The present study investigated the effects of a special interactive dialogic reading method developed by Whitehurst et al. (1988) on deaf and hard-of-hearing children in Hong Kong. Twenty-eight deaf and hard-of-hearing children in kindergarten, first, or second grade were pretested on a receptive vocabulary test and assigned to one of three conditions, dialogic reading, typical reading, and control, with age and degree of hearing loss matched. After an 8-week intervention, the children were re-tested. The dialogic reading group had a significantly greater improvement in vocabulary scores than did the other two groups. Parent-child interactions of high quality and the use of pictorial materials are likely the key successful factors in the program. The educational value of this intervention is discussed.

The present study tested the effects of a special parent-child reading method called dialogic reading (e.g., Zevenbergen & Whitehurst, 2003) to deaf and hard-of-hearing children in Hong Kong. By adapting this program, which has been used successfully to promote language skills in English-speaking, typically developing children, to deaf and hard-of-hearing children growing up in a Chinese society, we tested the extent to which this shared parent-child reading technique could promote vocabulary skills in a rarely studied population. Below, we review previous research on deaf and hard-of-hearing children in relation to general language skills, focusing on vocabulary skills, family interactions, and Hong Kong Chinese children’s language opportunities and development.

Hearing Loss and Language development

Language development involves skills and knowledge about the sounds of the language, how words are formed and are related to each other, and how language conveys meaning (Snow, Burns, & Griffin, 1998). Because of their difficulties in hearing, deaf and hard-of-hearing children tend to be relatively slow to develop language, and language deficits are common characteristics of children with hearing loss (Kretchmer & Kretchmer, 1978; Laughton, 1989). Language deficits have been found among the deaf and hard-of-hearing in all of the major language domains: syntax, morphology, semantics, pragmatics, and phonology (Levitt, 1987; Moeller, Osberger, & Eccarius, 1986; Shaw, 1994), and these deficits further lead to reading and academic difficulties, especially in language related subjects (Moeller et al., 1986).

Receptive vocabulary delay is one of the most difficult problems children with hearing loss face during language acquisition. A large-scale study by Moeller, Osberger, and Eccarius (1986) examined the receptive vocabulary skills of a group of 150 deaf or hard-of-hearing individuals from the ages of 4 and a half to 20 years old. These individuals demonstrated receptive vocabulary skills that were, on average, equivalent to those achieved by 5- to 7-year-old hearing children. Delays ranged from 2 years developmentally at 6 years of age chronologically to 9 years developmentally at
Moeller et al. (1986) found that there was a lack of improvement in language skills with age, with a plateau in vocabulary development at 12 to 13 years old. Carney and Moeller (1998) accounted for this finding by postulating that children with hearing loss have problems assessing constant and consistent information from the environment. Such difficulties result in poor early learning experiences that, in turn, create a weak foundation for forming language rules and developing language skills. However, although hearing impairment is related to delay in language development, the degree of hearing loss is not the determining factor in the delay. For example, receptive vocabulary delay has been found in children with only mild hearing losses as well as profound hearing losses (Davis, Elfenbein, Schum & Bentier, 1986). Mayne (1999) also found that degree of hearing loss is not significantly correlated with receptive vocabulary scores.

In the present study, we focused on receptive vocabulary skills of young deaf and hard-of-hearing children from Hong Kong. The importance of environmental stimulation for organization of sensory modalities early in development is widely recognized. We therefore adopted a multi-modal perspective on language instruction for children with sensory impairments. We did this by adapting visual stimuli in a shared parent-child reading program to suit the needs of deaf and hard-of-hearing children and their parents.

Positive family environment

Numerous studies have demonstrated that positive family environment is associated with many aspects of children’s language growth among normal hearing children (Zevenbergen & Whitehurst, 2003). Similar results have also been found in children with hearing impairment. Parental involvement in education of students with hearing impairment has yielded positive reports on academic, language, and social-emotional development (Bodner-Johnson, 1986; Calderon & Greenberg, 1993; Calderon, Greenburg, & Kusche, 1991). Also, Moeller (2000) examined the vocabulary skills in 1.5 to 5-year-olds with hearing loss who were enrolled in an intervention program and found that children with greater family involvement in the intervention program had higher language scores, regardless of the degree of hearing loss. Calderon (2000) assessed 28 children with prelingual, moderately severe to profound, sensorineural hearing loss and their parents who were able to sign to their children. Calderon indicated that parental involvement in their children’s educational program was the strongest predictor of children’s language development, and it shared considerable variance with maternal communication skill. These studies have demonstrated that family involvement, especially maternal communication skills, is critical for language development of deaf and hard-of-hearing children.

Parent-child reading provides one excellent context for parents’ involvement in children’s language learning and communication with their children. Over the past several decades, researchers have demonstrated that parent-child reading is associated with many aspects of language growth of typically developing children. Frequency of parent-child reading in the home can enhance preschool- and primary school-age children’s language comprehension and expressive language skills and has contributed to the gains in preschoolers’ vocabulary, oral language complexity, and narrative skills (Zevenbergen & Whitehurst, 2003). Longitudinal research has demonstrated the relations among early experiences with shared picture book reading and later language skills (Crain-Thoreson & Dale, 1999; Zevenbergen & Whitehurst, 2003). Despite the positive impacts of parent-child reading, few studies have examined the effects of parent-child reading for children with special developmental disorders and even fewer for deaf and hard-of-hearing children.

Ezell, Justice, and Parsons (2000) conducted one of the few studies investigating the effectiveness of parent-child reading on preschoolers with communication problems. Four parents and their children completed a 5-week program that included group parent training and individual training in guided reading. Results indicated that this parent-child reading program positively influenced children’s concepts of receptive and expressive alphabetic vocabulary. This study is encouraging because it demonstrates effective ways for parents to aide language learning of children with special needs.
However, parents of deaf and hard-of-hearing children report difficulties in teaching their children language for at least two reasons. First, because 95% of deaf or deaf and hard-of-hearing children are born to hearing parents (Mitchell & Karchmer, 2004), these children are often unable to exploit their available language learning capabilities because of a sensory mismatch between their own abilities and home environment (Padden & Humphries, 1988; Wilcox & Corwin, 1990). Second, parents of deaf and hard-of-hearing children may not feel skilled enough to communicate with the child with hearing loss and feel more comfortable being observers who are not involved in the reading process (Powers & Sackiewicz, 1998). Therefore, methods that can be employed to teach language are particularly needed by parents of deaf and hard-of-hearing children. Parent-child reading is an ideal context for practicing language skills.

Merely reading aloud to children during parent-child reading is likely not the best way to improve children’s language skills, especially for deaf and hard-of-hearing children. Previous research has suggested that parents’ specific techniques in parent-child reading, such as questioning, praising, and extending information given by children, can more directly improve children’s language skills (Ninio & Brunner, 1978; Crain-Thoreson & Dale, 1999; Zevenbergen & Whitehurst, 2003). To maximize the potential of parent-child reading, parents’ specific communication techniques and children’s active participation should be emphasized.

Past research has also shown the positive impacts of parents’ specific assistance and technique when reading with deaf and hard-of-hearing children. Van der Lam and Timmerman (1995) reported that the vocabulary of deaf and hard-of-hearing children was enhanced by parents’ use of picture books with explanation. The gain in vocabulary acquisition was stronger when SLN (Sign Language of Netherlands) was used jointly. Paul (1998) also pointed out that it is important to enrich (e.g., provide examples, discuss, elaborate upon) students’ prior knowledge of the topics they might read about. Students should also be encouraged to use or apply this knowledge during reading activities, and it is beneficial to the students if they can be offered assistance to answer different types of questions.

Few programs have been developed for teaching parents how to read to their deaf and hard-of-hearing children. The Shared Reading Project developed by Laurent Clerc National Deaf Education Center of the Gallaudet University is among the very few programs designed for hearing parents to teach language to their deaf and hard-of-hearing children. This project provides techniques for parents to read to their deaf and hard-of-hearing children using American Sign Language by observing how deaf adults sign a story. A trained deaf tutor visits the family once a week with a specially designed book bag that contains a copy of the storybook, a videotape for practice, a bookmark with tips for reading, and a guide of post-reading activities. The tutor demonstrates how to sign a story to the deaf or hard-of-hearing child and provides feedback to the parent as the parent signs the story to the child. The parent reads to the child with the book bag of the corresponding week between tutor visits, and the tutor brings a new book bag to the family in each of the 20 weeks. According to a post-project survey conducted by the center, participating parents reported that their sign language skills improved, and parent-child communication and children’s attention increased with this program (Delk & Weidekamp, 2001). However, no empirical evaluation of this project has been demonstrated. Our program adopted some similar principles. However, the dialogic reading technique, as described below, focuses particularly on the child’s interpretations and reactions to the story, rather than on teaching parents particular language (e.g., sign language) skills.

Dialogic Reading

The dialogic reading technique developed by Whitehurst and colleagues (1988) is a special parent-child reading method that takes parents’ reading techniques and children’s active attention into consideration. Zevenbergen and Whitehurst (2003) defined it as a specific technique of parent-child interactions based on the use of language, feedback, and appropriate scaffolded parent-child interaction in the context of picture book reading. Picture storybooks are used and, with stimulation from the pictures inside, the child gradually becomes the storyteller to the parents.
Indeed, role alternation is the main feature of dialogic reading. According to Whitehurst, the fundamental reading technique in dialogic reading is the PEER sequence, which is Prompt, Evaluation, Expansion, and Repetition, respectively. The parent prompts the child to say something with the help of the book, evaluates the child’s response, expands the child’s response by adding some new information, and finally guides the child to repeat the information to make sure that s/he has learned it. There are five different prompts to be used: completion prompts, recall prompts, open-ended prompts, Wh- prompts, and distancing prompts.

Several studies have established the positive impact of dialogic reading on language development, especially receptive vocabulary skills, among children without sensory impairments (Hargrave & Sénechal, 2000; Huebner, 2000; Lim, 1999; Valdez-Menchaca & Whitehurst, 1992; Whitehurst et al., 1988; Whitehurst et al., 1994). For instance, Valdez-Menchaca & Whitehurst (1992) found that children in the dialogic reading condition were several months ahead in language skills relative to their chronological age in a study of children from Mexico. Similarly, significant effects of dialogic reading were found in preschool children from low-income backgrounds (Lonigan & Whitehurst, 1998) and 2-year-old children from upper and middle SES families (Whitehurst et al., 1988). Zevenbergen and Whitehurst (2003) reported that preschoolers who received the dialogic reading intervention showed advantages in their later reading comprehension, and these effects lasted to elementary school. Dialogic reading was also effective in enhancing children’s oral productive and receptive Korean skills in Korea (Lim, 1999, cited in De Temple & Snow, 2003). Chow and McBride-Chang (2003) conducted research on the effectiveness of dialogic reading on Chinese language and literacy skills of typically developing kindergarten children in Hong Kong. Though the gain of receptive language skills in the dialogic reading group compared to the comparison groups was found to be less strong than the gains of literacy skills, the improvement of receptive vocabulary skills in the dialogic reading group was greater than that of the control group.

Dialogic reading emphasizes active interaction and parents’ specific assistance during picture storybook reading, and this matches the needs of deaf and hard-of-hearing children. To investigate whether the dialogic reading intervention could produce the same positive effects on language development for deaf and hard-of-hearing children in Hong Kong, the present study extended the dialogic technique to both kindergarteners and early primary students with hearing impairment who use Chinese as their primary communicative language.

To enhance the effectiveness of dialogic reading for deaf and hard-of-hearing children, several adaptations to the dialogic reading intervention were made. Most of these adaptations made use of principles of multimodal stimulation as an effective learning tool for young children. First, picture cards were used to assist the dialogic reading processes (see Appendix). Paul and Quigley (1990) attributed the difficulty that children who are deaf or hard of hearing have to the inappropriate inference strategies they use while reading. Such readers frequently use individual word recall as a basic comprehension strategy. However, because of their hearing loss, their development of a complex network of semantic links tends to be limited. These children are often unaware of strategies that assist comprehension, such as visualization. One way of activating comprehension processes that facilitate inference in readers is through pictures. Pictures activate relevant prior knowledge for readers and facilitate learning by inducing readers to form mental images of the information, an essential part of cognitive processing involving interaction with text (Bus, Van Ijzendoorn & Pellegrini, 1995; Chan, Cole, & Morris, 1990).

Second, heavy reliance on oral interaction or prompts at the beginning of the program might be relatively difficult for the deaf and hard-of-hearing children. Therefore, reliance on pictures was encouraged. When both parents and children practiced more, pictures could be gradually used less.

Third, among the five different prompts included in dialogic reading training, open-ended prompts and Wh- prompts were used more at the beginning in the present study since both of them are easier when compared to the other three. The remaining three were used later and the adults were asked to alter the ratio of the prompts according to children’s progress. In
addition, repetition, the last step in the PEER sequence, was emphasized. This is the most important step for children to gain novel vocabulary or information, so adults were encouraged to better use lip-motion, gesture, and even signing to clarify the meaning and the pronunciation. Slow but clear examples were given until children could provide correct responses.

Fourth, word cards were given to the parents and parents were encouraged to use them for asking questions or introducing new ideas to their children. Children could also use the cards by pointing to the answer in the book or finding the corresponding word cards, after they listened to the question or prompt. Using pictorial materials has proven to be beneficial for receptive vocabulary learning among prelingually deaf children (Walker, Munro, & Rickards, 1998).

Deaf and hard-of-hearing children in Hong Kong

In Hong Kong, most of the severe to profound deaf and hard-of-hearing children study in four local deaf schools. Those who have milder hearing loss are mainstreamed to normal schools or kindergartens with assistance from the Education Department in Hong Kong (K. M. Yiu, personal communication, 2002). Similar to normal hearing peers, every deaf and hard-of-hearing child ages 3 to 6 years enters either a normal kindergarten or the preschool classes offered by the four local deaf schools. In the four local deaf schools, oral communication is encouraged and used in lectures (Yiu, 2002). Even though some children have profound hearing loss, they are encouraged to speak, rather than sign, with the assistance of hearing aids.

Objectives of the Present Study

In summary, this study was designed to test experimentally the hypothesis that a dialogic reading intervention could produce larger receptive language gains in deaf and hard-of-hearing children as compared to children in typical parent-child reading and control conditions in Hong Kong. We hypothesized that children in the dialogic reading group would have greater improvement in receptive vocabulary skills relative to those in the typical reading group and control group after an 8-week intervention.

Method

Participants

Twenty-eight children with moderate to severe hearing loss were included. All were of normal intelligence with no additional disabilities. These children ranged in age from 5 years 2 months to 9 years 1 month, and were attending kindergarten, first, or second grade in local primary schools. Seventeen children were recruited from one local school for the deaf (The Hong Kong School for the Deaf) while the remaining eleven children were recruited from five different mainstreamed schools through the Special Education Resource Center of the Education Department. Their mothers (with normal hearing) who were able to speak Cantonese and had at least a primary educational level were included in this study.

Design

All the participants were randomly assigned to one of three conditions: dialogic reading group, typical reading group or control group. Dialogic reading methods proposed by Whitehurst et al. (1988) were used in the dialogic reading group. In order to investigate the effect of the skills, a typical reading group was used. Also, a control group was included in order to distinguish improvement due to normal growth or development from that caused by the experimental manipulation. Each participant was tested twice before and after the 8-week intervention. Therefore, a 3 (groups) × 2 (time) factorial design was used.

Materials

Twenty-eight sets of Chinese picture storybooks (8 different stories per set) were used. The titles of these books are shown in Table 1.

Dialogic reading group. In this group, prompt questions were attached to each page of the Chinese storybooks used. Those prompts included the five different prompts that Whitehurst and his colleagues (1988) used. Recall prompts were given at the end of each book. These were intended to act as a guide for the parents to practice dialogic reading with their children. In order to give clear guidelines on the
dialogic reading techniques to the parents, a dialogic reading guide accompanied the books. In these guidelines, each step of the technique was demonstrated clearly so that the parents could follow and lead the child with standard procedures. The guideline also explained the aims of dialogic reading. In addition, picture cards and a calendar checklist were also given to the parents. The picture cards were the choices in some of the prompt questions. They could also be used as materials to stimulate children's storytelling. For example, different animal cards were given to the parents so that they could ask questions about the characteristics of those animals. Parents could also ask questions about the content of the storybooks; the answer was one of the animals in those picture cards. Children, thus, could point or take the card out as a response. The calendar checklist was used to remind the parents about the schedule of the program. One example picture card is presented in Appendix A.

**Typical reading group.** The same set of storybooks and the calendar checklists were given to the parent of this group. However, none of those storybooks was accompanied with the prompts or picture cards that the dialogic reading group received.

**Control group.** The same sets of storybooks were given to these children, but they were given to them only after the participants in the other two groups had finished the program, 8 weeks later.

**Measures**

Demographic data were collected through a constructed questionnaire that included children’s age, sex, class, date of birth, level of hearing loss, signing ability, as well as parental educational level and parental occupation. Information on the degree of hearing loss was given by either the school or the parents. Home reading habits, such as the duration and frequency of parent-child reading before the program, were also collected.

*Raven’s Coloured Progressive Matrices (RCPM; Raven, Court, & Raven, 1995).* RCPM is an assessment of cognitive development in children between 5 to 11 years old. It consists of 36 in-color, multiple-choice items in which a missing part has to be chosen from among six alternatives to complete a matrix-like pattern. The test is composed of three subsets A, Ab, and B, each consisting of 12 items. Sets A, Ab, and B measure the apprehension of identity and change in continuous patterns, discrimination of discrete figures as spatially related wholes, and attention to analogous changes in spatially and logically related figures, respectively.

**Vocabulary.** Receptive vocabulary was measured using a translation of the Peabody Picture Vocabulary Test–Third Edition (PPVT–III; Dunn & Dunn, 1997), which is an achievement and screening test of vocabulary acquisition for English-speaking people older than 2.5 years of age. The PPVT–III consists of 204 items. There were four line drawings of nouns per page. Participants were asked to respond by pointing to one of the four picture options after hearing the examiner pronounce a given vocabulary word. In our study, the translated Cantonese version was used; the pilot test was done with 2 deaf and hard-of-hearing children without any problems and was proven to be appropriate to use for deaf and hard-of-hearing children in Hong Kong. The inter-item reliability for

<table>
<thead>
<tr>
<th>Title of the story books</th>
<th>Author</th>
<th>Publisher</th>
</tr>
</thead>
<tbody>
<tr>
<td>要買泥沙</td>
<td>黃淑慧 (2000)</td>
<td>晶晶教育出版社</td>
</tr>
<tr>
<td>小雞穿鞋子</td>
<td>黃淑慧 (2000)</td>
<td>晶晶教育出版社</td>
</tr>
<tr>
<td>小水滴旅行</td>
<td>黃淑慧 (2000)</td>
<td>晶晶教育出版社</td>
</tr>
<tr>
<td>彩色的雲</td>
<td>黃淑慧 (2000)</td>
<td>晶晶教育出版社</td>
</tr>
<tr>
<td>一次奇異的賽跑</td>
<td>陸趙鈞鴻 (1999)</td>
<td>晶晶教育出版社</td>
</tr>
<tr>
<td>多了一個月亮</td>
<td>陸趙鈞鴻 (2001)</td>
<td>晶晶教育出版社</td>
</tr>
<tr>
<td>小鴨鴨肯說話了</td>
<td>陸趙鈞鴻 (2001)</td>
<td>晶晶教育出版社</td>
</tr>
<tr>
<td>小猴子的木瓜子兒</td>
<td>陸趙鈞鴻 (2001)</td>
<td>晶晶教育出版社</td>
</tr>
</tbody>
</table>
the translated PPVT–III was .70. Raw scores were used for all analyses of this task.

Follow-up questionnaire. At the posttest period, a follow-up questionnaire was given to each parent in the dialogic and typical reading group. The purpose of this questionnaire was to evaluate children’s reading habits and the parents’ practices with the dialogic reading intervention. For the dialogic reading group, questions included the duration and frequency of the dialogic reading intervention. Parents’ use of extra skills and reading methods were also obtained. An example of these questions was “在這八星期裡,你與孩子每週以對話式方法閱讀多少次?” (How often did you read with your child per week using the dialogic reading technique within these 8 weeks?). In addition, there were questions concerning children’s response toward the intervention, which were on a Likert-type scale, from 1 to 10, indicating “反應最多” (maximal response) to “反應最少” (minimal response). An example of these questions was “在對話式閱讀的過程中,孩子反應的頻率是?” (How frequently did the child respond during dialogic reading process?). For the typical reading group, follow-up questions included the duration and frequency of reading at home with parents. There were also questions concerning the reading methods the parents used as a comparison with the dialogic group.

Procedures

After collecting informed consent, the parents were asked to complete the demographics information questionnaire. The children were tested on the RCPM (Raven et al., 1995), and pretested on the PPVT–III (Dunn & Dunn, 1997). The 17 children from the local deaf school were tested in the classrooms in their own school. The 11 mainstreamed children were tested in the special center of the Education Department or the Psychology Department of the Chinese University of Hong Kong. All children were one-on-one tested by 10 trained experimenters who were all undergraduates in the Department of Psychology of the Chinese University of Hong Kong. The pretest was conducted in two sections. Each session was about 30 min long. Children were given a 10-minute break between sections. All 28 children were then assigned into one of three different conditions: dialogic reading group, typical reading group, and control group, with age and degree of hearing loss controlled. The condition assignment was double-blind to both parents and experimenters. Children from the three groups did not statistically differ in chronological age or level of hearing loss. Those descriptive statistics are presented in Table 2 in the results section.

Materials were given to the participants of the dialogic reading and the typical reading groups once the pretesting was complete. Children in the dialogic reading group were given a set of total eight storybooks accompanied with prompt questions on each page of the books. Parents were also given the calendar checklist, the picture cards, and the guidelines. Parents were taught about the dialogic reading method by a trained experimenter through an individual 20-minute training session before the start of the intervention. They were asked to use specific strategies (e.g., the PEER sequence) and the materials given to encourage their children to respond while reading at home. Parents were asked to read with their children each book twice a week for 15 to 30 min each time. As outlined in the PEER sequence of the book, parents were trained to prompt their children to say something about the content, then evaluate children’s responses. Parents were then encouraged to expand on the children’s

Table 2 Descriptive statistics on the demographic measures

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronological Age (in months)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dialogic Reading</td>
<td>9</td>
<td>88.67</td>
<td>12.54</td>
</tr>
<tr>
<td>Typical reading</td>
<td>9</td>
<td>88.77</td>
<td>16.39</td>
</tr>
<tr>
<td>Control</td>
<td>10</td>
<td>85.00</td>
<td>11.78</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of Hearing Impairment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dialogic Reading</td>
<td>9</td>
<td>4.22</td>
<td>1.09</td>
</tr>
<tr>
<td>Typical reading</td>
<td>9</td>
<td>4.33</td>
<td>1.11</td>
</tr>
<tr>
<td>Control</td>
<td>10</td>
<td>4.40</td>
<td>1.07</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>17</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>11</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Dialogic Reading</td>
<td>7</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Typical reading</td>
<td>5</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>
responses, possibly by adding new information. The parents were taught to repeat the prompt finally to ensure their children actually grasped the idea.

Five different prompts were also taught to the parents: Completion, Recall, Open-ended, Wh-, and Distancing, or CROWD. The first are the Completion prompts, fill-in-the-blanks questions that provide the children with information about the structure of language (e.g., 小猴子住的地方是________). The second ones are the Recall prompts. They are questions that ask for the summary of the content or what happened before in order to help children to understand the story plot (e.g., 最後一個成爲比賽的冠軍? Who is the champion of the competition? ). Third, Open-ended prompts are statements that encourage children to respond in their own words to increase their expressing and explanation ability (e.g., 而家到你話俾我聽小熊同爸爸做緊咩? Please tell me what little bear and his father do). Next, Wh-prompts (what, where, why, when etc.) can also be used to help children to learn new meanings (e.g., 邊度會見到泥沙? Where can you find sand?). Lastly, parents were asked to use Distancing prompts. These are prompts that require children to link what is in the book to their real life settings or their own experiences. This can improve children’s memory for newly learned materials and also conversational abilities (e.g., 你平時有冇見過雲呢? Have you ever seen a cloud?).

Parents were contacted over the phone once a week for the first 2 weeks in order to remind them to read the books with their children and also to solve problems they came across during dialogic reading.

For the typical reading group, the same set of books and calendar checklist were given without the prompt hints. Parents were also instructed to read the story-book on schedule, one book a week, twice each for 15 to 30 min each time. Nevertheless, they were taught no specific skills about promoting any responses or participation from children. They were asked to read the books to their children as they normally would. These parents were debriefed after the 8-week period and were taught the dialogic reading skills following the posttest section.

No books were given to the control group immediately after the pretest section. The parents were asked to continue their original reading habits with their children throughout this 8-week period. The same set of books was given to children in this group after the posttest section. Debriefing was also given to these parents. They were also taught the same dialogic reading skills following children’s posttesting.

After 8 weeks (the intervention period), children from all three groups were immediately posttested on the PPVT–III while the parents were asked to fill in the follow-up questionnaire at the same time.

Results

Pretest measures

The descriptive statistics on chronological age, level of hearing loss, and gender distribution are presented in Table 2. Information on level of hearing loss was obtained from ratings on a Likert-type scale, from 1 to 7, indicating mild to profound, from the children’s teachers at school. Statistics indicated that the children’s average level of hearing loss was around moderate. One-way ANOVAs were carried out to compare the chronological age (in months) and the level of hearing loss among the three groups. There were no statistically significant differences in either chronological age, $F(2, 27) = 0.239, p > .05$, or the level of hearing loss, $F(2, 27) = 0.063, p > .05$, among the three groups. The gender ratios of the children were similar in both the typical reading and control group but uneven in the dialogic reading group. This was because the age and the degree of hearing loss had to be statistically controlled.

A one-way ANOVA was conducted to compare the differences in the levels of nonverbal intelligence, as measured by the RCPM, among the three groups. There was no statistically significant difference in this measure either, $F(2, 27) = 1.011, p > .05$. The descriptive statistics for the RCPM score are presented in Table 3. Thus, none of these control variables, chronological age, level of hearing loss, or non-verbal intelligence, were included in the subsequent analyses as covariates.

A repeated measures analysis was also performed to compare vocabulary scores in the pretest and posttest periods. Although the effect across time was not significant, $F(1, 25) = 1.97, p > .05$, which means that
posttest scores did not significantly differ from the
pretest scores across all three groups, a significant
difference was found in the changes in scores among
the three groups, with $F(2, 25) = 4.77$, $p < .05$, indicating the effect of group was reliable. Different
interventions did result in different degrees of changes
in scores. Descriptive statistics for the pretest and
posttest scores of the PPVT–III are presented in Table
3. As indicated in Table 3, the degree of variability on
scores was high and that might have been due to the
small sample sizes included.

Owing to the greater utility of the dialogic reading
program predicted, $t$ tests were conducted to compare
the differences of PPVT–III posttest scores between the
dialogic reading and the typical reading group, as well as
between the dialogic reading and the control group.
Separate $t$ tests were also conducted to compare PPVT–
III pretest scores between the groups to ensure that any
group differences were not due to biased sampling. No
significant differences were found on the pretest scores
between the dialogic reading and typical reading groups,
$t(16) = 0.94$, $p > .05$, or between the dialogic reading and control groups, $t(17) = 0.95$, $p > .05$.
However, differences on the posttest scores between
dialogic reading and typical reading groups were
significant, $t (16) = 2.26$, $p < .05$, and the difference
between the dialogic reading and the control groups was
marginally significant, $t(17) = 2.05$, $p = .057$. This result
indicates the effectiveness of the dialogic reading
program in improving children’s vocabulary skills.

T-tests were also conducted to compare the differences
on both PPVT–III pretest and posttest scores between
typical reading and control groups in order to
distinguish improvement due to normal growth or
experimental manipulation. No significant differences
were found between the typical reading and control
groups on either the pretest scores, $t(17) = 0.10$, $p > .05$, or the posttest scores, $t(17) = 0.07$, $p > .05$.

To further investigate the effectiveness of the
dialogic reading program, effect size was calculated. In
the present study, the partial $\eta^2$ was used as an indicator of effect size. The $\eta^2$, the proportion
of variance accounted for by population membership, is
another useful indicator of effect size. Partial $\eta^2$ was
more appropriate in this study than $\eta^2$ since more than one independent variable was present
(Cohen, 1988). The partial $\eta^2$ is the proportion
of the effect plus the error variance that is attributable to
the effect. Its formula differs from the $\eta^2$ formula in that the denominator includes the effect sum
of squares plus the error sum of squares rather than the
total sum of squares, $\eta^2 = SS_{\text{effect}} / (SS_{\text{effect}} + SS_{\text{error}})$. The partial $\eta^2$ squared for this study was .276. Given
the commonly used guidelines proposed by Cohen
(1988), .01 = small effect, .06 = moderate effect, .14 =
large effect), the partial $\eta^2$ squared in the present study
suggested a very large effect of the dialogic reading
treatment on PPVT–III scores. The comparisons
between the pretest and posttest mean scores on the
PPVT–III are shown in Figure 1. The figure indicates
that the dialogic reading group showed the greatest
improvement among the three groups, while the other
two groups failed to show any improvement.

Follow-up questionnaire

Follow-up questionnaires were received from parents
in the dialogic group with children in mainstreamed

---

### Table 3

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>RCPM Pretest Mean</th>
<th>SD</th>
<th>PPVT–III Pretest Mean</th>
<th>SD</th>
<th>PPVT–III Posttest Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dialogic Reading</td>
<td>9</td>
<td>27.56</td>
<td>4.80</td>
<td>91.11</td>
<td>50.24</td>
<td>114.22</td>
<td>51.52</td>
</tr>
<tr>
<td>Typical reading</td>
<td>9</td>
<td>23.56</td>
<td>5.59</td>
<td>70.11</td>
<td>44.11</td>
<td>66.56</td>
<td>36.91</td>
</tr>
<tr>
<td>Control</td>
<td>10</td>
<td>26.10</td>
<td>7.29</td>
<td>67.80</td>
<td>55.87</td>
<td>65.00</td>
<td>52.90</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
settings. Those parents generally felt satisfied with the program; all of them liked this intervention. They also rated their children’s interest in reading during the intervention, and the mean score was 8.2 out of 10 (10 indicates the most interested while 1 indicates the least interested), which demonstrates that most of the children enjoyed the program, at least as rated by their parents.

**Discussion**

The primary purpose of the present study was to investigate whether the dialogic intervention program was effective in improving the receptive vocabulary skills of deaf and hard-of-hearing children. Our results extend the findings of Whitehurst et al. (1988, 1994) by demonstrating that the dialogic reading technique can work for Hong Kong deaf and hard-of-hearing children. In addition, children in the dialogic reading group produced the largest improvements in receptive vocabulary learning among the three groups, controlling for age and the degree of hearing loss.

The experimental design of the present study was based on Whitehurst’s previous studies (1988, 1994) on dialogic reading research. However, the present study used extra picture cards that had not been used in Whitehurst’s previous studies as an adaptation for the deaf and hard-of-hearing children. The effectiveness and importance of these cards is discussed later in this section.

Compared to the past research on dialogic reading, the findings of the present study showed similarity and further supported the usefulness of the dialogic reading intervention. Whitehurst et al. (1988) and Huebner (2000) both indicated that the group differences of the PPVT–III favored the dialogic reading group although no significant statistics were obtained. Valdez-Menchaca and Whitehurst (1992) showed a significant gain in receptive vocabulary skills as indicated by PPVT–III for the children in the dialogic reading group. The results in the present study, therefore, were very similar to those of western studies; deaf and hard-of-hearing children in the dialogic reading group showed a relatively large improvement on the receptive vocabulary test.

Greater gain in receptive vocabulary skills in the dialogic group was found compared to the other two groups, and the typical reading group did not show greater improvement compared to the control group. These results highlight the importance of the interactive nature of parent-child reading and indicate that typical reading does not fully exploit the potential of parent-child reading. The main component in facilitating children’s language improvement is not only reading per se, but also the parent-child interaction.

The comparative success of the dialogic reading intervention on deaf and hard-of-hearing children in the present study can be attributed to several factors. First, high-quality parent-child interaction is one important factor in the success of dialogic reading program for deaf and hard-of-hearing children. Past research has found that deaf and hard-of-hearing children (3 to 5 years old) with hearing parents, when compared to hearing peers, tended to communicate less, use fewer spontaneous communications (i.e., communications that are not a direct response to maternal communication), and be less responsive to maternal directives (Cross, Nienhuys, & Kirkman, 1985; Henggeler & Cooper, 1983). Some researchers have proposed that these deficits might result from poor and inappropriate responding by hearing mothers towards their children’s communicative attempts (Schlesinger, 1988). Mothers who are constantly correcting their children and controlling their activities are unlikely to have enjoyable conversations with their children. As a result, these children may withdraw from interactions and communication (Lederberg & Everhart, 2000). In contrast, in the dialogic reading program, parents asked different questions and engaged in interactive activities while reading. Children not only enjoyed the reading process, but also learned through the interaction with parents. Because most of the parents had received training of the dialogic reading skills before the actual intervention, they knew about the importance of the relaxing atmosphere and the interactive nature. This is particularly important for deaf and hard-of-hearing and is believed to be one of the key factors in the success of the dialogic reading intervention.

Another possible reason for the success of the dialogic reading intervention for deaf and hard-of-hearing children is that picture cards were used in
the present study. Although deaf and hard-of-hearing children sometimes have poor knowledge of the semantics and syntax of the spoken language, they, like children without hearing difficulties, are able to use their visual modality to help them read and learn (Musselman, 2000). Multi-modal teaching may improve learning for all children, and our experiences in this study indicate that deaf and hard-of-hearing children appeared to benefit from our focus on both auditory and visual stimulation. In our dialogic reading intervention, parents used picture cards to guide the children to link novel vocabulary words and pictures. Learning was enhanced by having readers use their visual ability as a complement to their hearing ability. Previous studies have also demonstrated the usefulness of the use of pictorial materials in language teaching to deaf and hard-of-hearing children. For instance, in Walker, Munro, and Rickards’ (1998) study, the use of pictorial materials combined with written text was proven to be effective in making significant reading gains in prelingually deaf children (9 to 18 years old). Results of the present study provided additional support of the usefulness of pictorial materials (e.g., picture cards) in promoting language abilities among the deaf and hard-of-hearing.

The present study demonstrated several important aspects of the experimental program of relevance to parents and educators. The success of the dialogic reading is only one of those. In addition, improvements were shown within a relatively short period of time. In the present study, parents and their children participated in the intervention program for only 8 weeks, but significant gains were produced in children’s receptive vocabulary skills, and improvement in vocabulary skills should have long-term effects on children’s language development. It is believed that if the intervention can be practiced for a longer period of time, the effect will be greater in quantity and quality.

In addition, the dialogic reading method is valuable because it is easy to learn and practice (Whitehurst et al., 1988). Parents are not required to have a strong educational background in order to use it effectively. In our experience, even parents with an early primary educational level could learn the dialogic reading technique within a short period of time, without problems in actual practice during the 8-week intervention period. This is particularly important because parental involvement has been proven to be a key factor for children’s language improvement (Moeller, 2000), and if parents can contribute to children’s learning process, the gain by children will become greater. The training offered to the parents is also easy and requires only a short period of time. This can encourage more parents to join and enjoy the positive effect of dialogic reading.

Dialogic reading can provide a positive learning environment at home. According to the feedback from the parents, children in the dialogic reading group were enthusiastic about this reading activity, and the parents believed that the dialogic reading intervention could raise children’s interest in reading. Lyytinen, Laakso, and Poikkeus (1998) found that children’s interest in reading is related to language development, suggesting that enthusiasm for shared book reading may promote language learning just as cognitive stimulation does. In other words, the dialogic reading intervention might indirectly improve children’s language ability by raising children’s interest in reading.

Recommendations to Parents and Educators
To maximize the effect of dialogic reading, it is important to consider the following. First, although the method is not age-limited, it is better to practice the method early, preferably when the deaf and hard-of-hearing child is still in kindergarten. In Moeller’s (2000) study, for example, results showed that hard-of-hearing children who were enrolled early in an intervention program did approximately as well on language tests (e.g. PPVT–III) as did their hearing counterparts. There is a strong continuity between the language skills with which children enter school and their later academic performances (Lonigan & Whitehurst, 1998). As a consequence, the earlier the intervention is, the earlier the effect may occur.

Apart from the early intervention, the frequent use of pictorial materials is also important. As stated earlier, learning through pictures is particularly important for deaf and hard-of-hearing children. Therefore, parents are encouraged to use different picture cards, which can be any pictures parents can find. Combinations of the use of picture cards with the PEER sequence and the CROWD prompts are
encouraged. Parents can even ask the children to draw
their own pictures instead of using the given cards.

Another point to be noted is that a relaxing
atmosphere should be provided. Good parent-child
interaction is likely the key factor of the success of the
intervention. If parents continuously correct children’s
mistakes or blame them for their inactive responses
during the process, positive communication is mini-
mized. This will reduce the effectiveness of dialogic
reading. As Whitehurst et al. (1988) suggested, dialogic
reading is conversational reading between parents and
children. Children will enjoy dialogic reading when
parents follow children’s interest and vary what they do
from reading to reading. The most important theme
should be “Keep the reading fun.”

Limitations and Further Studies

In the present study, only self-reported duration and
frequency of reading was obtained and we had no
objective information on the degree of implementation
of the intervention. As the degree of implementation is
an important factor for the successfulness of the
program, it is recommended that tape recording or
videotaping of the sessions can be done in future
studies for some qualitative analysis. Also, owing to the
exploratory nature of the present study, the sample
size was small, and we included the PPVT–III as the
only measure of receptive vocabulary skills. Future
studies can involve a larger sample size and other
measures of vocabulary skills. The effects of dialogic
reading on other language skills, such as expressive
language and syntactic skills, on deaf and hard-of-hearing
children can also be explored. In addition, the pretest score of PPVT–III of the dialogic reading
group was somewhat higher than the other two groups,
though this difference was not statistically significant
in the present study. The development of individual
differences in language ability might be accounted by
the Matthew Effect, the idea that children who start
out better will improve more quickly over time, and
those who start out poorer will improve at a relatively
slow rate (e.g., Stanovich, 1986). We cannot rule out
the possibility that greater improvement of the dialogic
reading condition is affected by the Matthew effect in
the present study. Therefore, further study with better
control of the children’s language abilities at the
beginning is recommended.

In addition, there is a special characteristic in
Cantonese dialogic reading intervention. Some spoken
forms of vocabulary in Cantonese are different from
the written form of Standard Chinese. Using the word
“little duck” as an example, the Cantonese form is
“鴨仔” whereas the Standard Chinese form is
“小鴨” The prompts attached in the books in the
present study were written in the Cantonese form, but
the vocabularies that appeared in the books were
written in the Standard Chinese form. It is not clear
whether different forms affect children’s language
acquisition. Further study may be done to compare the
use of these different forms in the dialogic reading
skills.

Conclusion

In conclusion, the present study has successfully
demonstrated the effectiveness of dialogic reading
intervention on deaf and hard-of-hearing children’s
receptive vocabulary skills. More importantly, the
relationship is a causal one. Although we cannot
distinguish whether the effect was caused by dialogic
reading per se or the use of pictorial materials, the
combination of the two improved receptive vocabulary
skills among deaf and hard-of-hearing children over an
8-week intervention. Such improvements in vocabu-
lary skills may also facilitate language development of
deaf and hard-of-hearing children in a long run. Given
the ease with which the dialogic reading technique can
be learned, educators and parents might consider using
this technique to further facilitate positive learning in
children.

Acknowledgment

This project was supported by Direct Grant No.
2020667 from the Chinese University of Hong Kong.
Sincere thanks are given to Mr. Yiu from the Special
Education Resources Center of the Education De-
partment, Ms. Lai, the principal of the Hong Kong
School for the Deaf, and Ms. Choi from the same
school.
Appendix A

Example of picture cards for the dialogic reading group

References


Received June 8, 2004; revisions received August 27, 2004; accepted September 2, 2004.