaning of target words.
Opel, Ameer, & About (2009), <i>International Journal of Educational Research</i>	QE	Expressive language	Researcher-designed vocabulary definition test	Wh-questions, word definition questions and cause and consequence	Children in intervention learned more target vocabulary than children in control group.

		questions (dialogic reading)		
Lee, Kinzie, & Whittaker (2012), <i>Teaching and Teacher Education</i>	QE	Student language (verbal productivity, lexical diversity and syntactic complexity); number of teachers' open-ended questions	PPVT-IV, measures of verbal productivity, lexical diversity and syntactic complexity	Open-ended questions Teachers in training intervention asked more open-ended questions. Children in intervention used more complex language than those in control group.
Strasser, Larrain, & Lissi (2013), <i>Early Education and Development</i>	TE	Story comprehension, vocabulary	Researcher-devised pre-test of target vocabulary words (Study 1 only); Spanish language version of PPVT; researcher-devised narrative comprehension task; researcher-devised measure of attention (Study 1 only)	Coherence questions Study 1: Elaborative style of reading focusing on difficult vocabulary had a positive effect on preschool children's story comprehension. Study 2: Children asked coherence questions scored better on story comprehension.

Walsh & Rose (2013), <i>Journal of Research in Childhood Education</i>	TE	Receptive vocabulary	PPVT-III; SWCG	Low demand vocabulary eliciting and vocabulary noneliciting questions	Children in noneliciting intervention had higher novel word and receptive vocabulary scores.
Milburn, Girolametto, Weitzman, & Greenberg (2014), <i>Journal of Early Childhood Literacy</i>	TE	Number of open- ended questions asked by educators, number of different words used by children, length of story reading session	SALT	Open ended questions	Teachers in intervention group used significantly more open ended questions and responsive comments than those in control group.

Note. TE = True experimental; QE = Quasi-experimental; PPVT= Peabody Picture Vocabulary Test; EOWVT = Expressive One Word Vocabulary Test; ITPA = Illinois Test of Psycholinguistic Ability; DSC = Developing Skills Checklist; PLAI = Preschool Language Assessment Instrument; NWCT =New Word Comprehension Test; NWPT = New Word Production Test; NWDI = New Word Definition Test; SWCG = Researcher-devised Seasonal Word Comprehension Game; SALT = Systematic Analysis of Language

Table 2
Additional Features of the Reviewed Studies in Chronological Order

Authors	Participants	Period of intervention	Group size
Whitehurst, Epstein, et al. (1994)	167 children aged 4y in Head Start – low income group	3-5 times per week for 1 school year	Group (1:4)
Sénéchal, Thomas, & Monker (1995)	Study 1: 32 children $M=4y$ 10m, middle-class Study 2: 48 children M (high language) = 4y 0m; M (low language) = 4y 1m, upper-middle class	Study 1 & 2: 3 sessions each	One-on-one
Sénéchal (1997)	60 children in two groups of 30. Group 1: $M=3y$ 6m; Group 2: $M=4y$ 8m. Both groups middle-class	1-2 25 minute sessions depending on intervention	One-on-one
Reese & Cox (1999)	50 children, 4y 0m to 4y 10m, working class	2-3 times per week for 6 weeks	One-on-one
Hargrave & Sénéchal (2000)	36 children; aged 3-5 $M=4y$ 1 m; low income, 6 teachers	Daily for 10 minutes for 4 weeks	Group (1:8)
Wasik & Bond (2001)	127 children, $M=4y$ 3m, low income (Title 1); 4 teachers	15 weeks	Group (approx. 1:30)

Justice (2002)	23 children, $M=3y$ 11m no SES reported	1 week	One-on-one
Ard & Beverley (2004)	40 children, 3-5 years of age, no SES reported	4 sessions	One-on-one
van Kleeck, Vander Woude, & Hammett (2006)	30 children $M=4y$ 2m, low-income (with language impairments)	Twice weekly for 15 mins for 8 weeks	One-on-one
Walsh & Blewitt (2006)	35 children 3y, middle- to upper-middle class	6 week period	One-on-one
Wasik, Bond, & Hindman (2006)	207 children, $M=3y$ 10m, Head Start, 16 teachers	Once daily for 9 months	Group (approx. 1:11)
Blewitt, Rump, Shealy, & Cook (2009)	Study 1: 60 children, 2y 10m to 4y 1m Study 2: 50, 3y 0m to 3y 11m, middle- to upper-middle-class	4 sessions in each study	One-on-one
Opel, Ameer, & Aboud (2009)	153 children $M=5y$ 5m, rural Bangladeshi (Low income)	4 weeks	Group (1:20-25)
Lee, Kinzie & Whittaker (2012)	No. of children not recorded ($M=4.5$ y, low SES (at-risk) 25 teachers	Full academic year	Class group size not stated

Strasser, Larrain, & Lissi (2013)	Study 1: 72, Study 2: 95 M=4y 2m, medium to low SES	Studies 1 & 2: 3-4 weeks	Group (1:4-6)
Walsh & Rose (2013)	45 children M=4y 3m, Head Start (low SES)	6 weeks	One-on-one
Milburn, Girolametto, Weitzman, & Greenberg (2014)	76 preschool children, M=4y 7m, 75% low income families, 20 teachers	8 weeks	Group (1:3-4)

Table 3
Definitions of Questioning Terminology Used in the Reviewed Studies

Lower Order	Higher Order
<p><i>Low Demand</i> “focus on describing story and picture content” (Blewitt et al., 2009, p. 295).</p>	<p><i>High Demand</i> “require some degree of decontextualization or distancing from the story itself, encouraging inferences about why an event happened or about characters’ feelings, explaining the meaning of a word, making predictions, or relating a story element to personal experience” (Blewitt et al., 2009, p. 295).</p>
<p><i>Literal</i> “focus on identifying or recalling information directly presented in the text or accompanying pictures” (van Kleeck et al., 2006, p. 86).</p>	<p><i>Inferential</i> “go beyond what is stated directly in the text or shown in the pictures” (van Kleeck et al., 2006, p. 86).</p>
<p><i>Contextualized</i> (also known as immediate or concrete) “refers to information that is apparent on the pages of the book, addressing content directly related to the here and now of the story” (Hindman et al., 2012, p. 453). Includes labelling, describing, explaining what is happening.</p>	<p><i>Decontextualized</i> (also known as nonimmediate or abstract) “uses the story as a springboard or jumping-off point connecting the story to the larger world or the body of children’s experiences by adding information or drawing inferences or conclusions” (Hindman et al., 2012, p. 453). Includes strategies such as prediction, summarizing, connection to outside events.</p>
<p><i>Perceptual</i> “questions ask children about concrete perceptual features of the text or illustration” (Justice, 2002, p. 90).</p>	<p><i>Conceptual</i> “questions require children to make judgments, predictions or explanations about concepts depicted in the text or illustrations” (Justice, 2002, p. 90).</p>

Chapter 5

Publication No. 4: Evaluating Interventions for Young Gifted Children using Single-Subject Methodology: A Preliminary Study

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Evaluating Interventions for Young Gifted Children Using Single-Subject Methodology: A Preliminary Study

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Abstract

Single-subject experimental designs have long been used in special education to evaluate the effectiveness of interventions for exceptional children. However, the design has not been used widely in gifted education. In this article, an overview of the main features of single-subject design is presented, and its potential for application in gifted education is discussed. The article concludes with a report of a preliminary single-subject study, conducted with a young gifted child, in which the effects of higher order questioning are investigated.

Keywords

gifted, single-subject design, young children, questioning

Single-subject research designs (also known as single-case, intrasubject, and $N = 1$ designs) have a long history in special education (Barlow & Hersen, 1984; Kennedy, 2005; Riley-Tillman & Burns, 2009; Tawney & Gast, 1984). Despite calls for single-subject designs to be used in gifted education (Foster, 1986; Simonsen & Little, 2011; Swassing & Amidon, 1991; Tieso, 2009), a search of the literature revealed only one published single-subject design (Simonsen, Little, & Fairbanks, 2010). The main features of single-subject experimental research and its appropriateness for use in the field of gifted education are presented in this article, followed by an example of its application in the form of a pilot study conducted with a young gifted child.

Main Features of Single-Subject Design

The fundamental approach of single-subject design is to study individuals in a nontreatment (baseline) condition, and in a treatment condition, with measurement of the dependent variable systematically applied across both conditions. Single-subject designs have the potential to demonstrate a strong cause-and-effect relationship. Provided that the experiment is well designed and the dependent and independent measures are defined operationally and reliably implemented, we can be relatively sure that the changes in behavior in the subject are a direct result of the intervention. Although the term *single-subject* might seem to suggest that only one subject is studied, it in fact refers to the method by which the results are presented and analyzed, that is, on an individual basis. Single-subject design is quantitative and experimental in nature and should not be confused with case study approaches, which are qualitative research methods.

A variety of different types of designs are used in single-subject research, but according to Neuman and McCormick (1995), there are some features common to most single-subject designs. These are outlined in Table 1. Riley-Tillman and Burns (2009) have stated that in an educational context, single-subject designs allow educators to make research-based observations and judgments about the effectiveness of interventions. One major limitation of single-subject designs is poor external validity. Generalizability of results can only be obtained by replication with other subjects and in different settings. Simonsen and Little (2011) have offered an excellent and detailed discussion of the different types of single-subject designs, along with potential applications for gifted education.

The Usefulness of Single-Subject Designs in Gifted Education

Those working in the field of gifted education have long advocated the importance and effectiveness of individualized approaches to instruction for children displaying gifted behaviors (Rogers, 2002). There is, however, little research that reports on the effectiveness of interventions used with

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Table 1. Single-Subject Design Features.

Common Features of Single-Subject Design Suggested by Neuman and McCormick (1995)

1. Baseline data are collected before the intervention (independent variable) is introduced.
2. Data are collected frequently and over a period of time while the independent variables are manipulated.
3. The experimental procedures and data collected are controlled, rather than using control groups. In this way the subject acts as his/her own control
4. Interobserver data are collected for the dependent and independent variables.
5. Data are presented in graphical form. Using specific guidelines, data are analyzed using visual inspection.
6. Maintenance data may be collected after the main study has been completed in order to report the ongoing effects of the intervention.

gifted students (Johnsen & Ryser, 1996; Jolly & Kettler, 2008; White, Fletcher-Campbell, & Ridley, 2003; Ziegler & Raul, 2000). One of the main reasons that a single-subject approach may be appealing to educators in gifted education is the lack of homogeneity within the gifted population. Just as children with different disabilities manifest different symptoms and behaviors, not all intellectually gifted children behave and react in the same way to educational interventions. The tendency of researchers to use group comparisons, in which results are averaged, can in fact mask the effectiveness, or lack thereof, of certain interventions for gifted individuals (Barlow & Hersen, 1984; Neuman & McCormick, 1995). Single-subject research allows the researchers to carefully examine the effectiveness of the intervention for the individual child.

Gifted education research is often criticized for having small sample sizes (Ziegler & Raul, 2000). The exceptional nature of the population can make finding suitable children difficult (Walsh, Kemp, Hodge, & Bowes, 2012). This can mean that studies with large sample sizes are restricted to being conducted in areas or contexts where large groups of gifted children are readily found, for example, in city high schools where there are numbers of gifted students already grouped for instruction. In the field of early childhood, where children may be in a variety of settings prior to school, it is also difficult to obtain sufficiently large sample sizes (Walsh et al., 2012). Generally, successful single-subject research can be achieved with small sample sizes; the power of the design is the potential to achieve high levels of internal validity through this type of research (Simonsen & Little, 2011). Replication of the experiments can be used to provide evidence for generalizability.

Ethical concerns can be problematic in educational research when a group is denied access to an intervention (Barlow & Hersen, 1984; Riley-Tillman & Burns, 2009). For example, random assignment of gifted children to either an

enrichment intervention class, or to a regular class, in order to compare the educational effectiveness of the enrichment class means that a whole group of gifted students are deprived of potentially appropriate instruction. The use of single-subject research eliminates this dilemma by ensuring that all participants involved in the research experience the intervention.

Finding suitable control and/or comparison groups for large group experiments can also be challenging, especially in gifted education, as it can involve recruiting and tracking gifted children not involved in a gifted program. In a single-subject design, the subject acts as his/her own control, thereby eliminating the need for a control group. In the following section, a single-subject study, in which a differential questioning intervention was implemented, is reported. This study, which included a young potentially gifted child, allowed the viability of a single-subject design for the population of young gifted children to be tested.

Rationale for Study

Using questioning strategies to facilitate higher order thinking is frequently cited as a recommended practice for use with young intellectually gifted children (McCollister & Saylor, 2010; A. Robinson, Shore, & Enersen, 2007). Despite this, there is no research that has investigated the effectiveness of higher order questioning techniques with gifted children in the early childhood context (Walsh, Kemp, Hodge, & Bowes, 2012). Current research in early childhood education has generally found that early childhood professionals tend to use lower level thinking questions (Siraj-Blatchford & Manni, 2008) and that cognitively challenging talk is infrequent in early childhood settings (Massey, 2004). For example, Massey found that the teacher talk associated with storybook reading in preschool classrooms tended to focus on organizing the reading task, asking students for simple feedback and on naming activities. Although Zucker, Justice, Piasta, and Kaderavek (2010) found that preschool teachers tended to use more cognitively challenging questions when reading informational texts as opposed to narrative texts, Bortenem (2008) suggested that the majority of books read to young children in early childhood settings are likely to be narrative fiction.

Siraj-Blatchford and Sylva (2004) suggested that quality child care is linked to teachers and children engaging in "sustained shared thinking," that is, "an interaction where two or more individuals 'work together' in an intellectual way to solve a problem, clarify a concept, evaluate activities, or extend a narrative" (Siraj-Blatchford & Sylva, 2004, p. 718). This was found to occur more often when effective questioning techniques were used. Although commonsense would suggest that asking a higher order question should elicit a higher order response (Barden, 1995), research has been equivocal on whether or not this is true in practice, with some researchers suggesting that the level of student response corresponds to teacher question only about half the time (Dillon, 1982). Using a single-subject methodology, the

purpose of the study reported below was to investigate whether asking higher order thinking questions would produce more complex answers from one young potentially gifted child.

Method

Participant

Three children, two girls and one boy, were nominated by the director as having advanced intellectual development and all three were assessed on the Peabody Picture Vocabulary Test, Version 4 (PPVT-4; Dunn & Dunn, 2007) and Raven's Coloured Progressive Matrices (CPM). Rose (a pseudonym) was selected for the study based on her score of 138 (99th percentile) on the PPVT-4. She scored at the 50th percentile on the CPM. The other two children did not fall in the gifted range on either instrument. Rose's age at the commencement of the study was 4 years and 11 months.

Following Rose's assessment, parent validation was sought through use of Saylor's Things My Young Child Has Done questionnaire (Saylor, 2003), which was completed by her father. The Saylor questionnaire consists of 15 items describing various research-based characteristics of young gifted children (e.g., uses advanced vocabulary, has an advanced sense of humor) that parents are required to rate on a scale of 0 (*strongly disagree*) to 10 (*strongly agree*). Space is provided for parents to record personal examples of each behavior. Rose's father strongly agreed that Rose had quick and accurate recall of information, intense curiosity, and used advanced vocabulary. The only items on which he scored Rose lower than 7 out of 10 were early motor development, which he stated he was unsure about, and leadership abilities. He provided examples of Rose's advanced development from early childhood including that she could already read and write many words and that these were mainly self-taught. The results of this questionnaire supported the child care center director's nomination and the results of the PPVT-4. Rose's parents both held PhDs and English was her first and only language.

Setting

The study was conducted in a university-based child care center catering for children aged 6 weeks to 5 years. The center had a strong child-centered, play-based, and antibias approach to programming, along with staff-to-child ratios of 1:6, in excess of state-mandated requirements. Most children at the center had at least one parent who was employed at the university in either an academic or general staff role. Rose attended the child care center 4 days per week.

Experimental Design

A single-subject reversal design (ABA) was used in this study. In a reversal design, a baseline (A) is established, the

intervention (B) is applied, and finally the intervention is withdrawn and there is a return to the baseline (A) condition. This design was chosen as it was not anticipated that learning following the intervention would persist after the withdrawal of the treatment. In some circumstances, a reversal design is not possible, as the skills taught during the intervention phase are impossible to reverse, for example, teaching reading or spelling strategies. In this case, however, the higher order questioning technique could be confidently withdrawn. Typically, in single-subject research, the research will be replicated with one or more participants. As this was a preliminary study, designed to trial the intervention, materials, and methodology, only one participant was included for this phase of the research.

Independent Variable

The intervention included in the treatment phase of the research involved the use of higher order questioning during a one-on-one story reading session. Higher order questions were defined by Barden (1995) as "those that require more than simple recall to produce an answer" (p. 423). Barden defined lower order questions as "those that require responses either recalled directly from memory or cited explicitly in text" (p. 423). All questions were open-ended. Lower level thinking questions, which were the only questions used during the baseline phase, were constructed using the first three levels of Bloom's Taxonomy (Anderson et al., 2001): Remembering, Understanding, and Applying. The higher order thinking intervention questions were constructed using teaching strategies from Frank E. Williams's (1972) *Total Creativity Program for Individualizing and Humanizing the Learning Process*. Although Williams acknowledged that the model was not designed specifically for use with gifted children (Williams, 1993), and a search of the literature in gifted education revealed no studies in which its application with gifted children was evaluated, these strategies were chosen as they had been identified previously as suitable for use with intellectually gifted children (Gross, Macleod, Drummond, & Merrick, 2001; Maker, 1982; Maker & Nielson, 1995; Maker & Schiever, 2005; VanTassel-Baska, 1994) and because of their perceived novelty in the prior-to-school setting. The teaching strategies chosen were Analogy, Provocative Question, Paradox, Attribute Listing, and Tolerance for Ambiguity. Definitions and examples of the questioning techniques appear in Table 2.

Dependent Variable

Complexity of answer was determined by measuring mean length of communication unit. Communication units or c-units were defined by Loban (1976) as "each independent clause with its modifiers" (p. 9). For example, "I see a dog" is a single c-unit, as is "I see a dog with yellow and brown fur" as the phrase "with yellow and brown fur" makes no sense without the initial sentence "I see a dog." However,

Table 2. Examples of Lower Level and Higher Order Questioning Techniques.

Level of Questioning	Type of Questioning Technique	Example
Lower level	Remembering—Exhibit memory of previously learned materials by recalling facts, terms, basic concepts and answers	Why didn't Cinderella go to the ball?
	Understanding—Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas	How did Cinderella manage to get to the ball in the end?
	Applying—Solve problems, apply to new situations by applying acquired knowledge, facts, techniques and rules in a different way	Why did the Prince fall in love with Cinderella?
Higher order	Analogy—Situations of likeness; similarities between two things	How is Cinderella like a butterfly?
	Provocative Question—Inquiry to bring forth meaning; summons to discovering new knowledge	What would happen if we all had a fairy Godmother?
	Paradox—A situation opposed to common sense, self-contradictory statement, or observation	Can ugly people be beautiful? Why? Why not?
	Attribute Listing—Inherent properties, ascribing qualities	What are the important qualities of a fairy Godmother?
	Tolerance for Ambiguity—Pose open-ended situations which do not force closure	How might the story have been different if Cinderella had not lost her slipper?

Note. Types of questioning techniques adapted from Williams (1993).

the phrase “I see a dog and it has yellow and brown fur” would be considered two c-units as the second part of the phrase “it has yellow and brown fur” can stand alone.

Loban (1976) conducted longitudinal research that demonstrated that the mean number of words per c-unit increased as children matured. This meant that linguistic development could be measured through the increase in the number of words per c-unit. Furthermore, Loban found that there were differences between the mean number of c-units used by high-achieving and low-achieving children. High-achieving children were between 1 and 3 years ahead of a control group of randomly assigned children as measured by the number of words they produced per c-unit. For example, in first grade Loban's high-achieving children were producing, on average, 7.91 words per c-unit, whereas the random group children were producing just 6.88, and children in the low-achieving group less than 5.91. By sixth grade this had increased to 10.32 for the high achievers, 9.82 for the random group, and 8.57 for the low-achieving group.

Loban (1976) stated that although a high mean number of words per c-unit might simply indicate verbosity, his research suggested otherwise, with high mean c-unit being linked to more effective use of complex language. In the example above, “I see a dog with yellow and brown fur” is considered a more mature and complex utterance than “I see a dog and it has yellow and brown fur.” The mean length of c-unit was calculated by dividing the number of words uttered by the

number of c-units for each session. This technique has been used in analyzing the complexity of children's responses to storybook reading (Kertoy, 1994), the complexity of response to questioning (Smith, 1977), and production of analogies (Rummel & Dykstra, 1983) with elementary school-aged children.

Other Study Variables

Other variables that could arguably have an impact on the dependent variable were also measured. These were the length of each storybook session and previous exposure to storybooks. It was hypothesized that previous exposure to the storybook might produce more complex answers in the treatment phase as the child might have already discussed the book with adults. Given that gifted children usually have excellent memories, it would not be unreasonable to suggest that these possible conversations and interpretations may well have been remembered and translated into more complex answers to questions in the treatment phase. The length of the storybook reading session could have affected the dependent variable in a variety of ways; if a session were particularly long, the child may have experienced a fatigue effect and, therefore, the quality of answer may have been diminished or, alternatively, the length of the session may indicate that the child was particularly engaged and verbose during that particular reading and the number of words uttered may have increased.

Materials

Thirty books for young children were selected for inclusion in both the baseline and treatment phases of the study. These were selected from the Children's Book Council of Australia Award winners and shortlisted books from 2002 to 2009 (these books appear in the appendix). All books were narrative fiction recommended for young children.

Measures of Giftedness

It is widely accepted that identification of potential giftedness in young children should not rely on one single measure (Borland, 2008; A. Robinson et al., 2007). Therefore, a variety of subjective and objective measures of giftedness was employed, as well as instruments that assessed different aspects of development, verbal and nonverbal. Care was taken to develop a rapport with the children prior to testing, to administer the tests in the morning on different days to minimize any fatigue effect that might depress scores, and to meet with the children in a familiar place.

In the current research, teacher nomination was used as an initial identifier of potential giftedness. The director of the child care center was approached to recommend children whom she believed demonstrated "advanced intellectual development." Although teacher nomination has been demonstrated to have varying levels of reliability (Ciha, Harris, Hoffman, & Potter, 1974; Gear, 1976; Scheblanova, 1996), it was felt that in this situation the director had sufficient understanding of the characteristics of young gifted children to be able to make appropriate judgments.

Two tests were chosen to measure the potential giftedness of the nominated participants: the PPVT-4 and CPM. Both tests (and earlier versions thereof) are accepted as appropriate measures for screening the abilities of young potentially gifted children (Karnes, Manning, Besnoy, Cukierkorn, & Houston, 2005; Mills, Ablard, & Brody, 1993; Porter, 2005; N. M. Robinson & Robinson, 1992). The criterion for inclusion in the study was a score of 130 or above (two standard deviations from the norm) on either one of the instruments. The decision to accept scores on either measure was in line with the idea of "best performance," which suggests that for young potentially gifted children measures of intellectual giftedness are not always reliable and, therefore, decisions about inclusion in a program for gifted children can be based on superior performance on any one of a number of measures that might be used to identify giftedness (Roedell, Jackson, & Robinson, 1980). A cutoff of two standard deviations from the norm is accepted as evidence of moderate giftedness (Gross, 1993; Porter, 2005).

Peabody Picture Vocabulary Test, Version 4. The *PPVT-4* is designed to measure receptive vocabulary and may be used to estimate verbal development (Dunn & Dunn, 2007). The test manual (Dunn & Dunn, 2007) reports the reliability of the instrument's scores as follows: internal consistency

($M_{\text{a coefficient}} = .97$ for Form A and .96 for Form B), test-retest (4-week interval, $M_r = .92$ across age groups), and alternate form ($M_r = .88$ across age groups).

Raven's Coloured Progressive Matrices. The CPM is designed as a brief nonverbal assessment of general ability (Raven, 2004). The test is considered to be a measure of Spearman's g (Robertson, 2010). The split-half reliability of the test scores is reported to be .97 ($N = 608$). The content validity of the test relies on studies conducted on the Standard Progressive Matrices as most of the content of the CPM is derived from the Standard Progressive Matrices. The CPM has been used for early identification of giftedness (Mills et al., 1993).

Phases of the Study

The study included three phases: a baseline phase, a treatment phase, and a return to baseline. The first author implemented both baseline and treatment phases. For each phase, before story reading commenced each day, Rose was asked whether she had previously read the story. This was noted when transcribing the data from the video recordings. The length of each story reading session was measured using the video data. The time codes from the selection of the book to the end of the reading session were noted, and the length of the session calculated by deducting the start time from the finish time. All sessions were recorded using a Canon XL1 digital video camcorder placed on a tripod directly in front of the researcher and the participant. Back-up audio recordings were made using an iPhone.

Lower level and higher order thinking questions were developed for all 30 books that Rose would be offered as choices for reading. These included a range of lower level questions and five higher order thinking questions, one for each Williams's Model category (analogy, paradox, tolerance for ambiguity, attribute listing, and provocative question).

Baseline. Baseline data (i.e., responses to lower level questions) were collected over four sessions for 4 days before the intervention began. Rose was offered a selection of books and was asked to choose a story to be read. Lower level questions were asked during the story reading. Each session was videotaped (with the exception of the first session, which was only audiotaped due to a camera fault, and the eighth session in which the video tape ran out and the backup audio tape had to be used for analysis) and the data transcribed and analyzed by the first author (the primary rater) immediately following the session.

Intervention. During the treatment phase Rose selected a book and only Williams's Model higher order thinking questions were asked during the reading of the story. Responses were analyzed following each session. The plan was that the intervention should span eight sessions. Rose refused to participate during Session 6 (the second treatment session) as it was her birthday and she was anxious to participate in

making a cake with the other children at the center. This reduced the number of treatment sessions to seven.

Return to baseline. Conditions in the return to baseline phase were the same as those in the initial baseline phase, that is, only lower level questions were asked during the story reading. This phase lasted for four sessions.

Reliability

Data were analyzed for interrater agreement and treatment integrity. Interrater agreement data were collected for the number of words uttered by the child in response to questions, the number of c-units, and the accuracy of transcripts. The data provided by the primary rater were used to report the results of the study.

Interrater agreement. Transcripts of six randomly selected sessions (40%), a combination of three baseline and three treatment sessions, were given to an independent rater with a postgraduate qualification in communication disorders and 23 years of teaching experience. The rater was asked to count the number of words uttered by the child and to calculate the number of c-units. The percentage agreement between the primary rater and the independent rater was calculated using the total agreement approach (Kennedy, 2005), that is, dividing the smaller total by the larger total and multiplying by 100. The interrater agreement was 98% for the number of words uttered by the child and 94% for the number of c-units.

Another independent rater, with an honors degree in early childhood and 10 years of teaching experience, was asked to check the reliability of the transcripts that the researcher had prepared. To do this, the independent rater was given a copy of three of the transcripts (20%), a combination of one baseline and two treatment sessions, and asked to watch the videotaped story reading sessions and note any discrepancies between the transcript of the participant's responses and the video recording of sessions. Percentage agreement between the first and second raters was again calculated using the total agreement approach. The interrater agreement for the transcription of the child's utterances was calculated to be 98%.

Treatment integrity. Treatment integrity (also known as treatment fidelity) refers to "the extent to which the intervention is delivered as intended" (Kazdin, 2011, p. 194). To determine the fidelity of the implementation of the intervention with regard to the level of the questions delivered in baseline and treatment phases, an independent rater was asked to rate each question asked as either higher order or lower level. The independent rater was a PhD candidate in the field of early childhood. The rater was given the aforementioned definitions of higher order and lower order questions and a random sample of six books (40%) from baseline and treatment phases, and the questions for each book. The point at which each question had been asked in each book was marked with a yellow sticky note and numbered to

match the appropriate question on the list to ensure that the rater was able to see the context in which the question was asked, as this can have an impact on the level of questioning. The books were placed in a random order and the rater was not informed of the design of the study so that there was no discernible pattern in the questioning. The rater was asked to read each book and to mark on the question sheet whether the question asked was a higher order or lower order question. The interrater agreement between the primary rater and the independent rater was again calculated using the total agreement approach (Kennedy, 2005) and found to be 100%. Following this, to ascertain the treatment fidelity (i.e., that the correct level of question been asked in the correct phase of the study), the same independent rater was given a list of higher order and lower order questions and transcripts from six randomly selected sessions (40%). The rater was asked to indicate which list the questions in each session came from. The fidelity of the treatment was calculated using the interval agreement approach (Kennedy, 2005), which is found by dividing the total number of agreements by the total number of agreements and disagreements and multiplying by 100. Treatment integrity was found to be 100%. A level of 80% or greater is deemed to be acceptable (Kennedy, 2005).

Data Analysis

Descriptive data are reported in the first instance. The data pertaining to the mean length of c-unit were graphed and analyzed using visual inspection. In addition, the percentage of nonoverlapping data, which gives an effect size calculation (Riley-Tillman & Burns, 2009), was derived by taking the most positive baseline data point and drawing a line through the treatment data (this appears on Figure 1). Effect sizes for known versus unknown books were calculated using Cohen's *d*. McMillan and Schumacher (2006) reported that effect size indexes of around .20 are considered to be small, with .50 a medium or moderate effect and .80 or greater regarded as a large effect.

Results

The mean length of the story reading sessions was 9.23 minutes (range = 6.35-15.88), with baseline sessions lasting an average of 8.89 minutes and treatment sessions lasting an average of 9.62 minutes. See Table 3 for details relating to session length, number of questions asked, and words and c-units per response for individual sessions, and means for each of these variables across the three phases of the study.

Mean Length of C-Units

Details relating to the mean length of c-units for individual sessions and means for each of the phases of the study are presented in Table 3. Figure 1 provides graphical rep-

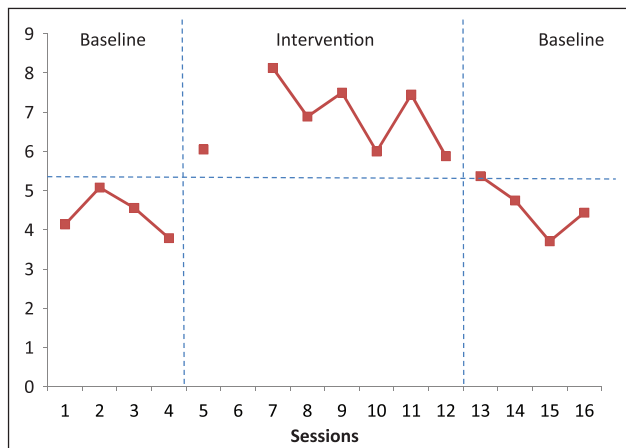


Figure 1. Mean length of c-unit in the baseline, intervention, and return to baseline conditions, with line indicating percentage of nonoverlapping data.

resentation of the mean length of c-unit per session in the baseline, intervention, and return to baseline phases of the study. It also illustrates the effect size of the intervention. As there was no overlap between the intervention data and the baseline data, a percentage of nonoverlapping data of 100% was calculated, indicating evidence of a strong effect size.

Effect of Previous Exposure to Books

The mean number of words per c-unit for known books in the baseline phases was 4.33 and 4.62 for unknown books. In the intervention phase, the mean number of words per c-unit was 7.00 for known books and 6.72 words for the unknown books. This indicates that the mean length of c-units was slightly higher for books that the child had indicated that she had previously read. However, the effect size for the use of known books was small for both baseline and intervention phases (0.15 and 0.23, respectively), indicating that these differences were not clinically significant.

Discussion

The Effect of Higher Order Thinking Questions on Complexity of Language

The effect of higher-order questioning on the complexity of language demonstrated by a young potentially gifted child was investigated using a single-subject reversal (ABA) design. The complexity of language, as measured by mean length of c-unit, did increase when higher order thinking questions were asked of this young potentially gifted child. This is supported by the fact that Rose's complexity of response increased noticeably in the treatment period and that the mean number of words per c-unit was higher for all

treatment sessions compared with baseline sessions. The functional relationship between higher order questioning and mean length of c-unit is further supported by the fact that in the return to baseline condition the length of c-unit reverted to pre-intervention levels.

Although there has been a presumption that there is a link between level of questioning and complexity of response (e.g., Barden, 1995), no study has been found that has investigated a causal relationship between these two variables. For this reason, it is not possible to compare the results from the current study with those of other researchers. However, it is worth noting that, in Rose's case, the mean length of c-unit for the intervention phase (6.84) was comparable to Loban's random group of first-grade children (6.88; Loban, 1976). This indicates that, during the intervention phase, Rose was potentially performing at the same level as the first-grade children in Loban's study (i.e., children 1-2 years older).

Other Study Variables

The results indicate that the mean number of c-units, used in response to the questions asked, was comparable across the three phases of the study. In contrast, the mean number of words used in Rose's responses was comparable for both baseline phases but was 36% greater in the treatment phase than in Phase 1 (Baseline 1) and 29% greater in the treatment phase than in Phase 3 (Baseline 2). This is not an unexpected result given that the complexity of language, as measured by the mean number of words per c-unit, increased during the treatment phase and that, given that the number of c-units used by the participant in response to questions was comparable across both baseline and treatment phases, there was likely to be a relationship between the mean number of words used in response to questions and the mean number of words per c-unit.

The mean session length for the first (Baseline 1) and second (Treatment) phases differed by less than 1 minute. The mean length of the third phase (Baseline 2) was more than 2 minutes less than the treatment phase (Phase 2) and 3 minutes less than the first phase (Baseline 1). Although there was some variability in the number of questions asked during the two baseline phases, only five questions were asked during each of the treatment sessions. This may be partially attributed to the differing lengths of the storybooks read in the phases. Overall, the time taken to implement the questions did not differ much from the first baseline to treatment, even though there were, on average, twice as many questions asked in the baseline phases than there were in the intervention phase.

It was not possible to ensure that the participant had no exposure to the selected books prior to the implementation of the research. Even if this had been checked prior to commencement of the baseline phase, given that (a) time was needed to find appropriate books and to write the range of lower level and higher level questions and (b) the study was

Table 3. Overview of Study Data.

Session	Phase	Number of Questions Asked	Number of Words Uttered	Number of C-Units	Mean Length of C-Unit	Length of Sessions (min)	Previously Read Book?
1	Baseline 1	7	29	7	4.14	9.03	No
2	Baseline 1	9	61	12	5.08	10.60	Yes
3	Baseline 1	13	82	18	4.56	15.88	No
4	Baseline 1	11	53	14	3.79	6.35	Yes
M Baseline 1		10	56.25	12.75	4.39	10.47	
5	Intervention	5	121	20	6.05	8.82	Yes
7	Intervention	5	65	8	8.13	10.52	No
8	Intervention	5	62	9	6.89	10.60	No
9	Intervention	5	75	10	7.50	8.83	Yes
10	Intervention	5	84	14	6.00	12.07	No
11	Intervention	5	82	11	7.45	7.42	Yes
12	Intervention	5	47	8	5.88	9.07	No
M Intervention		5	76.57	11.43	6.84	9.62	
13	Baseline 2	10	102	19	5.37	7.18	No
14	Baseline 2	8	38	8	4.75	6.55	Yes
15	Baseline 2	8	26	7	3.71	7.35	Yes
16	Baseline 2	13	71	16	4.44	8.23	No
M Baseline 2		9.75	59.25	12.50	4.57	7.33	

conducted over a 4-week period, it could not be guaranteed that the child would not have exposure to one or more of the books subsequent to a prebaseline check. The fact that a small to negligible effect size was found for prior exposure to books indicates that this variable does not explain the differences in complexity of language found between the baseline and intervention phases.

Response to Opportunity to Display Advanced Abilities

As others have previously stated (Gross, 1999; Harrison, 2003; Porter, 2005), it may be unclear what a potentially gifted child can do, unless that child is presented with opportunities to demonstrate his or her advanced abilities. Rose gave relatively uncomplicated and direct answers when the lower level questions were asked. It was not until questions of a more complex nature were asked that she was able to demonstrate fully her verbal and cognitive abilities. One could argue, therefore, that for a young child of Rose's ability, higher order questioning is useful not only in enabling the child to demonstrate more sophisticated skills but also in providing an opportunity for further developing intellectual thinking. What is not known, however, is whether this will prove to be true for all children who are intellectually advanced or, indeed, whether it will also be true for children of lesser ability.

Despite the fact that Rose had demonstrated an ability to respond to higher order questioning with more sophisticated language, she often answered a higher order question with "I don't know" and then went on to further elaborate, for example,

Question: So if Grandma knows that Dad couldn't really have a horse, how come she's knitting things for a horse?

Response: I don't know. (Pointing to the picture) 'Cause those won't fit a big horse. That won't fit its body. And that won't fit its arms. And that won't fit its tiny, tiny feet.

It has been suggested that children who have not been exposed to challenging material can sometimes avoid engaging with challenge due to perfectionist tendencies or fear of failure (Gross, 1999; Harrison, 2003; Porter, 2005). It is possible that "I don't know" was a stalling strategy thereby providing Rose with more thinking time.

Contribution of the Study to Gifted Education

This study has demonstrated how a single-subject reversal (ABA) design can be used in the field of gifted education to demonstrate the effectiveness of an intervention recommended in the literature. The advantages of the research design are that the experiment could be carried out relatively easily, with recruitment and testing taking a relatively short period of time. The actual implementation of the research took a period of 4 weeks, and a documented effect could be determined after this period. No control group was needed, as the subject acted as her own control through the collection of baseline data.

Perhaps most interesting is that even a child of advanced verbal ability will not readily demonstrate his or her higher level language ability when given lower order questions. This idea clearly challenges the idea that a child-centered,

open-ended curriculum is all that is needed in the early childhood context to challenge and develop children with advanced language abilities. Although there have been calls for higher order thinking skills to be taught to young gifted children (Maker, 1986; McCollister & Sayler, 2010; A. Robinson et al., 2007), there is no research that has demonstrated the ways in which young gifted children respond to higher order thinking questions in the preschool or child care setting. This preliminary study provides a useful platform for building an evidence base for the effectiveness of this type of intervention with young potentially gifted children.

Limitations and Future Research

The most obvious limitation of this research is that it is a preliminary study involving a single child. The intervention needs to be systematically replicated with other potentially gifted children to determine whether the effect can be generalized to others within this population. This requires research using multiple subjects and a stronger reversal design (ABAB), with an additional treatment phase.

Because external validity cannot be demonstrated easily using single-subject research, it is important that internal validity is strengthened by controlling variables, other than the independent variable, that could account for changes in the dependent variable. An attempt was made to enhance the internal validity of the current research by ensuring that teacher and time-of-day variables were constant across all three phases of the study and that measures of the fidelity of the implementation of the intervention, and rater reliability, were also gathered. Other variables, such as length of sessions, familiarity with books, and number of questions asked, were also examined to determine whether there were differences across the phases of the study. It was important to see whether these could be linked to differences in the complexity of Rose's language. In the current study, these variables did not offer an alternate explanation for the increase in language complexity in the treatment phase.

Although a one-on-one situation is useful in a research context, it is unlikely to occur in a regular preschool or child care classroom. A trial of the higher order questioning in a group situation would be needed, therefore, to establish the social validity of the higher order questioning intervention. It might also be of interest to investigate the effect of higher order questions on children of average ability. Are children of average ability able to respond to these questions in a meaningful way, or are the questions too difficult and, if so, what effect does this have on group dynamics? Teachers would undoubtedly need time to learn to implement an intervention using higher order questions, and their ability to faithfully implement it (treatment fidelity) would need to be measured. Further research could also address the usefulness of Williams's strategies as "conversation starters" for early childhood teachers learning how to engage young children in sustained shared thinking.

Conclusion

The purpose of this study was to investigate whether a young gifted child could answer higher order thinking questions during story reading and what effect answering such questions would have on the complexity of language used. Despite the study's limitations, in the case of Rose, it was clearly demonstrated that a young potentially gifted child is capable of answering higher order thinking questions and that her language, as measured by c-units, became more complex when she was presented with more challenging questions.

Single-subject research designs are potentially very useful for those working in the field of gifted education, where a small and exceptional cohort is being studied. In particular, they hold promise for those looking to evaluate educational interventions for gifted children by offering research that has the potential to achieve high internal validity and at the same time can be implemented in educational settings.

Appendix

Story Books Used in This Study

- Allen P. (2001). *The potato people*. Ringwood, Victoria, Australia: Viking.
- Danalis J., Danalis S. (2009). *Schumann the shoeman*. St Lucia, Queensland, Australia: University of Queensland Press.
- Fox L., Wilcox C. (2007). *Ella Kazoo will not brush her hair*. Sydney, New South Wales, Australia: Lothian.
- French J., Whatley B. (2002). *Diary of a wombat*. Pymble, New South Wales, Australia: Angus & Robertson.
- French S., Rawlins D. Australian Broadcasting Corporation. (2002). *Guess the baby*. Sydney, New South Wales, Australia: ABC Books.
- Graham B. (2008). *How to heal a broken wing*. London, England: Walker Books.
- Grant J., Curtis N. (2003). *Cat and fish*. Port Melbourne, Victoria, Australia: Lothian Books.
- King S. M. (2004). *Mutt dog!* Lindfield, New South Wales, Australia: Scholastic Press.
- Lee L., Gamble K. (2006). *Eight*. Malvern, Southern Australia: Omnibus Books.
- Lester A. (2004). *Magic beach*. Crows Nest, New South Wales, Australia: Allen & Unwin.
- Shanahan L., Quay E. (2005). *Daddy's having a horse*. Sydney, New South Wales, Australia: Hodder Children's Books Australia.
- Shanahan L., Quay E. (2009). *Bear and chook by the sea*. Sydney, New South Wales, Australia: Hachette Australia.
- Sullivan R., Huxley D. (2009). *Tom Tom*. Kingswood, South Australia: Working Title Press.
- Wild M., James A. (2007). *Lucy goosey*. Sydney, New South Wales, Australia: Little Hare.
- Wild M., Legge D. (2003). *Baby boomsticks*. Sydney, New South Wales, Australia: ABC Books for the Australian Broadcasting Corporation.

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Chapter 6

Publication No. 5: The Effect of Higher Order Questioning on the Complexity of Gifted Preschoolers' Language

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Abstract

A single-subject design was used to examine the effectiveness of a higher order questioning stimulus. Five children aged 3 to 5 years who were assessed as being potentially gifted took part in story-reading sessions in which higher order questions were asked. A treatment effect was found for three of the five children, suggesting that the use of higher order questions as part of a story-reading session has the potential to elicit more linguistically complex language in young gifted children. Possible reasons for the absence, or reduction, of a treatment effect for two children, and the implications of the findings for practice and future research are discussed.

Keywords: gifted, single-subject design, young children, questioning

The Effect of Higher Order Questioning on the Complexity of Gifted Preschoolers'
Language

The use of higher order questioning is frequently cited as an appropriate teaching strategy for gifted children (Harrison, 2003; McCollister & Sayler, 2010; Porter, 2005; Robinson, Shore, & Enersen, 2007; van der Westhuizen & Rautenbach, 1997). However, few studies have investigated the effectiveness of this strategy, and none of these studies has included children in the preschool years. Indeed, many of the strategies recommended within the literature for young gifted children have little or no research basis (Walsh, Kemp, Hodge, & Bowes, 2012), meaning that educators risk implementing approaches that although seem appealing, may be of little educational value.

Characteristics of Young Gifted Children

Harrison (2003) defined a young gifted child as:

one who performs, or has the ability to perform at a level significantly beyond his or her chronologically aged peers and whose unique abilities and characteristics require special provisions and social emotional support from the family, community and educational context. (p. 8)

Clark (2002) suggested that the traits of young gifted children are evident from infancy, and research into the manifestations of giftedness in early childhood has revealed a series of traits that may include: early physical development (Gross, 1993b), cognitive development (Roedell, Jackson, & Robinson, 1980), and language development (Rogers & Silverman, 1988).

The particular developmental characteristics of young intellectually gifted children, such as their speed of learning, their ability to absorb and retain large amounts of information, and their advanced vocabulary, mean that modifications to the general preschool curriculum are needed in order to respond to these differences. Maker (1986)

suggested that preschool curricula for young gifted children should use systematic questioning techniques and that teacher questions were in fact “the most important educational factors in the development of children’s thinking and reasoning abilities” (p. 67). Lower order questioning that relies predominantly on recall and comprehension may lack the challenge necessary to engage and extend young gifted children, thereby creating a preschool environment that, at best, is lacking in stimulation, and at worst is impeding the cognitive development of the child. As such, questions designed for young gifted children should be open-ended, with no single specific answer, and children should be encouraged to analyze and articulate how they arrived at a particular answer.

Questioning in Early Childhood

Questioning as a pedagogical technique is used for a variety of purposes: to engage children; to encourage children to express their ideas and thoughts; to allow other children to hear different explanations from their peers; for pacing and as a classroom management strategy; and to evaluate learning (Morgan & Saxton, 1991). Researchers investigating preschool settings have found contradictory results with regard to early childhood teachers’ use of questioning strategies. For example, Siraj-Blatchford and Manni (2008) found that most early childhood teachers tended to rely on lower order questions, and use questioning more for classroom and student management than for fostering learning. They further found that even within quality care situations 94.5% of questions asked by early childhood educators were closed questions, which they defined as those having a small range of possible answers. This focus on lower level questioning has also been reported by Dickinson, McCabe and Anastasopoulos (2003) who found that during story-reading early childhood teachers tended to focus on less cognitively challenging questions and more on the organization of the story-reading experience (e.g., sitting still, paying attention, raising one’s hand to ask a question). Even when given time

for planning the questions that they would ask during story reading sessions, preschool teachers appear to rely mainly on lower level questions (Scheiner & Gorsetman, 2009).

In contrast, other studies have found preschool teachers employing roughly equal numbers of higher order and lower level questions (Tompkins, Zucker, Justice, & Binici, 2013; Zucker et al., 2010). In some cases these apparently contradictory findings relate to a lack of consistency regarding the definitions of what constitutes a “higher order” question. In other cases the results may be altered by the characteristics of the sample. For example, some of the studies (e.g., Tompkins et al., 2013) are conducted with children with language disabilities. Furthermore, the activity in which the children are engaged may also influence the data. For example, Tompkins et al. (2013) used data from a play-based session, whereas Siraj-Blatchford and Manni (2008) used data from the entire day.

A recently published study by Strasser, Larraín and Lissi (2013) investigated the effects of asking open-ended questions targeting causal and logical relationships with at-risk Chilean preschoolers. Children who were exposed to coherence questions, those that focused on the character’s goals and problems, scored better on comprehension measures than the children who were given open-ended questions that required them to make predictions, interpret pictures and make connections with their own lives. Interestingly, children in the coherence condition were found to be paying significantly less attention to the story than those in the open-ended condition. The authors speculated that the open-ended questions might have been more interesting, and therefore more engaging, than the coherence questions.

Effective questioning within the preschool sector has also been researched with the aim of increasing quality learning through early childhood interactions. It has been linked to the concept of “sustained shared thinking”, defined as “an interaction where two or more individuals ‘work together’ in an intellectual way to solve a problem, clarify a

concept, evaluate activities, or extend a narrative” (Siraj-Blatchford & Sylva, 2004, p. 718). Open and genuine questions, questions where the teacher is authentically interested in the child’s response, rather than those where the teacher already knows the answer, appear to be one of the keys to quality early childhood interactions, and are inherently more appealing to children, as Strasser, Larraín and Lissi (2013) suggested.

It would appear, therefore, that there is a potential mismatch between the needs of young intellectually gifted children, and the current reported practice of early childhood educators, in that most early childhood educators are not asking enough higher order questions, or building sufficient challenge into story-reading and questioning. Conversely, it would seem that ‘best practice’ in early childhood education, in the form of sustained shared thinking, may indeed provide a useful tool for working with young gifted children in that it taps into the characteristics and educational needs of these children for complexity of thought and interaction (Walsh, Hodge, Bowes, & Kemp, 2010).

Storybook Reading Intervention Studies

Previous research on storybook reading with preschoolers has found that early and frequent shared reading experiences lead to better receptive vocabulary and verbal precocity; however, Reese and Cox (1999) highlighted the need to assess the quality of adult-child interaction during reading. It is not simply a case of children regularly taking part in reading experiences that influences the types of gains made. It is also the manner in which the adult converses with the child during the reading time. Dialogic reading, for example, where the adult scaffolds the child as story-teller through questioning and praise (Zevenbergen & Whitehurst, 2003), has been found to increase children’s language skills but relies primarily on a low-level questioning style, which has been characterized as a *describer* style. Although this may prove effective with very young children, children from low socioeconomic backgrounds, and preschoolers with developmental delays

(Lonigan, Anthony, Bloomfield, Dyer, & Samwel, 1999; Whitehurst, Arnold, et al., 1994; Whitehurst, Epstein, et al., 1994; Whitehurst et al., 1988), this low-level questioning style may not be as effective with young gifted children. Indeed, the same *describer* style when used with middle class children was found to be less effective for literacy development than styles that emphasized more higher order thinking (Haden, Reese, & Fivush, 1996). Similarly, Reese and Cox (1999) found that, for children with advanced vocabulary, a *performance-oriented* style that focused on higher-demand questioning techniques resulted in better vocabulary development. However, they also found that children's print skills (e.g., letter and word recognition, environmental print knowledge) were enhanced when using a *describer* style, thereby further supporting the idea that different styles of reading and questioning need to be tailored to the child's ability level and the purpose for which the intervention is undertaken.

Experimental research has been used to trial different methods of reading with young children and to evaluate their relative effectiveness on a number of different measures, usually related to literacy skills such as vocabulary and print recognition (e.g., Blewitt et al., 2009; Horner, 2004; Kertoy, 1994; Morrow, 1988; Walsh & Blewitt, 2006). There have, however, been no investigations of the effect of asking higher order questions during storybook reading with young children, in which increases in literacy skills have been measured by analyzing the responses of the children to the questions rather than using standardized instruments. Indeed, given that we ask questions in order to elicit a response, actual analysis of children's responses to questions appears to be curiously absent from the literature on storybook reading. In their review of shared story-reading interventions, Schickedanz and McGee's (2010) concluded that there was a lack of studies that examined the effects of higher-level comprehension.

Some studies (e.g., Sénéchal et al., 1995; Strasser et al., 2013) report evidence of a Matthew Effect (Stanovich, 1986), whereby children with high initial scores on dependent variable measures appear to benefit disproportionately over those with lower scores. In effect, some interventions, such as those designed to increase a child's vocabulary, are more effective when a child has a well-developed vocabulary prior to the intervention. This has interesting implications for early literacy interventions with young gifted children, who typically have advanced vocabulary and decoding skills. Most researchers have viewed the Matthew Effect as a negative, in that those who are already advanced become more advanced and the researchers have searched for ways in which to assist the other children to "catch up", or to "even out" differences. This is not surprising given that most the research in this area has been conducted with children from disadvantaged backgrounds, Head Start programs and those with learning disabilities. For researchers in the field of gifted education, this creates both a challenge and an opportunity: a challenge in that finding effective tools to measure and document change is difficult as measures traditionally used with preschoolers may not possess sufficient ceiling; and an opportunity because so little research has focused on children with advanced development.

In summary, research to date indicates that young gifted children have learning characteristics that mean that using higher order questioning is a possible beneficial classroom strategy. Research into the questioning styles of early childhood educators is contradictory, but would suggest that, on the whole, higher order or inferential thinking is not common place in the early childhood classroom, despite "sustained shared thinking" being currently regarded as best practice. The results of research into storybook reading techniques suggest that reading styles need to be tailored to the individual child's level of ability and the dependent variable targeted for the intervention.

The lack of current evidence-based research with young gifted children presents a compelling need for research of this kind. With many educators regarding questioning as an essential technique in building critical thinking skills in young gifted children (Maker, 1986; McCollister & Sayler, 2010; Robinson & Feldhusen, 1984), it is essential that practitioners have ample evidence to support the most effective ways of supporting and developing the intellectual needs of young gifted children.

The Present Study

In the research reported in this paper, the effect of higher order questioning on the quality of verbal response in children in preschool settings is investigated. A preliminary study (citation removed) using a single-subject research design (ABA) with one participant, indicated that complexity of language did increase when the complexity level of the question was increased, that is, the child would respond with more complex linguistic structures, as measured by mean length of communication units, when a higher order question was asked. Single-subject research has a high level of internal validity because the subject acts as his/her own control, allowing the researchers to attribute the change in the dependent variable to the treatment. However, external validity and generalizability to a specific population can only be determined by conducting replications of the experiment with larger numbers of subjects. As Kazdin (2011) stated: “replications that closely approximate the conditions of the original experiment increase one’s confidence that the original finding is reliable” (p. 375). A replication of the preliminary study with a sample of five young potentially gifted children using a more robust ABAB design (see Kazdin, 2011, for an overview of ABAB designs) is reported here. It was hypothesized that, as in the previous preliminary study, the use of higher order questioning would produce more linguistically complex answers during storybook reading with young gifted children. Specifically the research question was: What effect

does the use of higher order thinking questions have on the level of complexity of language used by young potentially gifted children?

Method

As this study is a replication of an earlier study (reference removed) the method is almost identical and details of the earlier study are reproduced here in part. Where any major changes to the method have been made, this is noted.

Participants

The participants in the study were five young gifted children (three female and two male) ranging in age from 3 years 3 months to 4 years 7 months (see Table 1). Four of the participants were due to commence formal schooling in the following year. One child (Anna) had two years remaining at preschool. All children had English as their first and only language. The participants' standard scores on the Peabody Picture Vocabulary Test, Version 4 (PPVT-4; Dunn & Dunn, 2007) ranged from 134 to 139, with all participants scoring at the 99th percentile or above. All children obtained Raven's Coloured Progressive Matrices (CPM; Raven, 2003) scores with an age equivalent of at least 6 months ahead of their chronological age. Scores relating to each child are included in Table 1. Four children came from high socioeconomic groups; one child (Molly) was from a lower socioeconomic group, as determined by whether families were receiving government assistance for childcare costs. Four children were of Anglo Australian ethnicity and one (Alicia) was of Asian Australian ethnicity. An application to conduct the research was approved by the University Ethics Committee and parental consent was sought and obtained for all participants. Pseudonyms are used to ensure privacy.

Setting

Three early childhood educational settings were used in the study. Alicia, David, Lionel, and Molly all attended a not-for-profit, university-based childcare center. The

third center was added as one of the children (David) attended a local government childcare center two days per week in addition to the university-based center. Another child (Anna) attended a preschool attached to a faith-based Kindergarten-Grade 12 school. All three centers were located within a 2km radius of each other in an urban area of Sydney, Australia. The children at the university-based center all had at least one parent who was a faculty member, with the exception of one child (Molly) whose mother was a graduate student. The number of days each child was in care is reported in Table 1. All center directors stated they used a child-centered, play-based curriculum and centers were rated as providing high quality care through the government-administered accreditation process.

Duration

The study was conducted over a period of 18 months, as different children were identified by the preschools. Each child took part in a series of between 15 and 25 consecutive day story reading sessions, that is, the children were read to on each day they were at preschool. In the case of children attending full-time preschool, they were read to each day for a period of 4-5 weeks. Children attending fewer days were read to over a longer period.

Experimental Design

A single-subject design was chosen for use with this particular exceptional population in order to examine the effect of the stimulus on individuals. Single-subject designs have a long history in special education as robust measures of response to intervention, and are particularly useful where the subjects come from an atypical population group, such as in this case, children of exceptional ability. Further analysis of the application of single-subject designs in the field of gifted education is discussed in [citation removed] and Simonsen and Little (2011).

The young potentially gifted children chosen for the study were all exhibiting intellectual behaviors significantly different from those of children of average ability, and in turn quite different to each other. For example, Molly was a particularly vivacious and outgoing child, whereas Alicia was more reserved and introverted. The limited number of intellectually gifted children and the difficulty in locating these children, especially in preschool settings, also made a single-subject design particularly appropriate.

Comparison groups are not required in single-subject designs since each child serves as his or her own control (Kazdin, 2011; Riley-Tillman & Burns, 2009). By establishing a baseline it is possible to predict how a child will likely respond to no treatment prior to introduction of the treatment. This baseline then serves as the measure against which the effect of the treatment is reported.

A single-subject reversal design (ABAB) was used for four of the five participants. In a reversal design, a baseline (A) is established and then the treatment (B) is applied. The treatment is then withdrawn and there is a return to the baseline (A) condition, followed by a further application of the treatment (B). The use of a second treatment phase (B) seeks to ensure that any changes in the behavior observed can be attributed to the treatment, rather than to coincidental changes in teacher behavior, changes in the participant (e.g., illness), or changes in environmental factors (Kazdin, 2011). This limits the threats to internal validity. Additionally, the ABAB reversal design could be used in this case because it could confidently be assumed that any changes in the dependent variable (i.e., linguistic complexity) resulting from the independent variable, in this case questioning type, could be reversed. Failure to establish a treatment effect for the fifth participant (Alicia) meant that it was not useful to employ a reversal procedure for this child. Instead, a modified stimulus was implemented, the plan being to apply a

second baseline condition, if this were successful. In Alicia's case, three phases (ABC) of the research were implemented.

Independent Variable

The stimulus used in the treatment phase of the study was higher order questioning during a one-on-one storybook reading session. Barden (1995) defined higher order questions as "those that require more than simple recall to produce an answer" (p. 423). Lower order thinking questions were defined as "those that require responses either recalled directly from memory or cited explicitly in text" (Barden, 1995, p. 423). All questions were open-ended, in that there were multiple responses that could be given and no questions could be answered with "yes" or "no". Baseline questions were all lower order questions. These questions were generated using the first three levels of Bloom's Taxonomy (Anderson et al., 2001): Remembering, Understanding, and Applying. The Frank E. Williams' *Total Creativity Program for Individualizing and Humanizing the Learning Process* (Williams, 1972) was used to generate the higher order questions. Although Williams acknowledged that the model was not designed specifically for use with gifted children (Williams, 1993), the teaching techniques are frequently recommended as suitable for gifted learners (Gross, MacLeod, Drummond, & Merrick, 2001; Maker, 1982; Maker & Nielson, 1995; Maker & Schiever, 2005; VanTassel-Baska, 1994). The questioning strategies chosen were analogy, provocative question, attribute listing, paradox, and tolerance for ambiguity, as these types of questions were believed to be novel in the preschool setting. Definitions of each type of questioning technique and examples of questions used in the study can be found in Table 2.

Dependent Variable

The linguistic complexity of answer was measured using the mean length of communication unit (c-unit). A c-unit is defined as "each independent clause with its

modifiers” (Loban, 1976, p. 9). Previous research has demonstrated that the mean length of c-unit increased with both age and ability level (Loban). Loban’s longitudinal study demonstrated that a high mean number of words per c-unit did not merely demonstrate verbosity, but also indicated a more effective use of complex language. For example, “I see a cat with a long tail and a collar” (one single c-unit of 11 words) is more complex than “I see a cat. It has a long tail and a collar” (two c-units, an average length of six words). Furthermore, Loban found differences between high-achieving and low-achieving students, with high achievers using significantly more complex sentence constructions, and therefore a higher mean length of c-unit, than children of average ability. These differences between the high-achieving and low-achieving groups were maintained over the course of the 12 years of Loban’s longitudinal study.

The mean length of c-unit was calculated by dividing the number of complete words uttered by the number of c-units for each session. This unit of measurement has been used in analyzing the complexity of children’s responses to storybook reading (Kertoy, 1994), complexity of response to questioning (Smith, 1977), production of analogies (Rummel & Dykstra, 1983), and the types of communication breakdowns that occur with children with learning disabilities (MacLachlan, 1988). In a review of different methods of analyzing spoken language, Foster, Tonkyn, and Gigglesworth (2000) suggested that the better measures target syntactic elements, such as clauses, as Loban’s c-unit does. Foster et al. stated that use of the c-unit “allow the analyst to give credit to performers who can embed clauses and hence construct chunks of speech which reflect more sophisticated planning processes” (p. 362).

Materials

Thirty-eight narrative fiction children’s books were selected for the study. In order to assure the quality of the material, all books had won awards or been shortlisted for the

Children's Book Council of Australia Awards (these books are listed in the Appendix) in the categories of Picture Book of the Year or Early Childhood Book of the Year.

Measures of Giftedness

In line with best practice in the identification of gifted children, a variety of measures was used to assess potential high ability (Borland, 2008; Robinson et al., 2007). Both subjective and objective measures were employed, as well as instruments that assessed different aspects of development, verbal and nonverbal. Care was taken to develop a rapport with the children prior to testing, to administer the tests in the morning on different days to minimize any fatigue effect that might depress scores, and to meet with children in a familiar place.

Initially, teacher nomination was employed by requesting the directors of the centers involved in the research to identify potential candidates who exhibited "advanced intellectual development" for further screening. Although previous research has suggested that teacher nomination has varying levels of effectiveness (Ciha, Harris, Hoffman, & Potter, 1974; Gear, 1976; Scheblanova, 1996), we found that the children nominated by the center directors all tested at least one standard deviation above the mean on at least one of the measures used.

Two tests were chosen to measure the potential giftedness of the nominated participants: the PPVT-4 and the CPM. Both these tests (or earlier versions thereof) have been demonstrated to be acceptable measures of advanced intellectual ability in young children (Karnes, Manning, Besnoy, Cukierkorn, & Houston, 2005; Mills, Ablard, & Brody, 1993; Porter, 2005; Robinson & Robinson, 1992). Children were accepted into the study based on a standard score of 130 or above (two standard deviations above the mean) on either test. The decision to accept scores on either measure was consistent with the idea of "best performance," which suggests that for young potentially gifted children

measures of intellectual giftedness are not always reliable and, therefore, decisions about the inclusion in a program for gifted children can be based on superior performance on any one of a number of measures that might be used to identify giftedness (Roedell et al., 1980). A cut-off score of two standard deviations above the mean is generally accepted as evidence of a moderate level of giftedness (Gross, 1993a; Porter, 2005).

Peabody Picture Vocabulary Test, Version 4. The PPVT-4 is a measure of receptive language and can be used to assess verbal development (Dunn & Dunn, 2007). According to the test manual (Dunn & Dunn), the reliability of the instrument's scores are reported as: internal consistency ($M_{\alpha coefficient} = .97$ for Form A and $.96$ for Form B), test-retest reliability (4-week interval, $M_r = .92$ across age groups), and alternate form reliability ($M_r = .88$ across age groups).

Raven's Coloured Progressive Matrices. The CPM is a nonverbal measure of general ability for children aged 4 to 11 (Raven, 2004). The test is considered to be a measure of Spearman's g (Robertson, 2009). The CPM consists of three sets of 12 items that are administered one-on-one. The split-half reliability of the test scores on the CPM has been found to be $.97$ ($N=608$). The content validity of the test relies on studies undertaken with the Standard Progressive Matrices (SPM), as the content for the CPM is largely derived from the SPM. The CPM has been employed in the identification of young gifted children (Mills et al., 1993).

Procedures

Selection of the participants. Initially an approach was made to two centers with staff who were known to the first author. After obtaining the consent of the center directors to participate in the research, the center staff were asked to recommend children that they believed to have advanced development. Parental consent for testing was obtained and these children were assessed using the PPVT-4 and the CPM. The criterion

for inclusion in the study was a score in the top 2% of the population on either one of these tests. Ten children were assessed, five of whom met the criteria established for inclusion in the study.

Phases of the study. For four of the children, the study consisted of four phases: a baseline, a treatment phase, a return to baseline, and a second treatment phase (ABAB). For the fifth child (Alicia), a modified treatment was implemented when no effect was observed for the initial treatment. As there were no effects for either treatment phases, a reversal to baseline was not implemented. The research design for Alicia was ABC.

The first author implemented all phases of the study with all participants. Each story-reading session took place in the child's childcare center or preschool. Children were read the stories individually in a quiet location, usually the staff room, office or an unused classroom. Each child was read the books in a different order, determined by allocating each book a number and using a random numbers table to decide the individual order for each child. Prior to commencing reading, consent was sought from the child by asking if the child was happy to read with the researcher on that day. The child's familiarity with the text was then ascertained by asking if the child had read the selected book before. Only one book was read in each session. Six higher order and six lower order questions had been developed for each book, and the questions were attached to the relevant page of the book on a sticky note to ensure that the researcher asked the same question at the same stage of the story for each child. All books were read only once to each child. Lower order questions were printed on blue sticky notes and higher order questions were on yellow sticky notes to ensure that the right questions were asked in the correct phase. Each session was audiotaped using an iPhone and the data transcribed and analyzed by the first author (the primary rater) immediately following the session.

Baseline. Baseline data (i.e., responses to the six lower order questions) were collected until a baseline, with the absence of an upwards trend (or slope), was obtained. Only lower order questions, those defined as requiring “responses either recalled directly from memory or cited explicitly in text” (Barden, 1995, p. 423), were asked during the story-reading in the baseline phase. Following the transcription of the children’s responses to the questions asked, data from each session were graphed by the first author. The second author was consulted to confirm that a stable baseline had been achieved.

The treatment sessions took place each consecutive morning that the child attended preschool. The number of sessions was dictated by the responses obtained in the storybook reading sessions. For example, a suitable baseline was obtained for Anna after 5 sessions, whereas Lionel required 8 sessions to reach a baseline that was considered stable enough for the experiment to proceed.

Treatment. The treatment involved a change in the level of questions that the children were asked. Only the six higher order questions were asked during the story-reading sessions in the treatment phase. No teaching occurred during the treatment sessions. Again, responses were transcribed and the score graphed by the first author immediately following the session.

Return to baseline. Conditions in the return to baseline phase were the same as those in the initial baseline phase, that is, only the six lower order questions were asked during story-reading.

Return to treatment. Conditions in the return to stimulus phase were the same as those in the initial treatment phase, that is, only the six higher order level questions were asked.

Treatment 2. In the case of one participant (Alicia) a second treatment was administered. This consisted of a mix of three higher order and three lower order

questions. As the participant was particularly shy, it was thought that the inclusion of lower order questions might give her confidence in speaking and thereby assist her with answering the higher order questions.

In all phases of the study no direct feedback was given to the children on their performance. If a child answered “I don’t know”, one non-specific prompt was given, such as “Can you have a guess?” or the question was repeated. If the children asked questions of the researcher, these were responded to with “What do you think?”.

Coding

Following transcription, responses were coded and graphed. The number of words and c-units for each response were recorded and the mean number of c-units for a session calculated by dividing the number of words by the number of c-units. Non-responses were coded as “0”. The phrase “I don’t know” was also coded as a “0” in order to avoid artificially inflating the scores. In line with Loban’s (1976) analysis, false starts and mazes (repeating of words) were not counted (e.g., “I wanted to... I wanted to see if he could fly” was coded as 8 words, rather than 11 words). As prescribed by Loban, contractions, such as “don’t”, “won’t”, and “can’t” were coded as two words.

Reliability

Data were analyzed for interrater agreement and treatment integrity. Interrater agreement data were collected for the accuracy of the transcripts and the accuracy of the coding. The data provided by the primary rater were used to report the results of the study.

Interrater agreement. An independent rater currently enrolled in the final year of a Bachelor of Education (Early Childhood Education) was asked to check the accuracy of the transcripts prepared by the researcher. The independent rater was given a copy of 34 transcripts (33%) and asked to listen to the reading sessions and note any discrepancies

between the transcript of the participant's responses and the audio recording of sessions. Percentage agreement between the first and second raters was calculated using the total agreement approach (Kennedy, 2005), that is, dividing the smaller total by the larger total and multiplying by 100. The interrater reliability for the transcription of the child's utterances was calculated to be 97%.

In order to determine if the responses that the children had given had been correctly coded, a random selection of 32 transcripts (30%) was given to a coder with post-graduate qualifications in linguistics and experience in early childhood education. The coder was given the information contained in this article relating to Loban's (1976) work and the coding process. The coder was asked to count the words in each response and calculate the number of c-units. Using a point-by-point agreement ratio, where the number of agreements is divided by the sum of the agreements and disagreements and multiplied by 100 (see Kazdin, 2011), the level of agreement was found to be 89%.

Treatment integrity. In order to determine the fidelity of the implementation of the treatment, an independent rater was asked to check that the correct level of questioning had occurred in the correct phase of the study. To do this the rater, a graduate student in early childhood education, was given 32 transcripts (30%) along with definitions of higher order and lower order questions and asked to indicate which level of questions had been used in each session. A total agreement method was used to calculate treatment integrity, which was found to be 100%.

Following this, a random selection of 12 of the 38 storybooks (32%) used in the sessions was given to a graduate student in early childhood education along with the questions that had been asked for each book. The location in the story where the question had been asked was marked with a sticky note to ensure that the correct context could be noted when coding the question. Definitions of higher order and lower order, as provided

by Barden (1995), were given to the rater and she was asked to code whether the question asked was a higher or lower order question. Again, a point-by-point agreement ratio was used to calculate agreement which was 86%.

Data Analysis

Descriptive data are reported. The mean length of c-unit for baseline and treatment sessions was graphed for each participant and analyzed using visual inspection, the traditional method of analysis for single-subject designs (Kratochwill et al., 2013). Visual analysis determines whether there is evidence of a causal relationship between the independent and dependent variable and the magnitude of that relationship (Barlow & Hersen, 1984; Horner et al., 2005; Kazdin, 2011; Tawney & Gast, 1984). As there are no agreed upon statistical methods for analyzing data in single-subject designs, the authors have relied upon the *Single-case designs technical documentation* (Kratochwill et al., 2010) from the What Works Clearinghouse for a systematic procedure for conducting visual analysis. This involves visual analysis of the level (overall mean of outcome measures in a phase); trend (slope of the line of the data points); variability (range, variance, or standard deviation of the outcome measures); overlap (the proportion of data that overlaps from one phase to another); immediacy of the effect (the more rapid the change, the more convincing that the change is attributable to the independent variable), and consistency of data patterns across similar phases (a comparison of the data at baseline and treatment phases) (Kratochwill et al., 2013).

Results

The mean length of c-units per session per phase, mean number of words per phase, mean number of c-units per phase and mean length of time per phase for each child in the study are presented in Table 3. Graphs for each participant illustrate the mean length of c-units per session for each phase of the study (see Figure 1).

Length of Story Reading Sessions

Story reading sessions ranged in length from 2.68 mins to 12.00 mins with the mean length of session being 6.68 mins.

Mean Length of C-units

Visual inspection of the graphed data (see Figure 1) indicates that for three of the five participants a treatment effect was evident. Molly's initial baseline had a downward trend, indicating that the linguistic complexity of her language was diminishing in this phase. An immediate effect was evident following the first application of the treatment, although this effect began to diminish slightly over the period of the treatment. The second baseline phase again showed an immediate reduction in linguistic complexity and the next application of the treatment demonstrated an immediate increase in linguistic complexity.

A stable baseline was established for David, as indicated by the almost flat trend of the data points. The initial treatment had an immediate effect. With the exception of the final session, these data generally followed an upward trend. In the return to baseline phase, the data for David were again flat followed by an initial increase with the reintroduction of the treatment.

A flat and stable baseline was obtained for Lionel. An immediate effect was evident following the first application of the treatment. The second baseline phase trended downwards with an immediate and stable effect evident following the reintroduction of the higher order questioning stimulus.

Although a clear relationship between mean length of c-unit and level of questioning cannot be established for Anna, the mean length of c-units in her combined baseline sessions was 3.89, and 5.60 in the combined treatment sessions. Her mean length of c-unit increased following the first application of the treatment, but did not return to

baseline level when the treatment was withdrawn. Instead, it continued to rise through the second baseline and into the second application of the higher order questioning stimulus.

In the case of Alicia, although there was a very small rise in the mean length of c-units from baseline to treatment (from 5.33 to 5.47), visual inspection of the graphed results would suggest that there was no effect. When the modified questioning stimulus was introduced, the number of words per c-units fell to 4.38.

Discussion

The Effect of Higher Order Questions on the Level of Complexity of Language Used by Young Potentially Gifted Children

This replication study employed a single-subject reversal (ABAB) design to investigate the effect of a higher order questioning stimulus on linguistic complexity. It was hypothesized that the use of higher order questioning would produce more linguistically complex answers during story-reading to young gifted children. For three of the five participants (Molly, David and Lionel), the level of linguistic complexity, as measured by mean length of c-units, was found to be clinically greater in the treatment phases. The complexity of Anna's language increased across all phases of the study, suggesting that there was a competing explanation for the increase in linguistic complexity. On the other hand, Alicia showed no change in her level of linguistic complexity between the baseline and treatment phases.

In Anna's case, exposure to books in a one-on-one condition might have provided the practice needed to increase the sophistication of her responses. Despite coming from a high socioeconomic background and attending preschool, Anna had the least experience with the books presented during the study. In fact, when questioned, she claimed to have read none of the books, which seemed surprising as they were all award-winning Australian children's books. Anna was the only one of the five participants who did not

attend the university childcare center. Her main experience of story-reading, judging from her extraneous talk during the sessions, appeared to be with Disney cartoon stories. This may account to some extent for the consistent increase in her language production throughout the course of the study; that is, the data would suggest that she was learning the skills of responding to questions about stories as the study progressed. Anna's age may also have been a factor. She was the youngest participant in the study and the only participant not to be in the year prior to school. She may, therefore, have had less experience in being asked to respond to questions about stories. The results of a recent study (Kidd & Castano, 2013) have suggested that reading literary fiction, even for a short period of time, can have a positive effect on theory of mind and, therefore, even this short period of exposure to high quality fiction and higher order thinking questions could possibly have resulted in positive effects for Anna. The fact that Anna's PPVT age equivalent was more than a year behind the other participants may also have played a part, as may the difference in her preschool environment.

Alicia was a particularly shy and introverted child, with her mother relating that during her interview to enter school for the following year she had not uttered a single word, prompting the principal of the school to ask if Alicia spoke in full sentences. Although the researcher managed to establish some rapport with Alicia, and she was never unwilling to take part in the reading sessions, she was an extremely reluctant speaker. She often responded with "I don't know" to the questions asked in the sessions and needed encouraging non-specific prompts such as "What do you think?" or "Can you have a guess?" in order to elicit a response from her. She would often turn the page of the book indicating that she wanted to continue with the story rather than be interrupted with questions. Interestingly, Alicia's mother reported that Alicia spoke enthusiastically about the stories that had been read during the study, once she returned home after preschool. In

Alicia's case, a different treatment that involved higher order questions in a different setting, for example during free play or during routine activities may have produced a different result. Alternatively, if the stimulus questions had been delivered by her regular classroom teacher, with whom she would have been more familiar, this might have produced a better result.

Although the findings of the current study provide some support for those of the preliminary study, the results appear to be more modest for each of the three children for whom a clear effect was demonstrated. One possible explanation for this might be the existence of a ceiling effect, that is, the children were approaching the highest possible level on the instrument assessing their language. Loban's (1976) longitudinal study found that by Grade 1 (average age 6) children in his high achieving group (median IQ 116) were producing a mean of 7.91 words per c-unit. Both Molly and Lionel were approaching this score, with mean scores of 7.39 and 7.45 in their treatment phases respectively, even though they were two years younger than Loban's group.

Implications for Practice

Although the functional relationship between linguistic complexity and higher order questioning was not consistent across participants, three of the five participants demonstrated a clear treatment effect for the use of higher order questioning and four of the five demonstrated an overall improvement in the mean length of c-units in the treatment phases. This would suggest, that the technique has potential for increasing the syntactic complexity of verbal language in children of advanced verbal ability.

The fact that the mean number of words per c-unit fell in the non-treatment phases for most participants suggests that, for some potentially gifted children, lower order questioning will produce less complex language. Therefore, if teachers ask a low-level question, they will not necessarily be able to observe the true extent of a child's linguistic

ability. This has implications for the early childhood classroom where observation of children's behavior is a primary means of assessing their ability and subsequently planning, and evaluating educational programs. If gifted children are not given the opportunities to demonstrate their skills and abilities through exposure to higher order activities, it seems unlikely that they will demonstrate their ability spontaneously for the teacher. This challenges a commonly held assumption that young gifted children are easily identifiable within a preschool context and will readily demonstrate advanced ability regardless of the context.

The findings of the present study, therefore, highlight a need for early childhood educators to have high expectations for all children and to offer all children the opportunity to work beyond what may be considered to be their "developmentally appropriate" level. They also provide support for the use of "invitational curriculum" (Hodge & Kemp, 2002), whereby children are provided with teaching that stimulates and challenges and provides opportunities for young children to engage in open-ended tasks where they can demonstrate their advanced capabilities. This needs to be coupled with training in techniques of observation of advanced development and methods for extending young gifted children. Using higher order questions during story-reading may also provide teachers with opportunities to identify linguistically advanced children who might benefit from additional challenges.

The fact that only three of the five participants demonstrated a clear treatment effect also supports the idea that young gifted children need strategies that are tailored to their particular cluster of strengths and observed traits. Too often in the gifted education literature a "one-size-fits-all" approach is taken, where it is assumed that all gifted children will respond in the same manner to the same stimulus.

Use of Prompts

It was noted in the preliminary study that the child being asked the questions would sometimes respond immediately with “I don’t know”. The same pattern was observed with the children in the present study with 18% of answers commencing with “I don’t know”. The majority (61%) of the “I don’t know” answers were in response to higher order questions. As Whitmore (1980) suggested, children who are used to instant mastery, and have not been exposed to challenging material, may be reluctant at first to engage; however, it is interesting that this reluctance to respond appeared to occur with children as young as three and a half. A. Robinson and Feldhusen (1984) highlighted the importance of prompting and the need to ask children to explain and justify their thinking. In the current study the researcher would always prompt for a better answer when a child responded with “I don’t know”, by allowing wait time and then either repeating the question or using a non-specific prompt such as, “What do you think?” or “Can you have a guess?”. In most cases, (71% in the case of higher order questions, and 85% in the case of lower level questions) this would yield a better answer. The following example from the current research was taken from the reading of the storybook “The Tall Man and the Twelve Babies”, which tells the story of a man who lives with and cares for twelve babies:

Q: Where do you think the Tall Man got the 12 babies from?

A: I don't know.

Q: Can you have a guess?

A: Maybe cause there was a girl there, but she died and she had a lot of babies.

But maybe he found more babies.

(Molly, Day 7, Treatment Phase)

Another example was taken from the reading of the book “Come Down, Cat!”, which is about a cat stuck on a roof:

Q: What do you think the cat might be saying?

A: I don't know.

Q: Have a guess.

A: Maybe he's saying he's afraid to come down

(Lionel, Day 13, Treatment Phase)

This finding emphasizes the importance of the use of prompts when working with young gifted children in order to give them processing time and time to formulate their responses.

The Contribution of Single-Subject Design to Research and Practice Involving Young Gifted Children

In addition to supporting the findings of the preliminary study through replication with a larger number of subjects, this study contributes to a new body of research using single-subject methodology with young gifted children. This methodology has a long history within special education as being particularly useful in assessing the educational effectiveness of strategies and interventions with specialized and unique populations. The effectiveness of the methodology is highlighted in this study by the way in which it allows researchers to examine each child as a single case and to analyze the effect of the treatment on individuals, instead of looking at aggregated norms for the group, which can hide the effects for individuals. For example, the single-subject methodology allowed the researchers in this study to tease out possible explanations for why Anna's results kept rising over the period of the study. Additionally, being able to manipulate the treatment with Alicia allowed the researchers to try a different type of stimulus and to observe the effect on her behavior. This type of research can be very useful to classroom practitioners

in planning and evaluating effective teaching strategies for the children in their care, as well as for researchers seeking to bridge the gap between research and practice.

Limitations and Future Research

The application of the higher order questioning stimulus relied heavily on forming a positive rapport between the children and the researcher. For some very shy young children, such as Alicia, this was a difficult process as most story-reading sessions were short (under 10 minutes) and did not allow sufficient time for the child to “warm up”. As there appears to be a higher proportion of introverts in the highly gifted population (Silverman, 1993), it would not be unreasonable to suggest that these children may have difficulties when called upon to answer questions without sufficient wait time, or in a group situation. For this reason, further research using a group situation, and with the child’s regular teacher, is necessary to give a fuller picture of the effectiveness of the strategy.

No other dimensions of language sophistication apart from complexity of sentence structure were measured in the current research. For example, level of sophistication of expressive vocabulary is not reported. Consider, for example, the difference between these two sentences: “The cat sat on the mat” and “The feline lounged on the ottoman”. Both sentences consist of six words and one c-unit; however, the second sentence demonstrates a far greater sophistication of vocabulary than the first. A qualitative analysis of the children’s responses would assist in examining whether higher order questions produce a better quality of response, not just in terms of the complexity of syntax, but also in the vocabulary and ideas expressed.

No social validity data were collected for this study. Further research should investigate the ease with which early childhood teachers can be taught to write and ask higher order questions and the effect of asking the questions in a mixed ability group.

Story reading often happens in a group situation in early childhood classrooms and rarely in a one-on-one situation. It would, therefore, be interesting to observe whether the young gifted child is prepared to share his or her higher order thinking in a group setting and, indeed, the effect of this type of questioning on the other children in the group. It may prove that all children are capable of responding to these types of questions, or that the questions themselves serve as a strategy for bringing out the divergent and advanced thinkers among a group of young children, thereby providing another means of identifying children with advanced ability.

A variety of questioning types was used in the higher order questioning treatment: analogy, provocative question, attribute listing, paradox, and tolerance for ambiguity. Further analysis of the data with a larger sample size might assist in determining if any one of these particular questioning types was more effective in producing more complex answers, or if any one of the types was more difficult for the children.

The position of questions within the text also needs to be examined. Previous research (Reese & Cox, 1999) has examined the differences between an “interrupting” and a “non-interrupting” style, that is, whether the story is read and questions only asked before and after the story-reading or whether questions are asked throughout the story-reading session. The effect of this needs to be further investigated with young potentially gifted children, as it may be that a “non-interrupting style” increases the quality of answer given.

Conclusion

Young gifted children are clearly in need of differentiated instruction within the early childhood environment. Although the use of higher order questioning techniques has been advocated in the literature, there has been limited research support for its use in the classroom. In the current study, asking higher order questions resulted in the

production of more syntactically sophisticated language for three of the five potentially gifted children, suggesting that the use of higher order questions may be a valuable stimulus for young gifted children in the early childhood classroom. This study was a replication of a preliminary study investigating the effect of higher order questioning on the complexity of one potentially gifted child's language. Replication studies are important in single-subject research as they are needed to demonstrate the generalizability of the initial findings.

The study also contributes to the emerging body of research in the field of gifted education in which single-subject methodology is used to examine the differences in responses to stimulus among children who exhibit advanced development. This methodology holds promise for those in the field who are committed to evaluating and promoting evidence-based practice for young gifted children. Further research is needed to determine which types of questions might be the most effective, the best ways to use these questions in the early childhood context, and how to educate early childhood teachers to elicit higher order thinking.

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Table 1

Participants

Name	Age at testing	Sex	CPM		PPVT-4		Days per week in care	
			Percentile	Age Equivalent	Standard score	Percentile		Age Equivalent
Anna	3:3	Female	*	4y0m	134	99	5y5m	5
David	3:11	Male	*	5y0m	138	99	6y7m	5
Molly	3:11	Female	*	4y6m	139	99.5	6y8m	5
Alicia	4:3	Female	95	6y0m	136	99	6y10m	2
Lionel	4:7	Male	91	6y6m	135	99	7y5m	3

* The CPM percentiles for these children could not be calculated as the norms for the test begin at age 4.

Table 2

Examples of Intervention Question Types

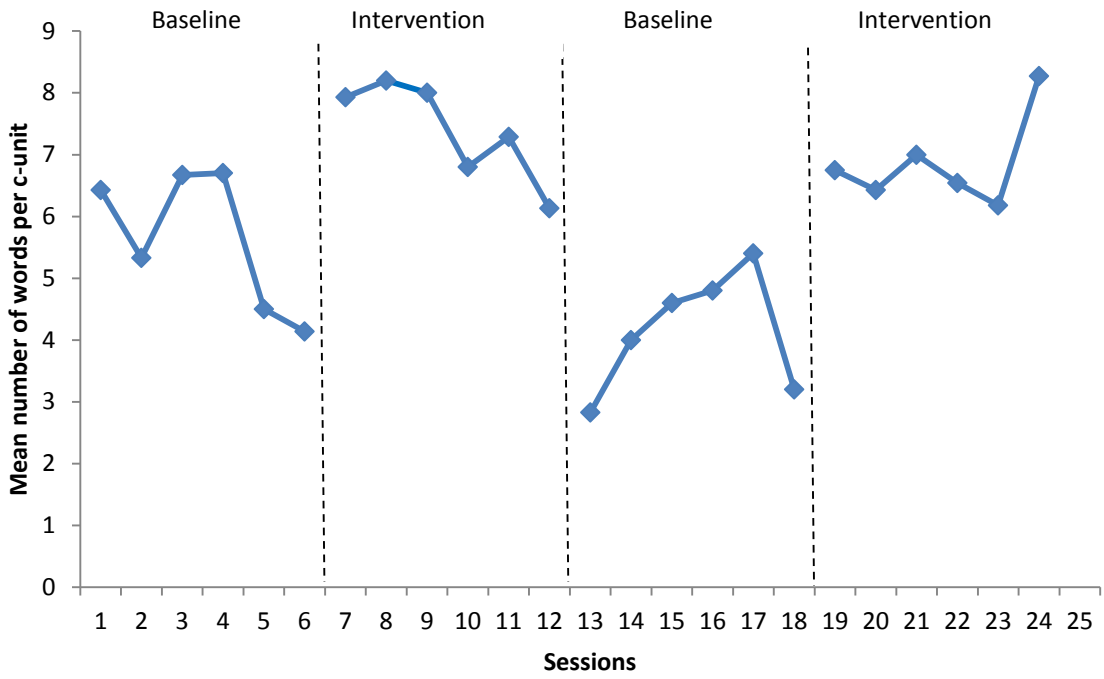
Question Type	Examples from “Tom Tom” by R. Sullivan and D. Huxley
Analogy – Situations of likeness; similarities between two things	How is Tom Tom like a fish?
Provocative Question – Inquiry to bring forth meaning; summons to discovering new knowledge	Tom Tom has lots of relations. Some people think that living with all your cousins and aunts and uncles would be fun. Do you agree? Why? Why not?
Paradox – A situation opposed to common sense, self-contradictory statement or observation	Why is the waterhole called “Lemonade Springs” when the water there “tastes just like water”?
Attribute Listing – Inherent properties, ascribing qualities	In what ways is Tom Tom’s day at preschool like your day at preschool?
Tolerance for Ambiguity – Pose open-ended situations which do not force closure	Why do you think Tom Tom has so many different names?

Table 3

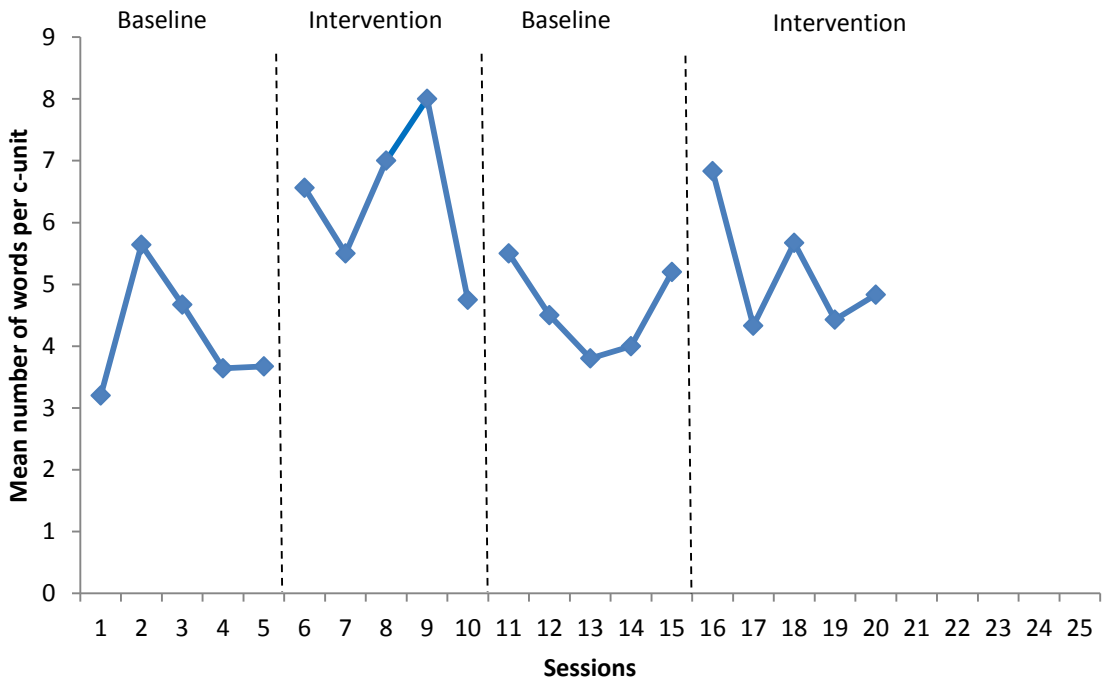
Overview of Study Data

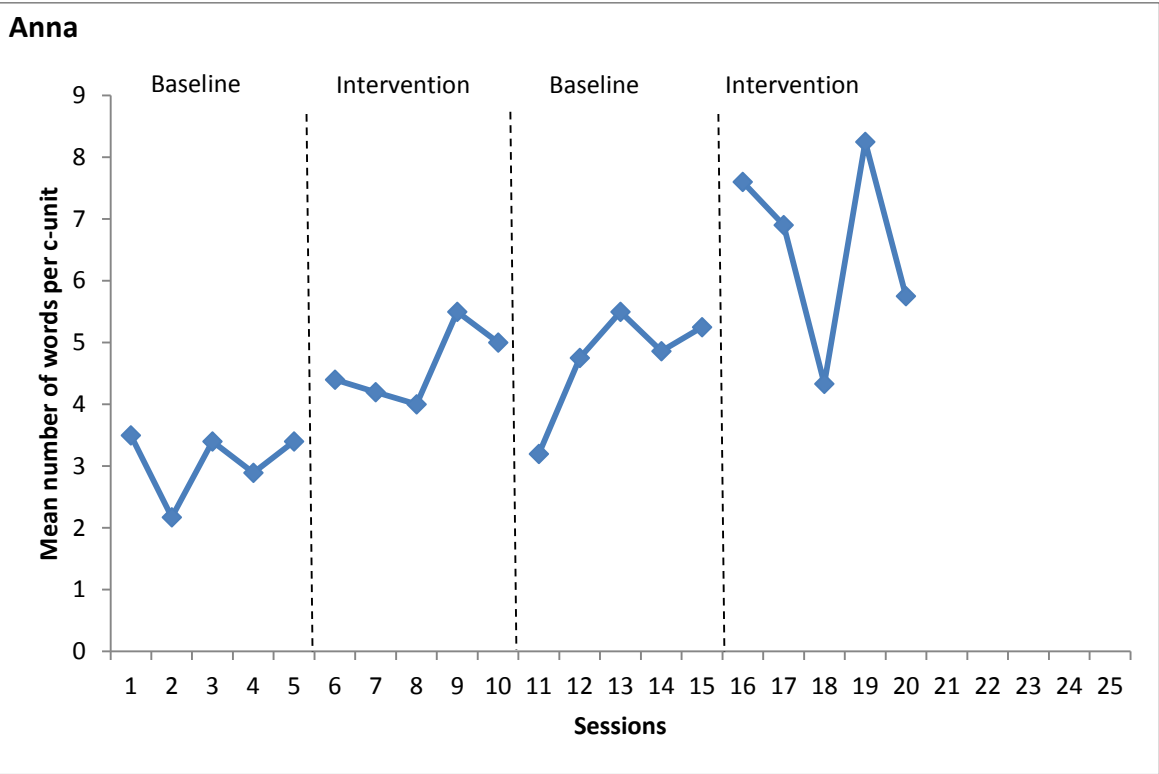
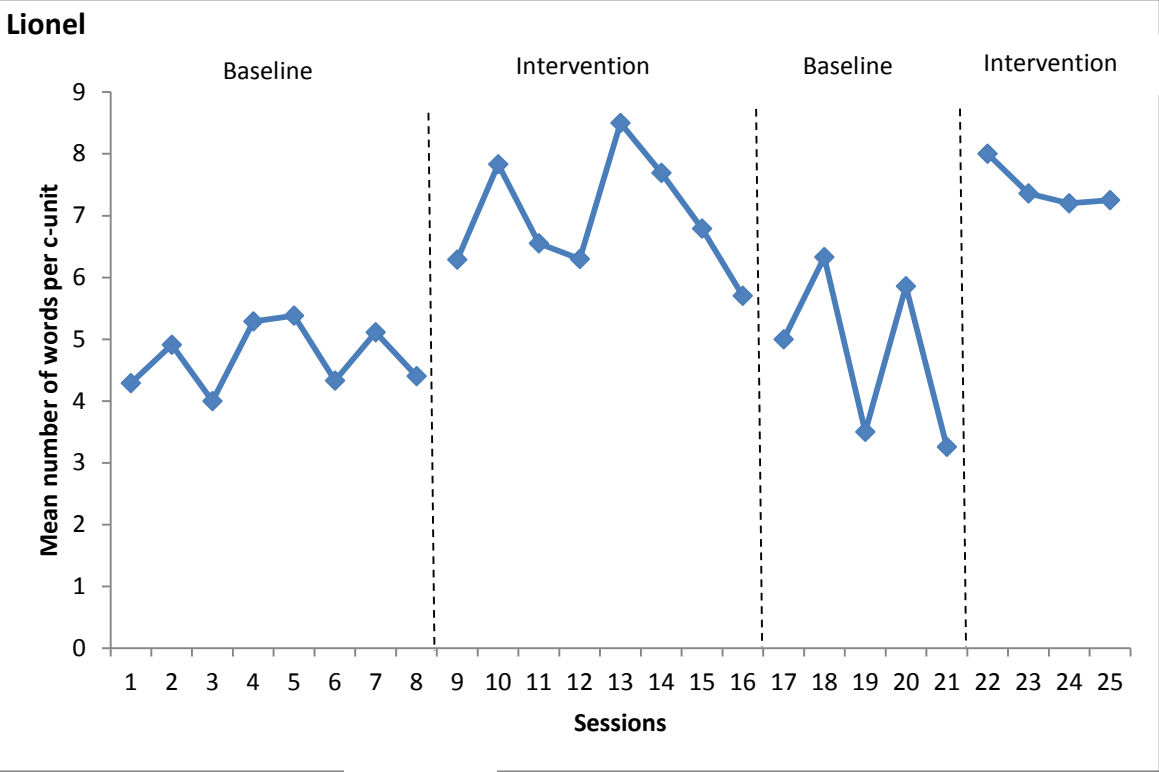
Child and phase	Mean length of c-units per phase	Mean length of sessions (mins) per phase
Molly		
Baseline A	5.63	7.22
Intervention B	7.39	6.58
Baseline A	4.14	7.45
Intervention B	6.86	6.59
David		
Baseline A	4.16	6.31
Intervention B	6.36	7.13
Baseline A	4.60	6.22
Intervention B	5.22	6.19
Lionel		
Baseline A	4.71	5.25
Intervention B	6.95	8.61
Baseline A	4.86	5.15
Intervention B	7.45	6.35
Anna		
Baseline A	3.07	6.23
Intervention B	4.62	7.65
Baseline A	4.71	6.86
Intervention B	6.57	7.10
Alicia		
Baseline A	5.33	5.58
Intervention B	5.47	8.99
Intervention C	4.38	5.94

Molly



David





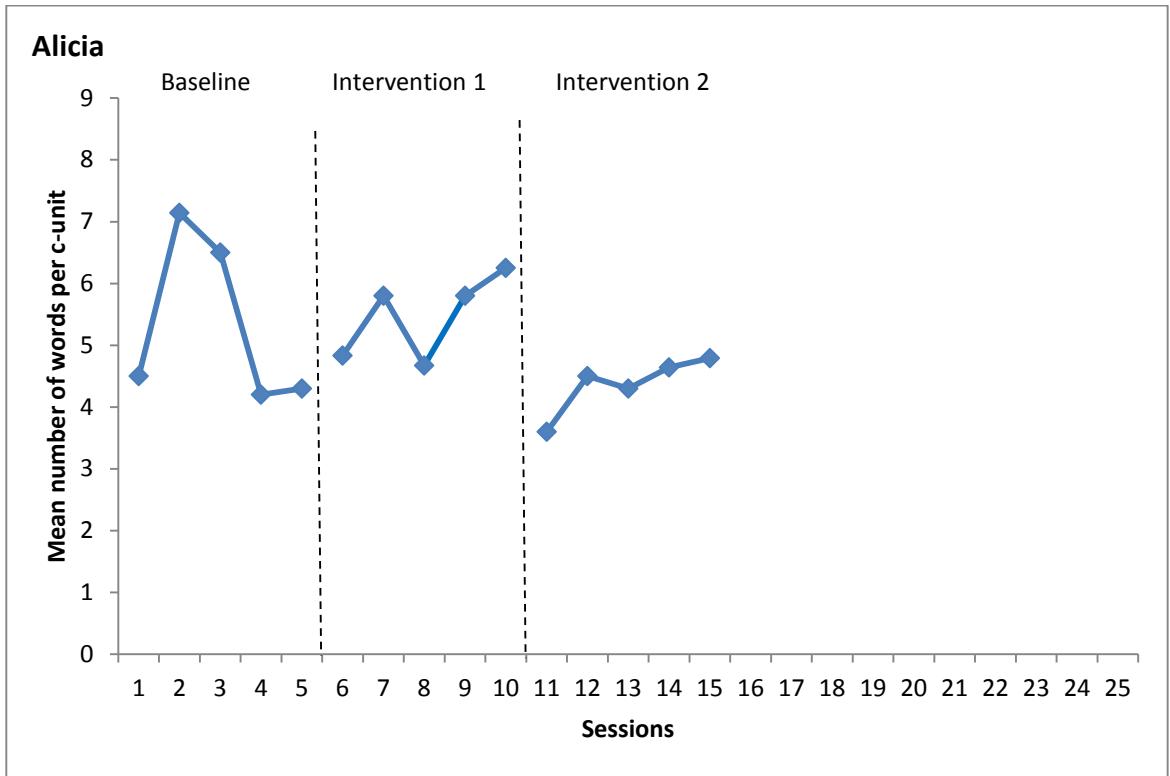


Figure 1. Mean words per c-unit

Chapter 7

Publication No. 6: Why Would You Say Goodnight to the Moon? The Response of Young Intellectually Gifted Children to Lower and Higher Order Questions during Storybook Reading

Publication Status: Submitted to *Journal for the Education of the Gifted*

Walsh, R. L., Bowes, J. M., & Sweller, N. (under review). Why Would You Say Goodnight to the Moon? The Response of Young Intellectually Gifted Children to Lower and Higher Order Questions during Storybook Reading

Statement of Candidate Contribution: This paper was co-authored with my doctoral supervisor, Professor Jennifer Bowes, who worked with me on ways to analyse child responses and Dr Naomi Sweller, who provided statistical assistance. I took the lead in writing, with contributions and revisions to subsequent drafts made by my co-authors and supervisors.

Abstract

Research into the effect of questions asked during storybook reading in preschool settings has generally targeted gains in vocabulary, with few researchers investigating questions that elicit higher level thinking. In the current study, Blank et al.'s Four Levels of Abstraction were used to code teacher questions and child responses from 177 individual storybook reading sessions with eight intellectually gifted 3- and 4-year-old children. The aim of the study was to investigate whether there was cognitive correspondence between teacher question and child response for lower and higher order questions. As expected, lower order questions, which have been found to be the most frequently asked questions in preschool settings, elicited mainly lower order responses. Significant cognitive correspondence was also found for higher order questions, which elicited higher order child responses 88% of the time. This suggests that such questioning would be a valuable addition to preschool storybook reading, particularly to extend the thinking of young intellectually gifted children.

Keywords: gifted, young children, questioning, higher order questions, abstract thinking, cognitive challenge

Why Would You Say Goodnight to the Moon? The Response of Young Intellectually Gifted Children to Lower and Higher Order Questions during Storybook Reading

Asking higher order questions is often cited as an appropriate intervention strategy to challenge and extend the thinking of young intellectually gifted children (Harrison, 2003; Maker, 1986; Robinson et al., 2007; Sutherland, 2012). However, little research has investigated how young gifted children respond when asked higher order questions (Walsh & Kemp, 2013), that is, whether higher order questions do in fact elicit higher levels of thinking. It is important to evaluate this strategy as previous research with teachers across all levels of education (from preschool to high school) demonstrated that teachers tend to rely on lower order questions and ask very few higher order questions (Dickinson & Keebler, 1989; Dickinson & Smith, 1994; Dillon, 1982; Hindman et al., 2012; Mills et al., 1980; Siraj-Blatchford & Manni, 2008; Zucker et al., 2010). If evidence can be found that asking higher order questions does indeed lead to higher level responses, especially in the context of shared book reading (SBR), implementing this change in teacher behavior could be highly beneficial for young gifted children.

Higher order questioning, designed to elicit inferential or abstract thinking, is defined as questioning that employs the higher levels of Bloom's Taxonomy: analyzing, evaluating and creating (Anderson et al., 2001). In a recent literature review of shared book reading (SBR) research with preschool aged children (citation removed), the authors concluded that the questioning strategies that teachers need to employ with young children are greatly dependent on the cognitive characteristics of the children. That is, in order to stimulate further growth in language and literacy in children who display advanced abilities, teachers need to tailor the questions they ask during SBR to the child's level of ability. From a theoretical perspective, if we want children to learn, then we need to provide educational experiences that fall into Vygotsky's Zone of Proximal

Development (ZPD). Vygotsky (1978) defined the ZPD as "the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (p. 86). In terms of SBR, if teachers ask questions that are too easy, children may become bored and disengaged (Turner & Paris, 1995). Likewise, questions that are too difficult may also cause children to become disengaged, anxious and/or frustrated (Turner & Paris). Optimal learning occurs when there is a match between the level of challenge and the level of the child's ability.

To date, most of the research about SBR interventions in the early years has focused on children from disadvantaged backgrounds and those with disabilities or language delays (citation removed). One study that did take into account individual differences in language ability was by Sénéchal, Thomas and Monker (1995). The 4-year-old children in the study were divided into two groups based on pretest scores on the Peabody Picture Vocabulary Test (PPVT-R; Dunn & Dunn, 1981). The high word knowledge group had a mean score of 113 (age equivalence of 5 years, 7 months; mean chronological age of 4 years, 9 months) and the low word knowledge group a mean of 93 (age equivalence of 4 years, 2 months; mean chronological age of 4 years 9 months). The children were then randomly assigned to one of two book reading conditions: passive listening, or labeling (in which the adult asked the child questions that required the child to label pictures with targeted vocabulary). Following two readings of the book, the children were tested on the new vocabulary presented in the book. The children with higher prior language knowledge who had participated in the labelling condition were able to produce more new words than children with smaller initial vocabularies and children in the passive listening condition.

A further experiment introduced a pointing condition in which children were asked to point to the illustration of the target word. Again, the researchers found that children with higher prior vocabulary outperformed the children with low prior vocabulary, but no significant interaction was found between reading condition and vocabulary knowledge; that is, no one reading condition was more effective for the children with high prior word knowledge. This study used only low-level forms of questioning (labeling and pointing to pictures) with the children. It is unsurprising, therefore, that the children with high prior word knowledge outperformed the low prior word knowledge group, nor that there was no significant difference between the questioning form that required labelling of pictures and the one that required pointing to pictures.

Several researchers have examined the difference and effects on children of low demand and high demand questioning (e.g., Blewitt et al., 2009; Reese & Cox, 1999; van Kleeck et al., 2006). Reese and Cox (1999) investigated differences between three styles of adult book reading: a describer style, a comprehender style, and a performance-orientation style. The describer style was characterized as low demand and involved labelling and describing by the adult throughout the book reading. In the comprehender style there was a focus on higher demand questions about inference and prediction, with questions asked throughout the reading of the book. The performance-oriented style of reader read the book uninterrupted and asked high demand questions only at the beginning and end of the book. Reese and Cox found that children with higher initial vocabulary appeared to benefit more from the performance-orientated style for further vocabulary development, whereas children with high initial comprehension scores benefited more from the describer style, which was found to increase their print awareness skills. This research supports the idea that the manner in which teachers read to

children needs to be matched to the abilities of the child and the learning outcomes that teachers are seeking.

Blewitt, Rump, Shealy and Cook (2009) investigated the effect of question demand level (high and low) and placement (interrupting and noninterrupting) on preschoolers' vocabulary learning, using level of general vocabulary knowledge (as measured by the PPVT-III) as an independent variable. They did not find any interaction effects for the high and low demand questions. That is, children with initially high vocabulary scores did not do better in the high demand condition and children with low initial vocabulary did not do better with the low level questions. However, in the same way as Sénéchal et al. (1995) had done, they did find a Matthew effect (Stanovich, 1986) present, whereby the children with initially higher vocabulary learned more new words than those with smaller initial vocabulary. Again, this study included no information about the responses that children gave to high and low demand questions during the questioning interventions.

In a second experiment Blewitt et al. (2009) compared low demand questions, high demand questions and a scaffolding condition in which low demand questions were asked first followed in later sessions by high demand questions. Again a Matthew effect was evident, with children with high initial vocabulary scores learning more new vocabulary than children with lower initial scores. They also found that children in the scaffolding-like condition, regardless of level of initial vocabulary, were able to provide better definitions for the new words learned than children in the low or high demand question conditions.

Although Blewitt et al.'s (2009) study would appear to contradict Reese and Cox's (1999) findings about the interaction between prior language ability and the appropriate level of questioning demand, Blewitt et al. conceded that in many situations

children with high initial vocabulary scores appear to show more gains when a higher order questioning style is employed. They suggested that this may simply be because more advanced children learn more quickly, or it may be because a large initial vocabulary has a causal relationship with new vocabulary learning.

For all the studies described above, the primary focus was on the most appropriate questioning strategies for the acquisition of new vocabulary, rather than on ways to develop children's ability to use higher level thinking skills such as analyzing, evaluating and creating. In none of the research reviewed were there reports of the accuracy of the children's responses or analysis of their responses for evidence of higher order thinking.

In contrast, the work of Blank, Rose and Berlin (1978a) focused on teaching thinking in the preschool years. Their model of classroom language explored the interactions between teacher and children to investigate how language can support higher level cognitive processes. Blank et al. proposed four levels of abstraction ranging from *Matching Perception*, and *Selective Analysis of Perception*, to *Reordering of Perception*, and *Reasoning about Perception*. The levels are hierarchical, with the lower levels representing levels of thinking that require more literal thought and responses and the higher levels requiring more abstract thought.

Blank et al.'s scale attempts to capture the distance between the content material and the language. As the distance becomes wider, the cognitive demands placed on the child increase. At the highest level of the scale children are required to "evaluate their perceptions and arrive at levels of judgment and reasoning that are based on, but go beyond, the specific information available at the moment" (Blank et al., 1978a, p. 13).

Cognitive Correspondence

There is conflicting research as to whether higher order questions do, indeed, elicit responses that indicate higher order thinking. Dillon (1982) refers to the extent to which a question of a particular level elicits a response of the same level as *cognitive correspondence*. Researchers working with high school and middle school samples have found that cognitive correspondence occurred in only about 50% of question-response cases (Dillon, 1982; Mills et al., 1980). These studies also found that the students were more likely to respond with a level lower than the level of the question than a response at a higher level than the question. Levels of cognitive correspondence were slightly higher for the lower levels of questioning. That is, a lower level question was more likely to prompt a low level response than a higher order question was to elicit a higher order response.

At the preschool level, very little research has been conducted about the level of cognitive correspondence between question and response, perhaps because of the overriding tendency of preschool teachers to use lower order questions (Siraj-Blatchford & Manni, 2008) and a perception that young children are not developmentally capable of abstract and inferential thought (Blank et al., 1978a). One study that did investigate cognitive correspondence during SBR with young children was conducted by Zucker, Justice, Piasta, and Kaderavek (2010) who analyzed children's responses in 25 preschool classrooms to determine if the level of abstraction of the questions asked resulted in more abstract responses by the children. They found statistically significant levels of cognitive correspondence at all four levels of Blank et al.'s Levels of Abstraction. However, the findings relied on the total corpus of questions and responses and did not allow an analysis of individual children's responses to the questions, as the method of data collection and the camera position did not allow individual children to be identified in

that study. Furthermore, Zucker et al. focused on the use of an informational text, rather than narrative fiction. More recently, Tompkins, Zucker, Justice, and Binici (2013) found high levels of cognitive correspondence during teacher-child interactions in pretend play with small groups of 3- to 5-year olds.

Gifted Children's Responses to Questions

In terms of our knowledge of the ways in which gifted children respond to higher order questioning, Gallagher, Aschner, and Jenné's (1967) seminal study of gifted high school students (aged 12-15 years) found that, even when teaching the gifted, teachers relied on cognitive memory (lower order) questions at least 50% of the time. In some of the classes that Gallagher et al. observed, there were no divergent or evaluative (higher order) questions asked at all. The authors also found that there was a consistently high relationship between the thought process asked for by the teacher (question type) and the thought process provided by the students (level of response). That is, if teachers asked a divergent thinking question, they were likely to receive a response that demonstrated divergent thinking. Similarly, if teachers asked a low level question they were more likely to elicit a low level response. Gallagher et al. stated that the latter was not surprising as it is hard to respond to a low level question such as "When was Lincoln shot?" with a response that displays divergent thinking.

With regard to young gifted children, previous research (citation removed) demonstrated that for some children the level of linguistic complexity in their responses to higher order questions during SBR was greater than for lower level questions. However, in that study the responses were analyzed using the mean length of communication units (c-units; Loban, 1976). C-units are defined as "each independent clause with its modifiers" (p. 9). Mean number of words per c-unit provides an indication of the linguistic complexity of a response, but not necessarily its cognitive complexity.

Using this measure, a response could be incorrect yet still have a high score on mean length of c-unit. For example, in response to the question “Do you think it is really possible for Mr Pockets to understand what the dogs are saying?” one child in the study responded with “Yes ‘cause if he doesn’t know then he doesn’t know what they are telling him” (scored as one c-unit of 17 words, with contractions counted as two words). Although this was a nonsensical response, it still scored highly on the c-unit measure of linguistic complexity. In contrast, a high level coherent response such as: “because he's a good man/ and he knows what dogs mean/ and he always listens to them” (scored as 3 c-units with a total of 18 words, giving a mean length of 6 words per c-unit), does not score as highly on the c-unit measure of linguistic complexity as the first response cited. However, it does indicate a higher level of thinking.

The purpose of the current study was to analyze the level of cognitive response made by gifted preschool children to higher order and lower order questions asked during SBR, with a view to examining patterns of thinking in response to different types of questions, and to determine whether there is cognitive correspondence (Dillon, 1982). Specifically the research questions were:

1. Are gifted preschool children able to respond to higher order questions?
2. What is the relationship between higher order questions and higher order responses and lower order questions and lower order responses (cognitive correspondence)?
3. Is there a relationship between question type and level of abstraction of child response?

Method

The data reported in the current study were originally collected for two studies examining questioning during SBR and its effects on the responses of young gifted children. The details of these studies are reported in (references removed). In order to examine children’s responses to higher and lower order questioning using finer

distinctions than are possible with a measure of the length of c-units, data were coded and analyzed differently for the current research. Data have also been included for two participants excluded from the earlier studies because a stable baseline required for single-subject research was not achieved.

Participants

Eight young gifted children were selected for this study based on nomination by the directors of their preschools and subsequent testing on the Peabody Picture Vocabulary Test-4 (PPVT-4; Dunn & Dunn, 2007) and the Raven's Coloured Progressive Matrices (CPM; Raven, 2004). Both of these tests are generally accepted as suitable measures of intellectual giftedness in young children (Karnes et al., 2005; Mills et al., 1993; Porter, 2005; Robinson & Robinson, 1992). A percentile score of 98 or above on either instrument was used as the criterion for acceptance into the study, this being the percentile equated with moderate giftedness (Gross, 1993a; Porter, 2005). The mean standard score of participants on the PPVT-4 was 136 (99th percentile; range 117-146; SD 8.3) and for the CPM 118 (range 100-140; SD 18). A standard score on the CPM could not be calculated for the three youngest participants as the test norms commenced at age 4. Pseudonyms have been assigned to the children to protect their identity.

The mean age of participants was 4 years and 2 months (range 3 years 3 months to 4 years 9 months). There were equal numbers of girls and boys. All children were attending daycare or preschool centers in [location removed] and spoke English as their sole language. The majority of the children came from middle-class families, based on the level of government support they received for their preschool/daycare fees, with the exception of one child (Molly) whose mother was a university student and received additional financial support from the government for childcare costs.

Setting

One private, one community, and one university childcare center were recruited for the study. Five children attended the university-based center only. One child attended the community center in addition to the university center, and the remaining two children attended a private center. All centers reported having a child-centered, play-based philosophy underpinning their curriculum and reported using SBR as part of their daily program.

Materials

Forty-three high quality children's books were used in the study. The books were all either winners or had been shortlisted by the Children's Book Council of [location removed] and contained narrative fiction suitable for younger children. A list of these books is available on request.

Development of Questions

Lower order and higher order questions were developed for each of the 43 books used in the study. Lower order questions were defined as "those that require responses either recalled directly from memory or cited explicitly in text" (Barden, 1995, p. 423). Higher order questions were "those that require more than simple recall to produce an answer" (p. 423). The lower level questions were developed using the lower levels of Bloom's Taxonomy: remembering, understanding and applying (Krathwohl, 2002). The higher order questions were developed using Frank E. Williams's (1972) *Total Creativity Program for Individualizing and Humanizing the Learning Process*. They included analogy, provocation, paradox, attribute listing, and tolerance for ambiguity. Although Williams acknowledged that his model was not specifically designed for gifted children (Williams, 1993), it is frequently cited as including strategies suitable for use with gifted

children (Gross et al., 2001; Maker & Schiever, 2005; VanTassel-Baska, 1994). Examples of the lower order and higher order questions used can be found in Table 1.

Procedure

All questions were scripted, and the place at which the question was to be asked was marked in the book with the question itself written on a sticky note. Children took part in one-on-one reading sessions conducted by the first author. After receiving informed consent from the children's parents, the author sought consent from the individual children by asking them if they wanted to take part in the reading. If a child was reluctant to take part, then the reading did not proceed. Only one child refused to take part on one occasion, as it was her birthday and she did not want to miss a cake making activity.

The reading sessions took place in the mornings at the child's center in a quiet room away from other children. During each reading session the child was read one randomly selected book. Children attended from 15 to 35 reading sessions (mean of 22.25 sessions) with one session a day on consecutive weekdays. The child was asked a selection of either lower order or higher order questions with questions being asked throughout the story reading session. In general, the questions were all of one type, that is, all the questions for the session were lower order, or all the questions were higher order. All children took part in both higher order questioning sessions and lower order questioning sessions. In the case of one child, the intervention was varied slightly and a 50/50 mix of higher order and lower order questions were asked during some of the sessions. No feedback was given to participants during the story reading. If a child did not respond to a question or responded with "I don't know", then the reader (the first author) would repeat the question, or give a non-specific prompt such as, "Can you have a

guess?” or “What do you think?” If a child asked a question during the reading the reader would respond with “What do you think?”

All sessions were recorded on an MP3 recorder with backups made on an iPhone. Transcriptions of questions and responses were made after each session.

Coding

All transcripts were imported into QSR International’s NVivo software program, a qualitative software program that assists researchers to manage, code and analyze data.

Questions. All adult questions asked during the story reading sessions were coded for level of abstraction using Blank et al.’s (1978a) Four Levels of Abstraction (see Table 1 for definitions of each level of abstraction). Within each level of abstraction each response was then coded for the question type as per the categories determined by Blank et al. (see Table 2).

Responses. All child responses to questions were coded for their level of appropriateness, ranging from fully acceptable to adequate to inadequate, and were assigned a score (see Table 3 for definitions and scores). All fully acceptable and adequate responses were then coded for their level of abstraction using Blank et al.’s (Blank, Rose, & Berlin, 1978b) four levels of abstraction. Codes and definitions are listed in Table 2. When a child responded with more than one answer (e.g., a child might respond initially with “I don’t know” and then, after a prompt, reply with a fully adequate response), the highest level response to the question was coded.

Reliability

Inter-rater agreement. A final year undergraduate Early Childhood Education student was recruited to analyze the accuracy of the transcripts prepared by the researcher. The independent rater was given 34 transcripts (19%) and the original recordings made of the sessions with the children. The independent rater was then asked

to note any discrepancies between the transcripts and the audio recordings. Percentage agreement between the researcher and the independent rater was calculated using the total agreement approach (Kennedy, 2005), that is, dividing the smaller total by the larger total and multiplying by 100. The inter-rater reliability for the transcription of the sessions was calculated to be 97%.

A graduate student undertaking study in early childhood was given 59 transcripts (33%) and coding instructions for level of question, question type, level of child response, and level of appropriateness of child response. Again percentage of agreement was calculated using the total agreement approach (Kennedy, 2005). The percentages of inter-rater agreement were calculated to be 84% for level of question; 92% for question type; 81% for level of child response, and 83% level of appropriateness of child response.

Results

Number and Duration of SBR Sessions

The children took part in a total of 177 story reading sessions. These sessions lasted a mean length of 6.68 minutes (range 2.68 to 12.00 minutes).

Questions

During the reading sessions, 997 questions were asked. Of these, 348 were lower order (Levels 1 and 2) and 649 were higher order (Levels 3 and 4) with an average of 5.6 questions per story reading session.

Gifted Children's Responses to Higher Order Questions

In order to determine whether the gifted children in the sample were capable of correctly answering the higher order questions, their responses were first coded for level of appropriateness using Blank et al.'s (1978a) Assessment of Child's Response (see Table 3). There were 290 fully adequate or acceptable responses to lower order (Level 1 and 2) questions and 403 to higher order (Level 3 and 4) questions. This means that 83%

of lower order questions and 62% of higher order questions received a fully adequate or acceptable response. The number of responses at each level of questioning is reported in Table 4. For Level 1 questions, 79% of responses were adequate or acceptable; at Level 2, 84% were adequate or acceptable; at Level 3, 64% were adequate or acceptable; and at Level 4, 58% were adequate or acceptable. Of the 403 adequate responses to questions asked at Levels 3 and 4, 354 (88%) were higher order (see Table 5).

Mean scores for each level of questioning were calculated using the criterion outlined in Table 3. Three points were awarded for fully adequate answers, two points for acceptable answers, one point for ambiguous answers, and no points for inadequate answers. Therefore the highest mean score is 3 and the lowest is 0. The mean scores and standard deviation at each level were 2.45 (SD=0.6991) at Level 1; 2.26 (SD=0.5032) at Level 2; 1.71 (SD=0.395) at Level 3; and 1.55 (SD=0.464) at Level 4. Blank et al. (1978a) set a criterion of 2.0 or above as reflecting mastery of a level. By this criterion 87.5% of the children in the sample mastered at Level 1, 75% at Level 2, and 37.5% at Levels 3 and 4.

In 48% of cases it was found that children gave acceptable or fully adequate responses after initially giving the response, "I don't know". In 56% of these cases the child had been prompted to answer the question. In the other 44% of cases the child's initial response of "I don't know" was followed by an unprompted, more complete answer.

Cognitive Correspondence

Generalized linear mixed models using SPSS version 22.0 were run to assess cognitive correspondence, that is, the extent to which teacher questions of differing levels corresponded with differing levels of child response. Both teacher question and child response were treated as ordinal variables, with levels ranging from one to four for both

questions and responses. Child response was assumed to have an ordinal multinomial distribution, and the cumulative complementary log-log link function was used. The more complex mixed model was required rather than a simpler ordinal logistic regression, as one of the assumptions of ordinal logistic regression is independence of observations. In the context of the current analysis, this would mean that each teacher question/child response pair was independent. Given each child responded to many different questions, this assumption is violated. The generalized linear mixed model was therefore run predicting child response from teacher question, with questions and responses nested within child. In other words, question/response is at Level 1, with child at Level 2, with multiple questions/responses present for each child.

Two analyses were run. The first analysis included child sex and teacher question as fixed factors, and book as a random factor. There were no effects of child sex or book ($p = .520$ and $p = .652$ respectively), so these two predictors were excluded from the second analysis (details of the first analysis available from the authors on request). The second analysis was identical to the first but had only teacher question as a fixed factor. The intra-class correlation for this analysis was .04, meaning 4% of the variance of the dataset was due to the clustering within children. It could be argued that this very small proportion of variance being accounted for by the clustering renders the generalized linear mixed model unnecessary, so the same analysis was re-run through an ordinal logistic regression. The overall results of the two analyses are highly similar, and the generalized linear mixed model analysis is reported here. There was a significant effect of teacher question, $F(3, 687) = 88.64, p < .0005$. Pairwise comparisons were carried out comparing each teacher question with all other teacher questions. Significance levels were Bonferroni adjusted for multiple comparisons, meaning all obtained p values are

compared to an alpha of .008. Parameter estimates and significance levels for each comparison can be found in Table 6.

As seen in Table 6, all pairwise comparisons were significant, meaning that increased levels of teacher question were associated with increased levels of child response. More specifically, a Level 1 question was likely to generate a Level 1 response, a Level 2 question a Level 2 response, a Level 3 question a Level 3 response, and a Level 4 question a Level 4 response (see Table 5).

Question Types

The relationship between question types within each level of teacher question and child response was analyzed with generalized linear mixed model analyses in SPSS, predicting child response (ordinal multinomial distribution as above) from question type, in order to obtain significance of differences between question types. At Levels 1, 2 and 4 no significant differences were found between the question types, that is, no one type of question appeared to be more effective than another at eliciting responses of certain levels than others ($p = .83$, $p = .07$ and $p = .40$ for Levels 1, 2 and 4 respectively). Significant associations were found, however, between question type and child response for Level 3: $F(6, 266) = 5.73$, $p < .0005$. See Table 7 for within-question type proportions of child responses at Level 3. As seen in Table 7, questions requiring children to summarize/synthesize information across more than one page appeared to yield the lowest level responses, whereas evaluate or judge non-perceptual qualities of objects/ideas/text as a whole appeared to yield the highest level responses. Post-hoc comparisons were therefore carried out within the generalized linear mixed model, comparing each question type to both (a) summarize/synthesize questions, and (b) evaluate or judge non-perceptual qualities of objects/ideas/text as a whole. Comparisons are Bonferroni adjusted for multiple comparisons, meaning all obtained p values are

compared with an alpha of .0042 (12 comparisons). Table 8 gives parameter estimates and significance levels for each comparison.

Child responses to higher order questions. Additional information about child response to teacher questions comes from examination of question-response pairs with a focus on the higher order questions that appeared to be most effective in eliciting from children a higher order response and the questions that children found difficult to answer. The results presented here focus on four particular higher order question types: evaluate or judge non-perceptual qualities of objects/ideas/text as a whole; compare similarities/differences of objects, characters or print; predict/hypothesize about subsequent events/conditions; and provide factual background information beyond the text. These have been selected as they provide further insight into some of the successful and less successful strategies.

Evaluate or judge non-perceptual qualities of objects/ideas/text as a whole. At Level 3 significant differences were found for those questions in which children were asked to evaluate or judge non-perceptual qualities of objects/ideas/text as a whole. This category included questions such as: “What does a farm need to be a farm?”; “Which do you think would be better to have, a baby or a pony? Why?”; and “Which do you prefer, night time or day time animals? Why?”. All these questions required children to give extended reasons for their choices or generalizations. The complexity of some of the answers received revealed higher level thinking and extensive knowledge. For example, in response to the first question, “What does a farm need to be called a farm?” one child gave the following response:

You need that (points to windmill) to make power and the farm is really big. It’s got lots of trees and grass and a light. Tractor and a lawn mower. And you need farm animals. So all farms have sheep dogs. I don’t think all

farms have cats. I once milked a cow. I did it a long, long, long, long time ago. (Lionel)

Lionel relied to some extent on the pictures from the book to identify components of a farm (e.g., windmill, trees, grass, a light) but then was also able to question whether certain elements were essential, such as the inclusion of cats. He then offered a text-to-real life connection by linking his knowledge of farms to his experience of milking a cow.

In the following example Molly used her knowledge of the habits of nocturnal animals to provide a justification of her preference for diurnal animals:

Researcher: These are night time animals (points to the book). Which do you prefer, night time or day time animals?

Molly: Day time animals.

Researcher: Why?

Molly: 'Cause they're just more nicer. They don't hunt around like night time animals. Look, (points to picture of a group of owls) they're making a collection.

Compare similarities/differences of objects, characters or print. Questions that required the children to identify similarities and differences were not as effective as some other forms of Level 3 questioning. On further examination it was determined that these questions fell into two separate categories: those that requested similarities, and those that requested differences. In some cases it appeared that the children were more able to answer questions that required them to describe differences than those that asked them how two things were alike. Consider the following examples from the book "Daddy's Having a Horse" (Shanahan & Quay, 2005) in which a father pretends he is pregnant with a horse while the mother is expecting a baby:

Researcher: How are babies like horses?

Lionel: I don't know.

Researcher: How are they different?

Lionel: Cause a horse goes neigh and babies go gaga and horses have hooves and babies have feet.

Lionel was unsure of how babies and horses are alike but quite confident in generating ways in which they are different. In the following example Molly demonstrated the same difficulty:

Researcher: How is the horse like the baby?

Molly: Umm... No.

Researcher: How is the horse different to a baby?

Molly: The pony... umm the baby doesn't have a tail and the pony doesn't have that (points to picture of the baby) and... that's something that I know.

On other occasions children appeared to confuse the terms “alike” and “different”, as in the following example.

Researcher: How are the Bunyip and wallaby alike?

Molly: That one's got feathers and that one doesn't. That's why they're different.

Cause that one's got feathers and that one's got feathers.

Predict/hypothesize about subsequent events/conditions. Prediction questions, in which a child is asked to hypothesize about an upcoming story event or action, are one of the most common forms of higher order questioning employed by early childhood teachers (Hindman et al., 2008). However, as (citation removed) highlighted, if a child has already read a story, then a prediction question such as “What do you think is going to happen next?” becomes a simple, lower order recall question. Although prediction questions were not found to yield significantly more higher order responses than other Level 4 questions, 68% of prediction questions did elicit a Level 4 response. There was

variation across the spread of answers, perhaps because of the variability of questions. For example, some prediction questions were very simple, e.g., “What do you think might be in the pirate chest?” One child’s response was “Gold” (Lionel). Other prediction questions resulted in much more lengthy explanations that demonstrated higher order thinking. For example, in the book “Mr Chicken Goes to Paris” (Hobbs, 2010) the children were asked to predict how the story would have been different if Mr Chicken had been a mouse. Alicia responded, “He would have fit on the plane.” Lionel replied, “It would be good because the mouse could just fit in. He could just go through the window.” Molly answered, “He would have been a little bit scuttly [sic] and he might bite.” All children were able to confidently predict changes that would occur in the story based on a change in the main character.

Provide factual background information beyond the text. Some questions required prior knowledge that the children did not possess. For example, in the book “Fearless” (Thompson & Davis, 2009) the mother places newspapers on the kitchen floor when she is house training the dog. Four of the children were asked “Why do you think Mum left newspapers on the floor at night?” The children responded with: “Cause he (sic) forgot to put them back” (Jeremy); “So the dog didn't get them?” (David); “Because she didn't want Fearless (the dog) to get them” (Anna); “Because... because... because... ummm... because she wants to read them after sleeping” (Adam). These are all logical answers, but they clearly demonstrate that the children did not possess the life experience to answer this question. In a situation where children were able to receive feedback this misunderstanding could have been eliminated.

Questions that were within the children’s field of knowledge proved more successful. For example, in the book “The Tall Man and the Twelve Babies” (Champion, Niland, & Niland, 2010) the children were asked to hypothesize from where the tall man

had obtained the 12 babies. Children's responses included: "From his wife" (David); "His tummy. Maybe he got them from the woman and the woman died so he's by himself with the 12 babies" (Lionel); "Maybe 'cause there was a girl there, but she died and she had a lot of babies. But maybe he found more babies." (Molly). All children were confident in generating ideas as to the origin of the 12 babies.

Responding to Lower Order Questions with Higher Order Thinking

Only one instance was found in the entire data set where a child gave a Level 4 response to a Level 1 question. At Level 2 approximately 24.7% of questions yielded a higher order response. The Level 2 question type most likely to elicit a higher order response was: describe perceptual qualities of objects/print. This type of question, such as "What does the bird look like?" yielded a level of response that was marginally higher than those in which a child was asked to recall actions/events/scene, e.g. "What did the bird do?" This may be because the children tended to repeat, sometimes verbatim, the text of the book when responding to recall questions. For example, one child in the study was asked a recall question during a reading of "Wilfrid Gordon McDonald Partridge" (Fox, 1984): "Why does he (Wilfrid) like Miss Nancy?". The text in the book reads: "But his favourite person of all was Miss Nancy Alison Delacourt Cooper because she had four names just as he did." The child's response was: "Maybe it's because she has four names just like him." (Lionel).

In contrast, when asked to describe the perceptual qualities of objects, the children were able to demonstrate higher levels of thinking. For example, children were asked to describe the house of one of the book characters. One child responded with "like a castle" (Alicia), another with "a ghost house" (Adam), answers that demonstrate an ability to generate similes (a higher order thinking skill), rather than simply rely on perceptual qualities such as big, brown, or messy.

Discussion

In this section the manner in which young gifted children respond to higher order questions is discussed with reference to the research questions. An overview of the most and least effective questioning strategies is presented. Implications for practice are then considered along with the limitations of the current study and possibilities for further research.

Are Young Gifted Children Able to Respond to Higher Order Questions?

The eight young gifted children who took part in the study demonstrated that they were able to respond to higher order (Level 3 and 4) questions. Unsurprisingly, as the questions became more cognitively challenging, the percentage of questions answered in a fully adequate or acceptable manner decreased. This mirrors the findings of Blank et al. (1978a) that, as the level of abstraction in questions increases, children's ability to answer decreases. Further to this, Blank et al. found that questions at Levels 3 and 4 were too difficult for the 3- and 4-year-old children in their sample. The children in the current study significantly outperformed Blank et al.'s cohort. Given that Blank et al. had already identified a relationship between IQ and performance on their discourse test—the Preschool Language Assessment Instrument (PLAI; Blank et al., 1978b), on which the coding system here is based—this was an expected result.

What is the relationship between higher order questions and higher order responses and lower order questions and lower order responses (cognitive correspondence)?

As both Zucker et al. (2010) and Tompkins et al. (2013) found, there was a significant level of cognitive correspondence at all levels of abstraction. That is, a Level 3 question was significantly more likely to elicit a Level 3 response, than a response which is higher or lower than Level 3. These results support earlier research in SBR contexts

(e.g., Zucker et al.) and in pretend play (e.g. Tompkins et al.) and further expand the research by employing a sample of intellectually gifted children.

It could be reasonably expected that young gifted children would demonstrate higher levels of cognitive correspondence than children of average ability. When compared with the results obtained by Zucker et al. (2010), it would appear that the children in the current study gave more higher order (Levels 3 and 4) responses than children in the Zucker et al. study, as well as a greater percentage of appropriate responses.

What are the Most Effective Higher Order Question Types?

In the present study, the effectiveness of a question type was determined by whether a child could give an acceptable answer to the question (level of appropriateness of response) and whether that answer demonstrated use of higher order thinking skills (level of response). Clearly the questions asked at the higher levels of thinking were more difficult than the lower order questions and therefore it is unsurprising that the lower level questions achieved a higher level of appropriateness. However, when examining the level of child response, it is apparent that higher order questions are more likely to produce higher order responses than lower order questions do.

With regard to the most effective types of higher order questions, the questions that required children to evaluate or judge non-perceptual qualities of objects/ideas/text as a whole were significantly more effective in terms of children generating higher order responses. It appeared that the children in this study were very comfortable with making evaluative judgments.

What were the Least Effective Higher Order Question Types

It is probably incorrect in some instances to label these questions as the “least effective”, in that questions that do not readily receive a higher order response may

provide opportunities for teaching. In the case of the compare similarities and differences questions, it would appear that some of the children had simply not grasped the concept of similarity, hence their confusion around the word “alike”. Clark (2013) suggested that the ability to see difference is easier than the ability to see connection, as seeing connection requires a more creative and intuitive style of thinking. This type of thinking, and therefore these types of questions, may be a useful teaching technique for young gifted children to challenge them to expand their creative thinking.

Some questions were clearly less effective at facilitating higher order thinking, such as those that required children to summarize/synthesize information across more than one page. These types of question are closer in expectations to the Level 2 recall questions, with the main difference being that children had to remember what had occurred over a longer space of time in the story. Although Blank et al. (1978a) viewed these questions as requiring a higher level of abstract thinking, because the distance between the text and the child was greater, it could be argued that these questions are in fact lower order in nature. This would especially be the case with young gifted children where their exceptional memory is a commonly identified trait (Porter, 2005). Therefore questions that rely solely on memory as likely to be easily answered and not particularly challenging.

Difficulty in Responding

All children experienced questions that they could not, or would not, attempt to answer. At some stages in the reading sessions it seemed that “I don’t know” was almost an automatic response. It may be the case that these were the first challenging questions that these children had been asked and therefore they were uncomfortable with answering them. Other possible explanations are that these gifted children thought an instant answer

was required (and were used to giving quick answers that were praised for being correct), or used "I don't know" to give themselves time to think.

Interestingly, Blank et al.'s (1978a) research indicated that the middle-class children in their sample with higher IQs were more likely to respond with "I don't know" than to give an answer that fell in one of the three inadequate categories (invalid, associated, or irrelevant). They hypothesized that this may be because these children were overly concerned with being correct or were inhibited about sharing their thoughts on the problem when unsure of the answer. Perfectionistic tendencies have been observed in young gifted children (Porter, 2005).

Implications for Practice

Young gifted children are capable of answering higher order questions and giving responses that demonstrate both a facility with language and complex thinking. However, teachers should not expect young gifted children to spontaneously demonstrate their abilities regardless of the level of questioning. It is important that teachers are aware that asking lower level questions will generally yield lower level responses and that higher order questions should be asked in order to give young gifted children the opportunity to both demonstrate and further develop their higher order thinking skills.

Teachers could use some of the question types suggested in this article with young gifted children. Some of these questions may be novel in a preschool setting and on face value may appear excessively challenging for the children. However, teachers should persevere with higher order questioning, remembering that children may initially respond with "I don't know" when first presented with a challenging question. Encouraging young gifted children to articulate their thinking processes and take intellectual risk is an important part of meeting the needs of these children (Porter, 2005). Teachers should

model thinking about a question, especially those higher order questions to which there is no one correct answer.

The propensity for children to respond by saying “I don’t know” highlights the importance of teachers’ awareness of concepts of “wait time” and their ability to use feedback to draw out answers from children. If teachers accept “I don’t know” without a prompt or allowance of more time, the child, in some cases, may view this as an acceptable response. Previous research in gifted education has demonstrated that children as young as 3 years are capable of modifying their intellectual behavior to conform with social norms (Gross, 1999). Therefore, if expectations in the classroom are low, a gifted child may well perform to those expectations.

The success of questions that relied on knowledge that the children already possessed highlights the need to be child focused in questioning. It also means that there are times during reading that questioning for comprehension is required to ensure that the children understand the concepts. An example is asking children if they know about house training a family pet, in the case of the example of the newspapers on the floor. In this case an explanation of the actions of the mother in the story would have assisted the children to understand what was happening.

Limitations and Future Research

Although the number of story reading sessions was high, the number of participants represents a relatively small sample and therefore the results of the study have limited generalizability. The children, with the exception of one, demonstrated particular strengths in the area of receptive language and would therefore be expected to have more developed language than their age peers. In this way, the results are not necessarily representative of all young gifted children and can only be applied to this population.

The data reported here were originally collected for two other studies—using a different methodology—and the questions were not initially developed using Blank’s Levels of Abstraction, although lower order and higher order questions were prepared. Consequently, the number of questions asked at each level of Blank et al.’s typology was inconsistent. For example, in the current study there were only 34 questions asked at Level 1, whereas at Level 4 there were 221. Future research might look at a more even spread of questions or replicating the 70:30, lower order to higher order ratio reported in the literature (van Kleeck et al., 1997).

As the original data were collected for two other single-subject design studies, there is no control or comparison group of typically developing children and, therefore, comparisons reported here have had to be made with data collected by other researchers. Ideally, a comparison group of children whose CPM and PPVT scores did not fall in the gifted range would assist in giving a more complete picture of whether the higher order questioning intervention is suitable for all children, or just gifted children, and whether gifted children demonstrate thinking that is significantly ahead of their age cohort.

The lack of feedback and further prompting of the children’s responses makes it difficult to ascertain how children would have responded in a more naturalistic setting. Unfortunately, the artificial nature of the original experiment prevented constructive feedback being provided to the children. In a naturalistic setting children may benefit from feedback and encouragement to continue to answer the questions. Possibly, the children who gave the response “I don’t know” then went on to give this response to all the questions for the session because the researcher had accepted the “I don’t know” response. In a normal interaction the adult reader would be able to provide more scaffolding and modify the question to assist the child to answer.

Other issues arising from the experimental nature of the research are that the researcher was initially an unfamiliar person to the children. Although the effects of a stranger reading with the child were to some degree controlled by the regularity of the sessions over a period of several weeks and by using the same reader for all sessions, it was clear from some children's responses during the sessions that they were more comfortable with their regular carers. Furthermore, the reading sessions were one-on-one, rather than in a group, which is the more usual mode of SBR in early childhood settings.

Conclusion

The current study demonstrates that young gifted children are capable learners who are able to successfully answer higher order thinking questions from an earlier age than would be expected from previous research. Their propensity to answer higher order questions with higher order responses highlights the usefulness of preschool teachers' inclusion of higher order questions in shared book reading with 3- and 4-year-old intellectually gifted children. This simple intervention, not often used in preschool settings, has the potential to challenge and extend young gifted children's thinking skills.

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Table 1

Examples of Question Types

Level of Question	Bloom's/William's Question Type	Definition	Examples from "The Pocket Dogs" by Margaret Wild	Level of Abstraction
Lower Order Questions	Remembering	Recognizing or recalling knowledge from memory	Where is Mr Pockets carrying his dogs?	Level 1 (Label objects)
	Understanding	Constructing meaning from different types of functions	Where does Mr Pockets live?	Level 2 (Recall scene)
	Applying	Carrying out or using a procedure through executing, or implementing	Why did Mr Pockets carry the dogs in his pockets?	Level 2 (Recall actions)
Higher Order Questions				

Analogy	Situations of likeness; similarities between two things	How are Biff and Buff like Mr Pockets' children?	Level 3 (Compare similarities/differences)
Provocative Question	Inquiry to bring forth meaning; summons to discovering new knowledge	Can animals dream? Why do you think so? Why do you think not?	Level 4 (Text-to-life connection/comparison)
Paradox	A situation opposed to common sense, self-contradictory statement or observation	Do you think it's really possible for Mr Pockets to understand what the dogs are saying? Why? Why not?	Level 4 (Judgment)
Attribute Listing	Inherent properties, ascribing qualities	Why would pockets make good places for dogs to live?	Level 4 (Justify or explain a prediction, judgment or inference)
Tolerance for Ambiguity	Pose open-ended situations which do not force closure	What could Mr Pockets do if his coat became too hot in summer?	Level 4 (Explain conditions that cause alternative outcomes or a solution)

Table 2
Blank's Four Levels of Abstraction

Level of Complexity	Coding Examples	Example of Teacher Discourse	Example of Child Language Behavior
1 - Directly Supplied Information (Matching experiences)	Label objects or print	What do you see?	Labelling of objects or actions "It's a balloon"
	Locate/notice objects or print	What is that?	Recalling information that has just been available "That's a whistle"
	Identify sounds	Did you see the snowman?	Expressing desire "I want that"
	Imitate/repeat a simple sentence/word		Employing verbal routines that are tightly bound to attractive and/or familiar contexts "Hi" – upon someone entering the room
	Count objects		Imitating what someone else has said "I see you" after mother has said it.
2 - Classification (Selective analysis of experience)	Describe story actions/events/scene	How does it feel?	Descriptions of single objects or actions "He's rolling"
	Imitate/act out story actions/scene	What color is it?	Labelling of isolated attributes "It's round"
	Describe perceptual qualities of objects/print		Integration of two or more distinct entities into a cohesive whole "She's pouring the milk"
	Recall information from a single page		

3 - Reorganisation (Reordering the experience)	Draw an inference from something not explicitly stated in text	Is an egg really round?	Involves concepts of time and sequence “He came here before we went to school”
	Explain/infer character’s point of view/cognition/feelings	What could we put around the snowman’s neck?	Concepts of exclusion “All of these are red except this one”
	Evaluate or judge non-perceptual qualities of objects/ideas/text as a whole		Metalinguistic skills “I know what W means; it means double U”
	Compare similarities/differences of objects, characters, or print		Generalisation “The knife and the scissors both cut”
	Summarize/synthesize information across more than one page		
	Formulate a generalization about events		
	Draw text-to-life connection/comparison		

<p>4 - Abstraction and Inference (Reasoning about the experience)</p>	<p>Predict/hypothesize about subsequent events/conditions</p> <p>Define a word's meaning</p> <p>Define the function/purpose of an object or print unit</p> <p>Explain conditions that cause alternate outcomes or a solution</p> <p>Identify causes of an occurrence/event</p> <p>Identify direct or indirect effects</p> <p>Distinguish between fact and fiction</p> <p>Provide factual background information beyond the text</p>	<p>What would make the snowman melt?</p> <p>What happens to water when you put it outside and it's cold?</p> <p>What else could I use this for?</p>	<p>Predictions "It's gonna break if you drop it"</p> <p>Formulating solutions "If we put two of them together it's not going to be long enough"</p> <p>Offering explanations "The baby can't lift that 'cause it's too heavy"</p> <p>Providing justifications "I could tell it would break because it was bending"</p>
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Note. Adapted from Blank & Franklin (1980), Zucker et al. (2010), Blank et al. (1978a), van Kleeck et al. (1997), Tompkins, Zucker, Justice & Binici (2013), and van Kleeck (2003).

Table 3

Assessment of Child's Response

Coding of Response	Rule for Coding	Score
Fully Adequate	Answer fully meets the demands of the task.	3
Acceptable		2
Imprecise	Answer valid but is vague or poorly formulated	
Oblique	Answer is not directed to the focus of the problem	
Extraneous	Answer includes extraneous or irrelevant information	
Ambiguous	It is not possible to determine if the answer is adequate or inadequate	1
Inadequate		0
Invalid	Answer shows an understanding of the question, but the answer is incorrect.	
Association to material	Answer indicates no understanding of the question, but it is focused on the material	
Irrelevant	<ul style="list-style-type: none"> a. Answer shows no understanding of the question or the material b. Answer is an imitation of all or part of the adult's words or actions c. Answer is denial of the problem stated 	
I don't know	Child states that he or she cannot answer	
No response	Child offers no verbal response	

Note. From Blank et al. 1978a. Blank et al. (1978a) stated that there is a difference between "I don't know" and "No response" as "I don't know" suggests a willingness to continue to engage with the exchange, whereas no response is indicative of a withdrawal from the dialogue.

Table 4

Frequency of Child's Adequate and Inadequate Responses at each Level of Blank et al.'s Scale, by Level of Question

Coding of Response	Level of Question			
	Level 1	Level 2	Level 3	Level 4
Fully Adequate	27	202	198	81
Acceptable				
Imprecise	0	54	51	25
Oblique	0	4	22	15
Extraneous	0	3	4	7
Ambiguous	0	1	10	14
Inadequate				
Invalid	7	17	39	22
Association to material	0	7	23	11
Irrelevant	0	7	27	16
I don't know	0	16	49	27
No response	0	3	5	3
Total number of questions	34	314	428	221

Table 5

Number (and Percentage within Teacher Question) of Appropriate Child Responses at Each Level

		Child Response			
		Level 1	Level 2	Level 3	Level 4
Teacher Question	Level 1	21 (77.8%)	5 (18.5%)	0 (0%)	1 (3.7%)
	Level 2	24 (9.1%)	174 (66.2%)	52 (19.8%)	13 (4.9%)
	Level 3	5 (1.8%)	37 (13.5%)	158 (57.5%)	75 (27.3%)
	Level 4	1 (0.8%)	6 (4.7%)	38 (29.7%)	83 (64.8%)

Table 6

Pairwise Comparisons of Level of Teacher Question to Level of Child Response

Comparison		B	SE	<i>t</i>	<i>p</i>
Question	Response				
Level 1	Level 2	-1.32	0.27	-4.84	< .0005
Level 1	Level 3	-2.62	0.28	-9.31	< .0005
Level 1	Level 4	-3.65	0.31	-11.65	< .0005
Level 2	Level 3	-1.31	0.27	-4.84	< .0005
Level 2	Level 4	-2.33	0.18	-13.19	< .0005
Level 3	Level 4	-1.03	0.17	-6.08	< .0005

Note. All significant at $p < .008$

Table 7

Proportions of Question Type to Child Response at Level 3

Question Type	Level of Child Response			
	1	2	3	4
Draw text-to-life connection	0	.06	.71	.24
Formulate generalization	0	0	.67	.33
Draw inference	.01	.16	.49	.34
Compare similarities/differences	.03	.07	.83	.07
Summarize/synthesize	0	.67	.33	0
Evaluate or judge non-perceptual qualities	0	0	.45	.55
Explain/infer character POV	.03	.20	.46	.31

Table 8

Pairwise Comparisons Between Question Types Within Level 3 Teacher Questions

Reference question	Comparison question	B	SE	T	p
Summarize/synthesize	Draw text-to-life connection	1.890	.6224	3.037	.003*
	Formulate generalization	2.472	.9435	2.620	.009
	Draw inference	2.128	.5614	3.790	< .0005*
	Compare similarities/differences	1.512	.5567	2.716	.007
	Evaluate or judge non-perceptual **	2.921	.6178	4.729	< .0005*
	Explain/infer character POV	2.059	.5640	3.651	< .0005*
Evaluate or judge non-perceptual	Draw text-to-life connection	-1.031	.4172	-2.472	.014
	Formulate generalization	-.449	.8232	-.545	.586
	Compare similarities/differences	-1.409	.3240	-4.348	< .0005*
	Draw inference	-.793	.3203	-2.477	.014
	Explain/infer character POV	-.862	.3235	-2.664	.008

Note. * denotes comparisons which are significant at $p < .0042$

** The corresponding comparison is not repeated in the bottom half of the table

Chapter 8: Discussion and Conclusions

In this chapter, a summary of the research conducted for this thesis is presented and examined in view of the research questions posed in Chapter 1. The contribution of the research to the fields of Gifted Education and Early Childhood Education in terms of the use of higher order questioning, the benefits of single-subject research design, and the intersection of research between the two fields is discussed. Implications for practice are examined, as well as the limitations of the research and directions for future research.

Overview of Findings

Chapters 3 and 4 presented extensive literature reviews of two areas addressed in this thesis. The first is of early childhood education research in the field of Gifted Education. The second is a review of the literature on questioning strategies during shared book reading.

The main finding of the review of early childhood education strategies in Gifted Education (Chapter 3) was that very little published quantitative research had been conducted with young intellectually gifted children. The majority of the literature has focused on identification of giftedness in the early years rather than on programming and teaching strategies to meet the needs of young gifted children. Where studies have been conducted, they tend to be qualitative in nature or else anecdotal reports of programs. A total of 11 empirical studies were identified and their methodological rigor examined. In many cases, the studies failed to meet the criteria for rigorous research. For example, problems relating to sample size, implementation of experimental research design, and finding appropriate measures for use with young gifted children were highlighted in this review. The research in this thesis attempted to redress the lack of rigorous research in this area and to address the issues discussed in Chapter 3 through the innovative use of single-subject design.

A further literature review was undertaken (Chapter 4) in which the questioning strategies employed by teachers during book reading with children in the early childhood years were reviewed with the aim of establishing guidelines for effective questioning practices. It became increasingly apparent during the process of writing this paper that the main aim of questioning during book reading in prior-to-school years was to develop vocabulary and pre-literacy skills such as learning the names and sound of letters, understanding the conventions of storybook reading and turning pages from right to left. There was little focus on development of higher order thinking or use of higher order questioning. Previous research, highlighted in the paper in Chapter 4, has demonstrated that young children's ability to respond to higher order questioning is often underestimated (Blank et al., 1978a) and that preschool teachers, on the whole, are not skilled in developing and asking higher order questions (Dickinson & Keebler, 1989; Dickinson & Smith, 1994; Hindman et al., 2012; Siraj-Blatchford & Manni, 2008; Zucker et al., 2010). If children of average ability are not being challenged by teacher questions, how much more frustrating must the situation be for young gifted children?

The aim of the research reported in this thesis was to develop, trial and evaluate a higher order thinking stimulus for young gifted children. The findings described in the articles contained in Chapters 5, 6 and 7 report on studies conducted with young intellectually gifted children during shared storybook reading. Chapters 5 and 6 report on two single-subject experiments in which a total of six young gifted children were asked lower order and higher order questions. The responses the children gave were measured using mean length of communication unit, as a measure of linguistic complexity (Loban, 1976). The results of these studies demonstrated that for four of the six young gifted children a treatment effect was found. This suggests, that for at least some young gifted children, asking higher order thinking questions produces increases in the linguistic

complexity of their responses. Furthermore, when asked lower order questions, the children gave lower order responses (see Chapter 7), suggesting that if educators regularly ask lower order questions the young gifted children in their class may not be encouraged to display or use higher order thinking.

Further analysis of these data, reported in Chapter 7, demonstrated that not only were the responses that these young gifted children gave to higher order questions more linguistically complex, these responses were also more cognitively complex than responses given to lower order questions. Comparison with findings from previous research (Blank et al., 1978a) suggests that the answers given by the young gifted children in the current research were also more cognitively complex than answers given by children of the same chronological age.

Research Question 1: Are intellectually gifted children of preschool age able to answer higher order thinking questions appropriately?

The research reported in Chapters 5, 6 and 7 suggests that, for the most part, these young gifted children were able to answer higher order questions in an acceptable manner. That is, their responses fell in the 'adequate' category in 62% of cases. The lack of non-responses reported in Chapter 7 suggests that these young gifted children could successfully engage with the questions. They made attempts to respond to the questions, even if not always successfully.

Research Question 2: Do intellectually gifted children of preschool age give more linguistically complex responses to higher order thinking questions than lower order thinking questions?

The research reported in Chapters 5 and 6 found that for four of the six participants in the research, asking higher order questions resulted in more linguistically complex language in their responses. Conversely, when lower order questions were asked, the children tended to give less linguistically complex answers, thereby suggesting that the change in language was attributable to the change in stimulus question.

Research Question 3: Do intellectually gifted children of preschool age give more cognitively complex responses to higher order thinking questions than lower order thinking questions?

In Chapter 7 the adequacy of the responses was evaluated and level of cognitive correspondence between question and response was assessed. In both respects the children demonstrated that their responses to higher order questions were more cognitively complex than their responses to lower order questions, and that this complexity increased with the level of complexity of the question. With regard to the level of the children's response to higher order questions, when the questions were answered in an adequate manner, 88% of the responses were at a higher level.

It would appear that, like most strategies, asking higher order questions is more effective at eliciting higher order responses for some young gifted children than it is for others. The results of the two single-subject studies reported in Chapters 5 and 6 demonstrated that an intervention effect could be seen for four of the six children. Further analysis of the results, as presented in Chapter 7, would suggest that the questioning strategy is effective in that higher order questions do elicit more higher level responses than lower level questions. Furthermore, there were particular types of higher order questions that were found to be more successful at eliciting higher order responses than others. These included questions that required children to use skills such as judging and

evaluating, the skills most closely associated with higher order thinking in Bloom's taxonomy.

Contribution of the Thesis

The work undertaken in this thesis has advanced knowledge in the fields of Gifted Education and Early Childhood Education in three ways. First, the research has demonstrated the effectiveness of higher order questioning as an intervention to elicit linguistic complexity and higher order thinking in young gifted children. Second, the particular research methodology employed—single-subject design—employs a little-used research method in the field of Gifted Education to test the effectiveness of asking higher order questions during shared book reading. Third, the studies contribute to the emerging body of research linking the fields of Gifted Education and Early Childhood Education, an intersection of fields that has received little research attention in the past.

The Effectiveness of Higher Order Questioning with Young Gifted Children

The finding that higher order questions are linked to more complex responses from young gifted children may not seem surprising. However, research that confirms what researchers have previously believed but not tested is both important and valid. To date, no one has demonstrated experimentally the effectiveness of higher order thinking questions for young gifted children. Furthermore, the research about the relationship between higher order questions and higher order responses is far from uniform. Although Gallagher et al. (1967) found that higher order questions were more likely to elicit higher order responses from gifted high school students, the same phenomenon had not been demonstrated previously with young gifted children. Indeed, the research with high school students is far less convincing than found in the current research, with reported rates of only 50% of cognitive correspondence between levels of question and response

(Dillon, 1982; Mills et al., 1980). More recently Zucker et al. (2010) and Tompkins, Zucker, Justice and Binici (2013) demonstrated significant cognitive correspondence between question and response with young children when reading informational texts and during observations of pretend play, but these studies were descriptive in nature and did not employ a sample of gifted children.

An important finding of the research reported in this thesis is that young gifted children who are asked lower order thinking questions tended to give relatively short and lower level responses. There is still a powerful belief in the general community that gifted children make themselves known to their teachers through their prodigious talents, which they demonstrate openly (Sutherland, 2008). Those working with young gifted children know that this is not always the case (Porter, 2005). Of course, there are children whose language and manner of expressing themselves from an early age provide a clear sign of their precocious development. However, as research has demonstrated, there are some highly gifted young children who choose from an early age to hide their talents, either from an innate tendency towards introversion, or to gain peer acceptance (Gross, 1999; Porter, 2005). Take, for example, Alicia, a participant in the current research. Despite scoring in the 99th percentile on the Peabody Picture Vocabulary Test, she was so reluctant to speak in public that when interviewed for school entrance at age 5, the principal needed to ask her mother “Does she speak in full sentences at home?” Such children can be missed by early childhood educators who are unaware of the traits of giftedness. For an education system that still values and actively cultivates extroversion (Cain, 2012), introverted gifted children are at risk of underachievement. They may not be identified by teachers, and therefore their need for intellectual stimulation may remain unmet from their earliest years of education.

The Value of Single-Subject Research in Gifted Education

One of the aims of this thesis was to demonstrate the usefulness of single-subject research designs in evaluating educational interventions in the field of Gifted Education. Despite the methodology having a long history in the field of Special Education, only one published study (Simonsen, Little, & Fairbanks, 2010) with a single-subject design was located in the Gifted Education literature. This was surprising given that there had been two articles in Gifted Education journals and a book chapter in a Gifted Education research text which advocated the methodology and its potential for use in the field (e.g., Foster, 1986; Simonsen & Little, 2011; Swassing & Amidon, 1991). Given the parallels between the fields of Special Education and Gifted Education (indeed, in many countries Gifted Education is part of the Special Education field) it is surprising that the methodology has not been used more widely.

The current research demonstrates the efficacy of this methodology in the field of Gifted Education, a field in which there has been little use of rigorous experimental and quasi-experimental research designs such as single-subject designs. The benefits of the methodology to researchers in Gifted Education are discussed in the article in Chapter 5. These include the ability to make judgements about the effectiveness of an intervention for an individual; the ability to assess the effectiveness of an intervention for an exceptional population; the fact that the subject acts as his/her own control, thereby alleviating the need to find suitable control groups; and the ability of the methodology to be used in classroom situations by researcher-practitioners.

Early Childhood Education and Gifted Education

Initially it would appear that the fields of Gifted Education and Early Childhood Education have little common ground, given the widely held assumption that the

development of intellectual talent is the domain of formal schooling (Robinson, 2008). Although there have been previous calls for researchers and practitioners from the two fields to work more closely together (Barbour, 1992), little research has been carried out in the intersection of the areas (see Chapter 3). Furthermore it has been difficult to promote the concepts of Gifted Education, which appear at first glance to be so different from those of Early Childhood Education. The contribution of the published article in Chapter 2 is to address the tensions and contradictions between the two fields, namely, issues relating the identification and labelling of young gifted children, appropriate strategies for educating young gifted children in an early childhood setting, the usefulness of current early childhood approaches, and the socialisation of young gifted children.

The research reported in this thesis contributes to an emerging field of research that examines the effectiveness of programs and provisions for young gifted children in prior-to-school settings. By connecting the curriculum and programming strategies used with older gifted children—in the case of the current research higher order questioning—and examining the effectiveness of the strategies when applied and adapted to the early childhood setting, it is hoped that the knowledge across the two fields can result in better educational experiences and outcomes for young gifted children.

Implications for Practice

There are a number of implications for practice that result from the research conducted in this thesis. These implications relate to the ways in which teachers ask questions in the early childhood classroom, the ways in which storybook reading is used in early childhood education, and how the cognitive needs of young gifted children can be met in early childhood settings.

Teachers need to be aware that their level of questioning may have an effect on the level of response and complexity of language of the young gifted children in their care. Developing an awareness of the types of questions that teachers currently use and building teachers' abilities to ask a wider range of more challenging questions requires teacher education. There is a skill to developing higher order questions that engage and challenge students. Early childhood educators need to plan storybook reading sessions with the aim of encouraging higher order responses, and questions should be devised accordingly.

There is a need to move away from the current practice of storybook reading as a "holding" or "transitional" activity that is conducted between other planned preschool experiences or at the end of the day to keep children busy until their parents arrive to collect them (Teale, 2003). As the research here has demonstrated, when used in an appropriate manner, planned storybook reading has the potential to impact on the complexity of language young gifted children use and the cognitive level of their responses to questions.

Young gifted children often crave intellectual stimulation. One of the ways in which early childhood educators can meet this need for intellectual stimulation is through appropriately planned storybook reading sessions. By using storybooks that interest the child and questions of suitable complexity, a child can be engaged and challenged to use his or her higher order cognitive skills and to demonstrate and develop more complex language.

Limitations of this Thesis

The research reported in this thesis has a number of limitations. These centre on issues around the chosen measures, the size of the sample, the social validity, and lack of a comparison group.

Measures

Choosing the right measures is critical in single-subject design (Kazdin, 2011). The choice to use of Loban's (1976) communication units (c-units) as the dependent variable was made after an extensive review of available measures of complexity of language and thinking. However, the choice is not without concerns. The primary limitation of the c-unit measure, in which the issue of incorrect answers being able to score highly on mean length of c-unit, was discussed in Chapter 6. This limitation was addressed in part by the research in Chapter 7 in which the child response data were reanalysed using a different method that took into account the adequacy as well as the cognitive complexity of children's responses to higher order questions.

Sample Size

The small sample size employed in this thesis may be perceived as a limitation. In total eight young gifted children took part in the research. Six children took part in the single-subject research, one in the pilot study (Chapter 5) and five as replications (Chapter 6), and a further two in the research reported in Chapter 7. However, these numbers are more than adequate for the single-subject methodology (Kazdin, 2011; Riley-Tillman & Burns, 2009; Tawney & Gast, 1984). In the further analysis of responses conducted for Chapter 7, the large number of reading sessions completed with the eight participants (177 in total) yielded a more than adequate corpus of question-response pairs for analysis.

Social Validity

The social validity of the research has been discussed in each of the articles in Chapters 5, 6 and 7. A possible limitation is the social validity of one-on-one reading situations in early childhood settings. Previous research has indicated that shared book reading in early childhood settings is more likely to occur in small or whole-class groups than in one-on-one sessions (Teale, 2003). The question of the application of the results obtained in this research is one that requires further research on small group and whole-class book reading sessions in early childhood settings. Furthermore, as there are very few programs in which young gifted children are taught in a self-contained setting, the social validity of mixed ability grouping needs to be addressed. That is, what is the effect of using higher order questioning strategies with groups that are not only small but also of mixed ability?

Lack of a Comparison Group

Although the single-subject experiments reported in this thesis use participants as their own control, the study reported in Chapter 7 (not a single-subject design) could have been augmented by a comparison group of children who were not in the gifted range. Some attempt has been made to rectify this omission by using the results of Blank et al.'s (1978a) research related to the different scores obtained by a wide range of children on the Preschool Language Assessment Instrument (PLAI; Blank et al., 1978b). Nevertheless, it may be that children of average ability could be just as successful at answering higher order questions as young gifted children. This needs to be explored in future research.

Directions for Future Research

The research presented in this thesis offers an insight into how a particular group of young gifted children responded to higher order questions during shared book reading. However, there are many questions that remain unanswered.

Further research is needed to tease out whether there is a link between the characteristics of some of the children, such as introversion, and the complexity of response they give. In Chapter 6 the possibility was discussed that the characteristics of some the children made them less responsive to higher order questions. There may also be links to the types of books children have been exposed to previously, the practices of home reading, and children's reading experiences in early childhood education. For example, in the article on the effect of higher order thinking on the complexity of language in Chapter 6, one child, Anna, had significantly less prior exposure to quality literature than the other children and her response level rose consistently over the period of the experiment, suggesting that learning was taking place in response to the exposure to quality literature as well as the challenging questions. Observation of the home and preschool reading environments would add useful data to help interpret the responses of gifted children to such learning opportunities.

In Chapter 7 it was suggested that perhaps there are certain types of questions that prove more successful in eliciting higher order responses. For example, those questions that required the children to provide evaluative responses were found to generate a greater number of higher level responses. There is a need for further research in which the number of questions of each particular type is more tightly controlled to determine more conclusively if some types of questions are indeed more effective than others for gifted preschool children. Research is also needed to investigate if this is the case for all children, or just for those with advanced abilities.

The issue of feedback given by the teacher to children's responses is another area in which further research is needed. In the experiments reported in this thesis feedback from the researcher was deliberately negligible, which is an unrealistic situation in a regular early childhood education environment. Research in which controlled feedback was given and attempts were made to scaffold the child into higher level ways of responding may give early childhood educators more information about the strategies they can use to encourage higher order thinking in all children.

The ability of educators to modify their teaching and questioning behaviour during shared book reading has been well documented in the research. Studies have shown that early childhood educators can be trained to ask more open-ended questions (Lee et al., 2012; Milburn et al., 2014). However, the ability of early childhood educators to generate more higher order thinking questions and draw out higher order responses from young gifted children is not known. The application of the higher order questioning strategy could also be investigated with parents to ascertain its effectiveness as a parent-led strategy to extend children's thinking and language.

The use of single-subject designs in the field of Gifted Education is an area in which there are many possibilities for future research. The unique characteristics and the small size of the gifted population mean that single-subject designs are useful for study of this group. There are many ways in which the designs could be employed, for example in measuring the effects of different teaching strategies with gifted students who are underachieving.

Conclusion

In conclusion, the use of higher order questioning during storybook reading with young gifted children has potential as a means of encouraging these children to

demonstrate higher order thinking. For some young gifted children higher order questioning elicits answers that are more linguistically complex. Conversely, when educators fail to use higher order questioning and young gifted children respond to lower order questions in a corresponding lower order manner, the children's giftedness may remain hidden. If our aim is to provide a challenging and supportive early childhood experience for all young children, then we need to take into account the characteristics of young gifted children and their need for intellectual challenge.

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Appendices

Appendix 1: Ethics Approval

Appendix 2: Participant Recruitment Information

Appendix 3: Expression of Interest Form

Appendix 4: Complete Listing of Williams' Teaching Strategies

Appendix 1: Ethics Approval

MACQUARIE
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15 July 2010

Professor Jennifer Bowes
Institute of Early Childhood
Macquarie University
NSW 2109

Reference: 5201000630D

Dear Professor Bowes,

FINAL APPROVAL

Title of project: Young Gifted Children's Responses to Higher Level Questioning: A Single Subject Experiment

The above application was reviewed by the Faculty of Human Sciences Ethics Review Sub-Committee. Approval of the above application is granted, effective 7th June 2010 and you may now proceed with your research. The following personnel are authorized to conduct this research:

Professor Jennifer Bowes – Chief Investigator
Mrs Rosalind Walsh – Co-Investigator
Dr Kerry Hodge – Supervisor
Dr Coral Kemp – Associate Supervisor

Please note the following standard requirements of approval:

1. The approval of this project is **conditional** upon your continuing compliance with the *National Statement on Ethical Conduct in Human Research (2007)*.
2. Approval will be for a period of five (5 years) subject to the provision of annual reports. **Your first progress report is due on 1st June 2011.**

If you complete the work earlier than you had planned you must submit a Final Report as soon as the work is completed. If the project has been discontinued or not commenced for any reason, you are also required to submit a Final Report on the project.

Progress Reports and Final Reports are available at the following website:
http://www.research.mq.edu.au/researchers/ethics/human_ethics/forms

3. If the project has run for more than five (5) years you cannot renew approval for the project. You will need to complete and submit a Final Report and submit a new application for the project. (The five year limit on renewal of approvals allows the Sub-Committee to fully re-review research in an environment where legislation, guidelines and requirements are continually changing, for example, new child protection and privacy laws).
4. Please notify the Sub-Committee of any amendment to the project.
5. Please notify the Sub-Committee immediately in the event of any adverse effects on participants or of any unforeseen events that might affect continued ethical acceptability of the project.

HUMAN RESEARCH ETHICS COMMITTEE
MACQUARIE UNIVERSITY

http://www.research.mq.edu.au/researchers/ethics/human_ethics

6. At all times you are responsible for the ethical conduct of your research in accordance with the guidelines established by the University. This information is available at: <http://www.research.mq.edu.au/policy>

If you will be applying for or have applied for internal or external funding for the above project it is your responsibility to provide Macquarie University's Research Grants Officer with a copy of this letter as soon as possible. The Research Grants Officer will not inform external funding agencies that you have final approval for your project and funds will not be released until the Research Grants Officer has received a copy of this final approval letter.

Yours sincerely,



Dr Peter Roger
Chair
Faculty of Human Sciences Ethics Review Sub-Committee
Human Research Ethics Committee

HUMAN RESEARCH ETHICS COMMITTEE
MACQUARIE UNIVERSITY

http://www.research.mq.edu.au/researchers/ethics/human_ethics

Appendix 2: Participant Recruitment Information

Young Children's Responses to Higher Level Questioning

You are invited to participate in a study of young children's responses to higher level questioning. The purpose of the study is to find out to what degree young children are capable of answering complex and abstract questions about picture books.

The study is being conducted by Rosalind Walsh of the Children and Families Research Centre, Macquarie University NSW 2109 (phone: 0416 250073) to meet the requirements of doctoral research under the supervision of Professor Jennifer Bowes of the Children and Families Research Centre, Institute of Early Childhood, Macquarie University NSW 2109 (phone: 9850 9844).

This study aims to trial the effectiveness of some questioning techniques not usually used in early childhood education. Results from the study will help equip early childhood professionals with some new techniques for encouraging higher order thinking with young children.

If you decide to participate, you will be asked to complete a questionnaire about your child. Your child will be asked to complete two short tests – a language test, and a test of non-verbal reasoning. Results of this testing can be made available to you on request. Following this, your child will read a story book with the researcher each morning over 4-6 weeks for a period of about 5-10 minutes. During this time, your child will be asked some questions about the book. All books have been chosen from the Australian Children's Book of the Year list. Your child will be audiotaped during the reading so that his/her answers and comments can be analysed. Audio recordings may be used in presentations about the research if you give your permission for this.

Any information or personal details gathered in the course of the study are confidential.

No individual will be identified in any publication of the results. Please contact me if you would like to receive a summary of the results of the study.

Participation in this study is entirely voluntary. You are not obliged to participate, and if you decide to participate, you are free to withdraw at any time without having to give a reason and without consequence. Should your child be at all reluctant to take part in the story reading he/she may withdraw at any time.

I, (_____) have read (*or, where appropriate, have had read to me*) and understand the information above and any questions I have asked have been answered to my satisfaction. I agree that my child and I will participate in this research, knowing that I (or my child) can withdraw consent at any time without consequence. I have been given a copy of this form to keep.

Parent/guardian's Name:

(block letters)

Parent/guardian's Signature: _____ Date:

Investigator's Name:

(block letters)

Investigator's Signature: _____ Date:

The ethical aspects of this study have been approved by the Macquarie University Human Research Ethics Committee. If you have any complaints or reservations about any ethical aspect of your participation in this research, you may contact the Committee through the Director, Research Ethics (telephone (02) 9850 7854; email ethics@mq.edu.au). Any complaint you make will be treated in confidence and investigated, and you will be informed of the outcome.

(INVESTIGATOR'S COPY)

Young Children's Responses to Higher Level Questioning

You are invited to participate in a study of young children's responses to higher level questioning. The purpose of the study is to find out to what degree young children are capable of answering complex and abstract questions about picture books.

The study is being conducted by Rosalind Walsh of the Children and Families Research Centre, Macquarie University NSW 2109 (phone: 0416 250073) to meet the requirements of doctoral research under the supervision of Professor Jennifer Bowes of the Children and Families Research Centre, Institute of Early Childhood, Macquarie University NSW 2109 (phone: 9850 9844).

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If you decide to participate, you will be asked to complete a questionnaire about your child. Your child will be asked to complete two short tests – a language test, and a test of non-verbal reasoning. Results of this testing can be made available to you on request. Following this, your child will read a story book with the researcher each morning over 3-4 weeks for a period of about 5-10 minutes. During this time, your child will be asked some questions about the book. All books have been chosen from the Australian Children's Book of the Year list. Your child will be audiotaped during the reading so that his/her answers and comments can be analysed. Audio recording may be used in presentations about the research if you give your permission for this.

Any information or personal details gathered in the course of the study are confidential.

No individual will be identified in any publication of the results. Please contact me if you would like to receive a summary of the results of the study.

Participation in this study is entirely voluntary. You are not obliged to participate, and if you decide to participate, you are free to withdraw at any time without having to give a reason and without consequence. Should your child be at all reluctant to take part in the story reading he/she may withdraw at any time.

I, (_____) have read (or, where appropriate, have had read to me) and understand the information above and any questions I have asked have been answered to my satisfaction. I agree that my child and I will participate in this research, knowing that I (or my child) can withdraw consent at any time without consequence. I have been given a copy of this form to keep.

Parent/guardian's Name:

(block letters)

Parent/guardian's Signature: _____ Date:

Investigator's Name:

(block letters)

Investigator's Signature: _____ Date:

The ethical aspects of this study have been approved by the Macquarie University Human Research Ethics Committee. If you have any complaints or reservations about any ethical aspect of your participation in this research, you may contact the Committee through the Director, Research Ethics (telephone (02) 9850 7854; email ethics@mq.edu.au). Any complaint you make will be treated in confidence and investigated, and you will be informed of the outcome.

(PARTICIPANT'S COPY)

Appendix 3: Expression of Interest Form

RESEARCH STUDY EXPRESSION OF INTEREST

Young Children's Responses to Higher Level Questioning

This study aims to trial the effectiveness of some questioning techniques not usually used in early childhood education. Results from the study will help equip early childhood professionals with some new techniques for encouraging higher order thinking with young children.

To be eligible to take part in the study, the child must have English as his or her first language and be between 3 and 5 years of age.

What is involved?

Your child's receptive language and non-verbal thinking skills will be assessed. This involves two short tests that will be called a "word game" and a "puzzle game". You can elect to receive a short report on your child's performance.

Over a period of approximately 3-4 weeks I will come to the childcare centre each day and spend 5-10 minutes reading a picture book with your child one on one. These sessions will be audio taped to assist with analysis of how your child responds to the questions.

Children will be able to withdraw from the research at any stage and your child will not have to take part on any day when he or she does not feel like doing so.

This study has been approved by the Macquarie University Human Research Ethics Committee.

If you would be interested in your child taking part or would like to know more, please contact Rosalind Walsh on 0416 250073 or email rosalindlee.walsh@students.mq.edu.au

Appendix 4: Complete Listing of Williams' Teaching Strategies

Strategies or Modes of Thinking	Explanation	Example
Paradoxes	Situations opposed to common sense; self-contradictory statement; discrepancy in belief, but true in fact.	In HSIE when pupils explore problems of poverty let them consider old proverbs such as "Hard work will solve any problem".
Attributes	Ask pupils to look at attributes: inherent properties; conventional symbols or identities; ascribing qualities.	In art have students analyse the properties of something considered artistically pleasing.
Analogies	Use analogies: situations of likeness; similarities between things; corresponding circumstances.	Allow pupils to discover how mechanical or scientific products have been adapted from a similar feature in nature.
Discrepancies	Point out discrepancies: gaps in knowledge; missing links in information; unknown elements.	In science ask students to think about and list things that scientists do not know yet.
Provocative Questions	Ask provocative questions: inquiry to bring forth meaning; inquiry to incite knowledge exploration; summons to discovering new knowledge.	Have children consider the differences between factual inquiries and in-depth comprehension.
Examples of Change	Cite examples of change: demonstrate the dynamics of things; provide opportunities for making alterations, modifications or substitutions.	Study a scientific principle and trace changes of its use through time.
Examples of Habit	Use examples of habit: discuss the effects of habit bound thinking; build a sensitivity against rigidity of ideas and functional fixation of things.	In Science and HSIE show examples of how the lives and functions of society have been held back by habit bound thinking or refusal to change old ways of doing things.
Organised Random Search	Allow for an organised random search: use a familiar structure to lead randomly to another structure. Set ground rules and allow students freedom to explore other ways within the rules.	In Literacy ask children to write their own poetry using the rules of cinquains or haiku.
Skills of Search	Consider ways something has been done before (historical search); use trial and error search on various methods and describe results (descriptive search); control experimental conditions and report subsequent results (experimental research).	Show how a law or theory was deduced through controlled observations (experimental research).
Tolerance for Ambiguity	Provide encounters which puzzle, intrigue or challenge thinking; pose open ended situations which do not force closure.	Show a portion of a film and after turning it off at a crucial point as the students to solve the problem or finish the story. Have them verify their or compare their ending to that of the film.

Intuitive Expression	Feelings about things through use of all of the senses; skills of expressing emotion; inward hunches about knowledge.	Point out examples of where scientists have been influenced by their intuitive hunches.
Adjustment Development	Examine how failures or accidents have paid off; how people learn from their mistakes; use examples of the process of developing from rather than adjusting to something.	Among great historians or contemporary political leaders show how sometimes they learn from their own mistakes, failures or accidents.
Study Creative People and Process	Analyze the traits of eminently creative people; study the processes that have led to creation.	In music or art have students discover how personal, physical or social challenges experienced by some people have fostered creative endeavours.
Evaluate Situations	Decide upon solutions in terms of their consequences and implications; extrapolate from the results of ideas and actions.	Pose the question: If this were to happen, what would the result be?
Creative Reading Skill	Develop a utilitarian mind-set for information; learn the skill of idea generation by reading; read not what it says, but where it takes you.	In any subject allow many opportunities for students to produce their own ideas from their reading rather than just ask them to recall what they read.
Creative Listening Skill	Learn the skill of idea generation by listening; listen for information which allows one thing to lead to another.	In music have children listen to a piece and create a story about what they think they hear. Have students list ideas as they listen.
Creative Writing Skill	Learn skills of self-expression through writing; develop the ability to write one's ideas clearly.	Ask children to state an idea they have in written form but in a way no one else has thought of.
Visualization Skill	Practice describing views from unaccustomed vantage points; express ideas in three-dimensional form; look at things from an unusual or different perspective.	Ask students to draw their classroom while lying on their backs on the floor.