Research Article

Development and Validation of Digital Tutorial to Facilitate Pre-reading Skill

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Abstract

The aim of the study was to develop a digital tutorial to facilitate training in pre-reading skills in young children and to test its efficacy. The present study was carried out in two phases. Phase I involved the preparation of the digital tutorial based on the intervention module for pre-reading skill. Phase II involved testing the efficacy of the developed digital tutorial. A group of 15 typically developing children in the age range of 1-6 years participated in the phase I of the study and 6 children with bilateral severe hearing impairment in the age range of 3-7 years participated in the phase II of the study. The participants with hearing impairment were divided into two groups of three each. In addition six adults (two speech-language pathologists, two special educators and two mothers of children with hearing impairment) were also selected as participants to train the two groups of children. One group was provided with only a text based intervention module to facilitate pre-reading skills, while the other group was provided with the text based intervention module as well as the digital tutorial. The outcome of the phase I was the digital tutorial material comprising of two DVDs. The results of the phase II revealed that the group trained using the digital tutorial along with the intervention module showed better gains revealing the effectiveness of the video mode in training literacy activities in children.

Background

Skills in communication are critical to success in life. Children begin to develop their communication skills at birth. As they mature, they learn to communicate in more complex ways. The acquisition of 'literacy', a form of communication, further refines their ability to communicate. Literacy is the ability to read and write with understanding in any language which is a significant milestone in the development of young children. Learning to read in the first years of school is essential for success in school and in life (Burns, Roe, & Ross, 1999).

The key to literacy is reading development, which involves a progression of skills that begins with the ability to understand spoken words and decode written words, and culminates in the deep understanding of text. Reading development involves a range of complex language underpinnings including awareness of speech sounds, spelling patterns, word meaning, patterns of word formation, all of which provide a necessary platform for reading fluency and comprehension. Reading development also involves other prerequisite skills such as concept of matching, directionality, motor skills, and phonological awareness. All these basic skills together are otherwise referred to as pre-reading skills. Pre-reading skills are those skills which children need in order to help them to become a reader and is an important component of emergent literacy. This concept of emergent literacy evolved during the past three decades, as a result of new information on how young children develop an understanding of reading and writing (Hiebert & Fisher, 1990; Neuman & Roskos, 1993; Rex, Koenig, Wormsley, & Baker, 1994).

Beginning from the first month through the second year of life, children's experiences with oral language development and literacy begin to build a foundation for later reading success (Strickland & Morrow, 1988; Weaver, 1988; Burns, Griffin, & Snow, 1999). From 2 to 3 years of age children begin to produce understandable speech in response to books and the written marks they create. From 3 through 4 years of age, children show rapid growth in literacy. They begin to "read" their favorite books by themselves, focusing mostly on reenacting the story from the pictures. Eventually, they progress from telling about each picture individually to weaving a story from picture to picture using language that sounds like reading or written language (Holdaway, 1979; Sulzby, 1991; In-

ternational Reading Association & National Association for the Education of Young Children, 1998). Around age five, most children at the kindergarten level are considered to be emergent readers. They continue to make rapid growth in reading skills if they are exposed to literacy-rich environments (Burns, Griffin, & Snow, 1999). Children at this age continue to "read" from books they have heard repeatedly. Gradually, these readings demonstrate the intonation patterns of the adult reader and language used in the book. Emergent readers are just beginning to control early reading strategies such as directionality, word-by-word matching, and concepts of print. They use pictures to support reading and rely heavily on their knowledge of language (Holdaway, 1979; Pinnell, 1996b; Snow, Burns, & Griffin, 1998). Therefore the early age, particularly, the preschool years for a child, is viewed as a very critical period for the learning of all the prerequisite skills that support later literacy development (Snow, Barnes, Chandler, Goodman, & Hemphill, 1991).

It is observed that while many children, provided with the opportunity and facility of education, learn to read without significant difficulty, considerable percentage of children experience difficulty in learning to read and write at some stage in their scholastic period. This difficulty could arise due to the presence of various communication disorders such as learning disability, hearing impairment, mental retardation etc. A communication disorder is an impairment affecting one's understanding and speaking abilities. In addition to the speech and language problems such as lack or delay in the onset of speech and language, limited language development, restricted vocabulary, incorrect / inappropriate speech characteristics including voice, articulation and prosodic abnormalities etc., such children may also exhibit difficulties in reading and/or writing and exhibit poor scholastic achievement. The estimates of all persons with disabilities in India obtained through the latest population census by National Sample Survey Organization (NSSO, 2003) is about 2%. It is critical to identify them early, assess and treat their pre-reading abilities so that their deficits can be reduced to the maximum extent possible. Early intervention of reading difficulties leads to a considerable improvement in the long-term reading abilities of children. Without early intervention, the"reading gap" between struggling readers and their peers widens over time.

The "intervention" primarily refers to the implementation of a plan of action to improve one or more aspects of an individual's abilities. It is also a process which is long term and has to be implemented in a systematic, effective, and efficient manner. The intervention of children with communication disorders involves a team approach and is a big challenge to every professional in the field since each child has a unique combination of strengths and weaknesses. The speech-language pathologists and the educators play a very important role. The role of parents in the rehabilitation program cannot be under estimated. They are integral members and considered as equal partners for the planning and implementation of the intervention program. The success of any intervention program depends on the fact that intervention should be initiated early with a systematic training program and with appropriate resource materials. A good theoretical and clinical knowledge of the skill to be established, the procedure of implementing and achieving these skills in children and its developmental pattern in typically developing children, are also extremely essential. Several studies have been carried out to assess the impact of different curriculums on pre-reading skills in typically developing children. Studies by DeBaryshe and Gorecki (2007) Assel, Landry, Swank, and Gunnewig (2007), Murphy (2007) and Moyle and Berman (2011) revealed that children trained using different literacy related curriculums show improvement in pre-reading skills.

Bailet, Repper, Piasta, and Murphy (2009) assessed the efficacy of an experimental targeted, explicit, developmentally appropriate intervention designed to teach emergent literacy skills to preschoolers considered at risk for reading failure. Results from this study suggest that pre-kindergarten children who demonstrated weakness on emergent literacy measures benefit from participation in a 9-week targeted intervention, when compared to children who demonstrate the same weakness but do not participate in the same intervention. By the end of intervention, many participants displayed increased knowledge in phonological awareness and letter knowledge.

Further, there are a number of evidence based research studies on intervention of literacy skills in children with different communication disorders. These studies reveal positive results in effective treatment of literacy skills. Katims (1991) examined the effect of using emergent literacy activities in such children. The emergent literacy activities included daily storybook readings paired with emergent writing activities, as well as the availability of a well-stocked classroom library center. The experimental group was compared with a control group of similar children in a preschool classroom that lacked these emergent literacy activities. The results of the study indicated that the children who were exposed to emergent literacy activities were subsequently found to interact with books in more sophisticated and varied ways than the children in the control group.

Warrick, Rubin, and Rowe-Walsh (1993) investigated the effect of phoneme awareness training

on a group of 14 language-delayed kindergarten children. Two 20-minute sessions of instruction were provided per week for 8 weeks, in groups of seven children. Results indicated significant growth in phonemic awareness skills as compared with 14 normal children and 14 comparable language impaired children who did not receive the experimental intervention. The researchers noted that the language impaired kindergartners learned rhyming more quickly than alliteration and recommended an instructional sequence for young children that reflected this finding.

Ezell, Justice, and Parsons (2000) conducted a pilot investigation aimed to examine the efficacy of a parent-child book-reading program. The program was designed to enhance the early literacy skills of preschoolers with communication disorders. Four parents and their children completed a 5-week program which included parent training supplemented by individualized guided reading practice sessions to complete daily. Pre and post-test measures were compared and found that the program positively influenced children's print concept knowledge and it fostered parental strategies during shared book reading. This study demonstrated the effectiveness of parent education: teaching them techniques to use during shared reading stimulated their children's acquisition of key literacy skills. The intervention included parent group sessions, weekly instructional plans for parents, parent training, and providing books to parents. It has been suggested that programs that focus on the family help maximize the parents' abilities and influence the child's development (Mahoney & Wheedon, 1997).

Research was carried out on preschool children with specific language impairment (SLI) by Ezell and colleagues (2000) and Lovelace and Stewart (2007) who measured print concepts, while Munro (2008) measured phonological awareness and vocabulary growth as indicators of emergent literacy skills. In all the three studies the results indicated that the intervention was successful in increasing language and emergent literacy outcomes for children diagnosed with SLI.

Maxwell (1984) and Rottenberg (2001) investigated the impact of interactive storybook reading on deaf children's emergent reading development. They detailed the development of a deaf child of deaf parents; examined the progress of a deaf child of hearing parents. Both studies demonstrated that preschool age deaf children can learn much about written language through interactive storybook reading and that their emergent reading development is similar to that of hearing children.

It may be noted that a large majority of the studies concerning emergent literacy practices have been concentrated in Western countries, especially dealing with English-speaking typically developing children and children with communication disorders. There are very few studies in India that have examined the impact of emergent literacy training on later literacy skills. Prema (2010) conducted a study to develop a 'Phonological Sensitivity Training Kit in Kannada (PhoST-K)', which mainly deals with phonological sensitivity, one of the key elements of emergent literacy. The study included children at risk of language based learning disability who were trained for their phonological awareness skills in 20 sessions. There was a significant improvement in the phonological awareness scores which could be attributed for the explicit training intervention that was provided.

Lakshmish and Prema (2010) developed digital literacy coach and an accompanying manual and evaluated the effectiveness of the material by assessing its impact on print knowledge and oral language. The trainees here were teachers who were trained by speech-language pathologists. The children were in turn trained using the manual for 20 sessions and the results revealed significant improvement in the experimental group in terms of print knowledge and oral language. The group that used the digital manual appeared to be 6 months ahead of their peers indicating that the digital manual promotes literacy learning in children.

Considering the fact that emergent literacy training programs are intensive as well as extensive and for a long term, it is highly demanding on the manpower and man-hour resources. In India, however, there is paucity of qualified service providers to meet the needs of the estimated population having various types of communication disorders. Further, it is seen that even though many consumers avail services from qualified professionals, due to several personal reasons such as funds, time constraints, tight job schedules and distance, they are unable to avail these intervention services for a prolonged period of time.

Taking into consideration the enormity of the percentage of children with communication disorders in our country and the mismatch in the trained professional manpower, designing early childhood programs for promoting young children's language and literacy development is essential, which can be used by parents and professionals. However, this is a complex endeavor and involves efforts at many layers within the essential. Studies by Ezell et al., (2000) have suggested that with systematic training protocol and adequate periodic monitoring mechanism, training is effective irrespective of the trainer, provided the trainer is imparted with sufficient knowledge and skill in administration of training program to children. These preliminary research findings suggest that intervention approaches should be multilayered, integrated or embedded type that requires involvement of man-

power at all the levels in order to bridge the gap between research and practice. This involves inclusion of early education providers, elementary teachers, parents, caregivers, along with the speech-language pathologists in the intervention model.

Keeping this in view, a structured intervention module was developed for children with communication disorders, which can be used by speech-language pathologists, special educators, teachers and parents (Swapna, Jayaram, Prema, & Geetha, 2010). This was expected to serve the purpose of early intervention so that any person with minimum training can effectively carry out early intervention program. The intervention module for preschool children with communication disorders was developed for ten different skills, of which pre-reading skill is a part. This module contains text-based checklists and activities that can be used to enhance the skills of children with special needs. This module has been standardized by administering it on 365 typically developing children in the age range of 0-6 years. It was also validated on 85 participants with communication disorders [67 with hearing impairment (HI) and 18 with intellectual deficit (ID)] in the age group of 0-6 years. However, it was felt that if such home training programs are accompanied by visual demonstrations of skill enhancement sessions, as demonstrated through the study by Lakshmish and Prema (2010), it would be beneficial for the parents as well as professionals. This could ensure accurate learning and implementation of the activities. Such materials would boost the motivation and confidence level of the caregivers/parents and would in turn result in a better delivery of the rehabilitation program by them to the child. This would also improve the face validity of the training program. Further, it will augment the efficacy of the existing preschool curriculum modules by offering digital video demonstrations of activities that are captured in a video camera. Moreover, there are limited documented reports on the efficacy of emergent literacy intervention programs in the Indian scenario. This paucity of literature calls for more research and the development of resource materials in the area of emergent literacy.

Considering the fact that there are limited audio-visual resource materials developed to train children with communication disorders, especially in the Indian context, this study was undertaken with the aim of developing a video based supplement (digital tutorial) to the intervention module on pre-reading skills. Further, recognizing the importance of early literacy services in the enhancement of reading skills, especially for children with communication disorders, the intervention module on pre-reading skills was considered for the purpose of digitization, from among the ten skills included in the intervention module. The specific objectives of the study were; (a)To develop a digital tutorial to enhance pre-reading skill as detailed in the intervention module for preschool children with communication disorders (Swapna et al., 2010) and (b)To evaluate the efficacy of the digital tutorial in training pre-reading skills in children with hearing impairment in the age group of 3-7 years.

Materials and Methods

The present study was carried out in two phases. The first phase of the study in involved the development of the digital tutorial to facilitate the pre-reading domain and the second phase involved evaluating the efficacy of the digital tutorial.

Participants

The participants in the study included typically developing children and children with hearing impairment. The typically developing children participated in the phase I of the study and the children with hearing impairment participated in the phase II of the study. Children with hearing impairment were included because the initial field testing of the intervention module was also carried out on children with hearing impairment. The details of the two groups of participants have been reported below.

Participants of phase I

A total of 15 Kannada speaking typically developing children in the age group of 1-6 years participated in the video recording of the activities to enhance pre-reading skill. The children were recruited from preschools in and around Mysuru. They were familiarized with the room set up, the camera and the materials so that they can focus on the task at hand. The instruction varied depending on the item and activity at hand. They were instructed in English and Kannada for complete comprehension of the activity. They were instructed to perform the activities as instructed by the investigator. Age appropriate activities were selected from the text based intervention module and they were administered, for e.g., for two year old children, turning pages of a book one at a time was done, for three year olds, noticing specific letters in environmental print was done, for four year olds, identifying names of all letters of alphabet was done etc. The videos of the children were recorded with prior written consent from the parents after explaining to them the purpose and the procedure of the video recording.

Participants of phase II

A group of 6 Kannada speaking children with bilateral severe hearing impairment using behind the ear hearing aids in the age range of 3-7 years

participated in the study, who were further divided into two groups (control and experimental group). The children with hearing impairment in both the groups were matched for their age, socio economic status, type and degree of their hearing loss, the type of hearing aid used and other factors. They were recruited from the Preschool Training Center housed at the Department of Special Education, All India Institute of Speech and Hearing (AIISH), Mysuru. The language ability of the children was assessed using the Receptive Expressive Emergent language scale (REELS, Bzoch & League, 1971). All the children had a language age greater than 2.6 years. The details of the children included in the efficacy testing have been provided in the table 1 below.

In addition, four professionals and two mothers of children with hearing impairment also participated who were also divided into two groups (control and experimental). Their native language was Kannada. The mothers of the children with hearing impairment had a minimum educational qualification of SSLC. The professionals included two speech-language pathologists and two special educators. These participants were recruited from the Department of Special Education, All India Institute of Speech and Hearing (AIISH), Mysuru, who were actively involved in early intervention practices. They were instructed to train the children with hearing impairment on pre-reading skills by following the instructions and activities provided in the text based module or the digital tutorial. The participants were selected by adhering to appropriate ethical procedures. A written consent was obtained from them indicating their willingness in participating in the study. They were randomly assigned to two groups (control and experimental) of three members each.

Procedure

The details of the two phases of the study are provided below

Phase I: Development of the digital tutorial

The preparation of the digital tutorial was undertaken in four steps as mentioned below

Script writing The text based intervention module for pre-reading skill consisted of a total of forty six items. These items were selected based on a thorough review of the existing literature (e.g., Teale, 1987; Whitehurst & Lonigan, 1998), books, and other internet resources. The items covered aspects of awareness of print or print knowledge which included the understanding of printed letters, understanding that print carries meaning, understanding that print has a variety of functions (street and store signs, lists, letters to a friend, etc.), knowing that printed words correspond to spoken words, knowing that print moves in a particular direction on a page, knowing how to hold a book the right way, book rules (how a book opens, turning pages, title and author on cover, differentiating between print and pictures, turning pages left to right, and being able to tell the front of the book from the back), print components (letters, punctuation, sentences), rules of print and naming letters, etc. and phonological processing ability which included aspects such as knowledge that speech is composed of units, such as words, syllables, and sounds, and the ability to perceive and manipulate the units of speech. According to Whitehurst and Lonigan (1998), these are essential components of emergent literacy skills. Each of these items had a set of three activities each to facilitate pre-reading skill in the age range of 0-6 years. Hence, the entire module consisted of 138 activities. A methodical and an elaborate script was prepared for the activities to be video recorded. The script included commentary, duration of the activity, the specifications regarding the visual effects, the characters and materials involved in each video clip and if the scene is to be shot indoor or outdoor etc. This script was prepared in accordance with the guidelines provided in the Educational Video Workshop by Hoffmann (2009). A sample script of the activities has been provided in the appendix.

Pilot sampling of video shots A pilot sampling was conducted by randomly picking a few activities from the script. The videos featured therapists and typically developing children who were going to be a part of the final video. The video recording was carried out in the setup identified for the same, keeping in mind all the specifications mentioned in the script. The video recording was later edited and the commentary was superimposed on the video. The title of the activity was also loaded on to the video. This was viewed by the authors and their feedback on the video with respect to parameters such as content and presentation of activities, clarity of the audiovisuals, utility of the video in teaching a particular skill and suggested modifications were taken into consideration before shooting the final video.

Final video recording and commentary The final video recording of the activities was done by a professional videographer using a Sony camcorder and a collar microphone. A silent room with minimum background noise with adequate lighting was chosen for the recording. The visual effects in terms of the angle of the shots and the type of shots (e.g., close up or a wide shot) were taken care of. The recording was done for all 138 activities with age matched typically developing children between the age group of 1-6 years. The video features a

speech therapist and a special educator teaching pre-reading skills to the children. The language used for training purposes was English since the original text based module was in English. The commentary was recorded in English by narrators, with good clarity in voice and fluent speech. It was recorded in the speech-language pathology lab of Dept. of Speech-Language Pathology, AIISH, Mysuru using CSL software to cut down all extraneous noise and for better quality of sound. These commentaries were later coupled with the videos during the editing phase. The commentary was recorded in English keeping in mind the multilingual users in India.

Editing The editing was done by a professional using editing softwares. For the audio and video editing, Adobe audition and Adobe Premiere softwares were used. The screen capture and image editing was carried out using the Camtaria and Adobe photoshop softwares and finally for the programming and integration of different edited video files, the Articulate story line software was used.

Phase II :Evaluating the efficacy of the digital tutorial

The efficacy study was divided into five steps

Orientation program to the professionals and parents An orientation program for about two hours was organized for the four professionals (2 speech-language pathologists, 2 special educators) and two mothers of children with hearing impairment involved in the efficacy study. This was carried out by the investigators of the study to impart knowledge about the concept of emergent literacy and how explicit training can enhance the pre-reading skills. The group was familiarized with the training procedure and the resource materials that they had to use during the research study.

Assessing emergent literacy experiences and assessment of baseline Prior to the training, the information regarding the child's exposure to literacy at home and in school environment was elicited by administering a parent and teacher questionnaire titled 'Emergent literacy experiences in the classroom/home' (Khurana & Prema, 2011) on the professionals (especially the special educators who handled the child in the preschool) and mothers who participated in the study. The questionnaire provided information regarding the types of books the children were exposed to at homes, story-telling habits at homes and overall literacy exposure that the child gets in the home environment. The special educators reported information regarding the teaching strategies used in the classroom; if the child was taught book handling skills, print awareness, phonological awareness etc. and the availability of training resources in the school. This gave the information regarding other sources from which the child was obtaining literacy inputs.

In addition, the children's pre-reading skills were assessed in terms of their attention towards concepts of print, matching ability, pointing ability, enjoyment of literacy activities, book handling knowledge, alphabet knowledge, phonological awareness etc. using the 'Assessment checklist for pre-reading domain' (Swapna et al., 2010). This assessment checklist rated the pre-reading abilities of children by scoring '1' if the child achieved a particular item, '0.5' if the child required help to complete the item or if the performance was inconsistent and '0' if the skill was absent in the child. This gave the baseline score of each child before the training program.

Preparation and distribution of the resource kit to the participants The professionals and the parents included in the study were further divided into two groups: control and the experimental group. The control and the experimental group consisted of one speech-language pathologist (SLP), one special educator and one mother each. Each trainer in a group (SLP, special educator & mother) was assigned a child with hearing impairment for providing training in pre-reading skills. The participants in each group were given a resource kit to teach pre-reading skills to the children with hear-

Table 1: Details of the participants

Sl.No.	Name	Age/gender	Degree of hearing impairment	Type of hearing aid
1.	AB	3.7/M	Bilateral severe hearing impairment	Behind the ear digital hearing aid on both the ears
2.	CD	3.7/M		
3.	EF	4.6/M		
4.	GH	4.3/M		
5.	JK	7/F		
6.	MN	6.10/F		

ing impairment. The resource kit included a text based manual, a video based manual (digital tutorial) for teaching pre-reading skills, teaching aids and a score sheet to document the responses. The control group (comprising of a special educator who trained AB, mother who trained EF and a SLP who trained JK) was provided with only the text based intervention module (manual) whereas the experimental group (comprising of another special educator who trained CD, a mother who trained GH and another SLP who trained MN) was provided with both the text based manual and the digital tutorial to facilitate pre-reading skills. The participants were asked to follow the instructions and activities given to them and score the responses of the child on a daily basis. Appropriate teaching aids required for the training such as the books or toys were provided to them.

Training in pre-reading skills Each trainer in both the groups (SLP, special educator & mother) was assigned a child with hearing impairment for providing training in pre-reading skills. The goals chosen for training each individual child were based on their baseline scores obtained on the 'Assessment checklist for pre-reading domain'. The pre-reading abilities in which the child scored either '0.5' or '0' were taken up as goals. A half an hour training session every day for one month (ranging from13-20 sessions) was carried out. During this period, it was ensured that pre-reading skill was not taught at any other time as the child was a part of the preschool training center at the Dept. of special education and the concerned special educators handling the children were instructed to engage the child in other activities. The training was provided using the resource kit and the scores were recorded every day on the score sheet along with the descriptive feedback regarding the intelligibility of the text, the audiovisual clarity of the videos, the ease of carrying out the activity, the availability of materials used in the activities etc. At the end of the training period, assessment checklist for pre-reading skills was run again on each child to assess the present level of pre-reading abilities. The score sheets along with their feedback were collected from the participants.

Evaluation of the digital tutorial A questionnaire on 'Instructional Video Evaluation Instrument' (Bart & Don, 1996) was used to obtain feedback from the participants who used the digital tutorial during the training. The participants rated the digital tutorial on a rating scale of 1-5 (1 indicated poor and 5 indicated exceptional) in terms of its accuracy, usefulness, content presentation, visual /audio quality etc.

Analysis

The pre-training and post-training scores obtained by the children in the control group and experimental group were averaged. Descriptive statistics was used to calculate the mean and standard deviation.

Results

Phase I

The outcome of the final educational video program was two DVDs with 138 activities for the two different age groups (0-3 and 3.1-6 years), which begins with an overview of the product. It contained clear titles and a sequential flow of activities which goes in parallel with the pre-reading text based intervention module. The language used in the video is simple and comprehensive as far as possible for the users. This video developed has been recorded in English keeping in mind the multilingual users in India.

Phase II

Quantitative analysis of the children's pre-reading skills

To determine the extent to which participation in such early literacy enhancing program influenced the pre-reading skills, the performance of all the children with hearing impairment before and after training was compared.

Descriptive statistics was computed. The pre-training mean percentage score obtained for all the six children as a group was 43.23 (SD=5.9) and the post-training mean percentage score was 80.78 (SD=11.46). This included those who had been trained in the text only mode and text and video based mode. Visual inspection of this data indicated that there was a remarkable increase in the mean post-training scores of the entire group. The mean scores obtained were then analyzed statistically using non parametric Wilcoxin signed rank test. The results indicated a significant difference in the pre and post-training scores (/z/=2.20, p¡0.05). This suggests that the participation in the intervention program has effectively stimulated the pre-reading skills indicating that both the text based manual and the digital tutorial served the purpose in enhancing the training skills regardless of the trainer's background/profession.

Further, the data was bifurcated in terms of control and experimental group to analyze for statistically significant differences, if any, within each group. However, as the number of participants in the control and experimental groups were only three each, further statistical analysis was not carried out. Their responses to the text based and

video based training have been explained descriptively in the following section.

Qualitative assessment of the program efficacy

A qualitative assessment of the children suggested that the training program had been effective in enhancing the pre-reading skills and the group that used the digital tutorial showed better gains revealing the effectiveness of the video mode in training to impart literacy activities in children. However, it was noted that the gains were variable across individuals since the activities that were given to children were based on their individual baselines. The following section details the specific gains observed for each child and trainer dyad.

Prior to the training, the information regarding the child's exposure to literacy knowledge at home and in school environment was obtained using a parent and teacher questionnaire titled 'Emergent literacy experiences in the classroom/home' (Khurana & Prema, 2011). The teachers in their feedback reported that the children were exposed to book handling skills, phonological awareness and print awareness. The parents reported that they encouraged children to read books and involved them in reading activities in general but no specific training strategies or techniques were used while training them in the home environment. It was concluded based on the checklist that the children who participated in the study did have an exposure to emergent literacy skills both at home and school but did not have any explicit training for pre-reading skills with specific goals and activities.

Participants trained by the special educator (AB and CD)

AB was trained for a total of 20 sessions and CD was trained for a total of 16 sessions. During the baseline assessment AB failed in 10 items. The activities that she failed ranged from some of the basic book handling skills such as the ability to turn pages singly, matching objects to pictures to visual closure and sequencing activities. CD failed in 8 items which included differentiating between toys and books, pretending to read books, ability to ask questions while stories are read etc. The special educator who trained AB was provided with the text based manual with illustrations, and activities particular to those that AB failed and a score sheet along with the necessary teaching aids. The responses of the children were documented objectively. At the end of 20 sessions, the post assessment revealed that AB had achieved 8 items out of 10 and had taken an average of 3 sessions to learn one subskill. The special educator who trained CD was given the tool kit which included the digital tutorial along with the text based manual, teaching aids and a score sheet. The post assessment revealed that CD had achieved 7 items out of 8 and had taken an average of two sessions to learn each skill. The feedback obtained by the special educator who trained AB stated that the program was beneficial and the text based manual was comprehensive, although she reported that the child did not show consistent responses throughout the training program for two of the activities. The feedback from the special educator who trained using the digital tutorial was more promising as she reported that the pre-reading abilities of the child were increasing over time and also in turn his oral language skills were also improving. She reported that the activities demonstrated in the digital tutorial were very easy to understand. She also reported that the video was well organized and more such videos should be developed. However, the number of sessions for participant CD was limited to 16 since she did not attend the preschool regularly. Overall, it can be seen that CD was quicker in learning the pre-reading skills and learnt greater number of items in lesser number of sessions than AB, which indicates the efficacy of the digital tutorial.

Participants trained by the parent (EF and GH)

EF and GH were assigned to their respective parent (mother) who imparted the training for 20 sessions. Participant EF was included in the control group and hence the parent was given only the text based manual as the training material, whereas, participant GH was assigned to the experimental group and hence received both the text based and the digital tutorial for his training. On the basis of participant EF's baseline evaluation, the mother was given 13 items to train the child. The activities ranged from developing questioning skills, recognizing alphabets, sequencing of events etc. At the end of 20 sessions, EF had achieved 11 items with a minimum of 2 sessions taken to learn each activity. The parent in her feedback reported that the child was positively responding to almost all the activities and the child enjoyed the activities. The material given was comprehensive however, two activities required more instructions according to her. Overall she said the program has been very helpful and was motivated to continue training her child based on the manual.

Based on the participant GH's baseline, the activities given to the child were book handling skills, matching skills, alphabet knowledge, rhyming and phonological awareness skills. A total of 18 items were given for the training purpose and the child was trained for a total of 20 sessions. At the end of the training period GH achieved 17 items and had taken a minimum of 1 to 2 sessions to learn each

activity. The feedback given by the mother was positive, reporting the activities to be very helpful for the child in quicker acquisition of pre-reading skills. She reported that she found it difficult to comprehend the activities when she read the text based material, however the same was clarified by the video and it had helped her understand the activities in a better way. To sum, it was seen that GH who was trained using the video based module learnt greater number of items in lesser time compared to EF and the mother also reported enhanced comprehension of the activities which had facilitated in better execution of activities.

Participants trained by the SLP's (JK and MN)

JK and MN were assigned to the SLP's who trained them for 15 and 13 sessions respectively. JK was included in the control group and hence the trainer was given only the text based manual, whereas MN was in the experimental group and the trainer obtained both the text based and the digital tutorial for training. Based on the baseline results of JK, he was trained for a total of 11 items. The activities given for training included goals such as alphabet knowledge, phonological awareness skills like rhyming, blending, alliteration, reading numbers etc. At the end of the training period JK achieved 8 items and took an average of 2 sessions to learn each skill. In case of MN who was included in the experimental group, his baseline indicated that he failed in a total of 10 items which comprised of alphabet knowledge, phonological awareness, matching skills, reading numbers etc. At the end of the training period, MN achieved 9 items and on observation of the score sheet he took an average of 1 session to learn each item.

The feedback obtained by the SLP of JK reported the activities to be very helpful and handy to carry out the training. The text based manual was comprehensive and easy to follow. She reported that the phonological awareness activities were very helpful in teaching the child awareness of sounds and the child responded positively for such activities. The feedback from the therapist of MN indicated that the video manual was very useful in following the activities. The activities were very clearly depicted in the video and were easy to follow. The video manual facilitated quicker understanding of the activities and therefore the SLP preferred the video manual and chose it as the option.

Rating of the digital tutorial

To evaluate the digital tutorial, the professionals (SLP's and special educators) and parents who trained the experimental group by using the video supplement were given the Instructional Video Evaluation Instrument (Bart & Don, 1993) to rate the video on a rating scale (1= poor, 5= exceptional) in terms of its content and its technical production. A mean rating of 4 and above was obtained for 12 out of 16 parameters such as accuracy, usefulness, bias free, video design, audio-video relationship etc. An average of 80% was rated by all the three trainers who used the digital tutorial indicating a good rating on the scale. This suggested that the video manual was certainly of benefit to impart training in pre-reading skills. The aspects on which a mean score of less than 4 was obtained was considered and feedback of the same were provided to the editors following which the fine tuning of editing was carried out.

Discussion

The major outcome of this study was the development of a digital tutorial (video based resource material) which can be used by professionals and caregivers involved in early childhood rehabilitation to train children in pre-reading skills in different environments (at classrooms, homes, language therapy sessions). The principal intention behind the development of a video based resource material is considering the fact that video is a strong medium of instruction, since it is VISUAL. Users can see new ideas and approaches in action. A variety of activities can be quickly displayed and viewers can watch the sequences a number of times to reinforce their learning. It is culturally appropriate and can be easily transported too. The video programs can be easily repeated with different groups of parents or professionals, and although such programs are time-intensive to produce, they are very time-efficient thereafter proving effectiveness.

In the present study the video was rated to be good 80% of the time for its content, planning and technical production by the viewers revealing that the video can be a great source in training personnel. The feedback obtained from the trainers in the experimental group revealed that they always chose the video over the text based manual since it was less time consuming, more comprehensive and it was easy to imitate the activities demonstrated in the video. This feedback supports the initiative taken by the UNESCO (1989) in producing video programs in developing countries for parent and community education. However, in the present study the number of trainers who viewed the video was limited and hence the video should be presented to a large group of viewers for their feedback and to report its effectiveness.

The video which was developed was further field tested for its efficacy in training children with delayed speech and language due to hearing impairment by trainers from different backgrounds (special educators, parents of children with hearing impairment and speech-language pathologists). The

results indicated a significant improvement in the pre-reading skills of both the control and the experimental group when their pre and post-training scores were compared. This revealed the effectiveness of both the text based and the video based manual in imparting training by all three trainer groups. The results are in consensus with several evidence based research studies carried out on intervention of literacy skills in language impaired population which revealed positive results in effective treatment of literacy skills. The studies by Katims (1991), Ezell et al., (2000), Lovelace and Stewart (2007) and Munro (2008) targeted intervention on specific literacy skills and compared the pre and post performance of the children and the results suggested that children with language impairment may benefit from explicit referencing strategies that can be easily incorporated into the context of storybook reading during language therapy and adult child interaction. The validation of text based intervention module on pre-reading skills on children with hearing impairment by Swapna et al., (2010) also revealed a significant difference between the pre and post training scores. Studies reported by Yaden (1988) and Senechal, LeFevre, Hudson, and Lawson (1996) revealed that repeated storybook reading contributes to positive language changes. Most of the activities in the present resource material are also designed based on stories.

Studies focusing on literacy interventions for hearing impaired population also reveal positive outcomes. The investigations by Lartz and McCollum (1990), Rottenberg and Searfoss (1992), and Lartz (1993) have indicated that deaf and hard-of-hearing preschool children are clearly capable of exhibiting responses characteristic of their hearing peers when engaged in dialogic, interactive reading during storybook reading sessions. They found that emergent literacy is a viable construct for conceptualizing deaf children's initial encounters with reading and writing and their early understandings about print. Similarly in the present study, the results showed improvements in their pre-reading skills reiterating the fact that the resource materials have been beneficial in training the special population. However, the video manual needs to be used with children with other communication disorders to comment on its effectiveness across all populations.

Comparison of the results between experimental and control group could not be carried out statistically because of the small sample size. Due to the variability in the performance of each child, the results of the training program were written descriptively by comparing the trainer-child dyads. The data obtained from the two trainers of the same profession were compared, i.e., one who used the video (experimental group) versus the one who used the text based manual (control group) and the results were reported individually. The children were matched for their age and type and severity of the disorder. But the uncontrolled variables were their learning capabilities and the skills that they had already learnt. Therefore, the baselines of the children were different and each child was trained for different activities. Another uncontrolled variable was the number of sessions that the trainers covered during the given period of time. Owing to the irregularity of the child in attending the school or the absence of the trainer to attend his/her professional duties, the number of sessions varied.

The participant AB (control group) achieved 8 out of 10 items and participant CD (experimental group) achieved 7 out of 8 items. These participants were trained by the special educators. Participant EF (control group) achieved 11 out of the 13 items that were given whereas, participant GH (experimental group) achieved 17 out of a total of 18 items. These participants were trained by their mothers. The last group wherein the SLP trained the children, participant JK (control group) achieved 8 out of the 11 items given to him and the participant MN (experimental group) achieved 9 out of 10 items that were given. Overall, it was seen that every child who participated in the training program irrespective of the trainer scored higher than their baseline scores at the end of the training and the participants in the experimental group learnt greater number of items in a shorter time span, compared to that of the control group in the given number of sessions. This can be accounted by the video based manual that was used by the trainers in the experimental group. Also, from the feedback provided by individual trainers, it can be inferred that the trainers who used the video were more confident and relaxed in carrying out the training program as they had an advantage in terms of viewing the demonstration of the activities.

The results are in consensus with the study by Lakshmish and Prema (2010) in which the children who underwent intervention using the digital material showed gains in their literacy parameters indicating the effectiveness of the digital literacy coach. Research in both developed and developing countries has also demonstrated the effectiveness of this method of training with families and staff (McConkey & Templer, 1987; Baker, 1989). In developed countries, video-based training is expanding rapidly in education and in the business world. Although video equipment and computer is not common-place in developing countries, it will become more so in the future. The availability of ready-made training packages will hopefully stimulate their interest in becoming more skilled in the use of video and give service personnel a model to follow in developing their own training materials. The results of the present study supports the idea

that the emphasis needs to be on learning by seeing for the trainer rather than from talks and books (Werner & Bower, 1982). However, the present study carried out only a pilot investigation to see the effectiveness of the digital manual and hence requires a larger sample size to get an insight regarding the efficacy.

Conclusions

In general, the results of the training program indicated that the children who underwent the training were benefited by the program and the trainers including the special educators, SLPs and parents provided a positive feedback on both the resource materials. The trainer in the experimental group who used both the text based and digital tutorial reported the program to be highly effective and useful. All the three groups of trainers ranked the video program highly beneficial in terms of information provided and the benefits upon the child's development of pre-reading skills.

It can be concluded from the study that the digital tutorial developed can bring about a positive change in pre-reading skills since the group that used the digital tutorial showed better gains. This revealed the effectiveness of the video mode in training literacy activities in children. However it is premature to conclude that the digital tutorial is effective in training these children since there are some limitations such as small sample size. Hence, it is considered as a pilot efficacy study and further longitudinal research on a larger number of children is needed to show relatively modest increases in childrens' language and literacy. Secondly, the difference in individual trainee and child dyads and their knowledge background could have contributed to the variability in the results. Further, there is a possibility of an impact of the other training methods on the performance of the children since they were all engaged in an active preschool intervention program. Also the digital tutorial needed to be viewed by a larger audience to comment on its overall effectiveness. These limitations suggest possibilities for future research on emergent literacy intervention on a larger sample of children with hearing impairment and other communication disorders. This digital tutorial being first of its kind can serve as a model for further activity based video materials in the future.

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Appendix

Sample script prepared for the video recording

Shots	Activity	Setup	Materials	Characters	Audio	Video	Duration
1	Follow or track the movements of the objects	Indoor	Torch, toy	• T,C	T: Look here Dolly....do you see the torch light on the wall? Now, look where it moves. C: Tracks the movement T: Very good Dolly! Great job, Now look at the toy dolly, see how it moves. C:Tracks the movement T: Excellent	*MLS *CU child's head MLS MLS	1 min

• T-Therapist, C- Child, *MLS- Medium length shot, CU- Close up