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## Early Childhood Communication Research Centre

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### Talking Together Project

Westpac Foundation Final Report  
January 2006 to July 2007

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## Part A

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### Background:

The *Talking Together* project is a collaborative effort that aims to educate early childhood staff and improve outcomes and access to services for young children with significant language difficulties. This is envisaged to be a five-stage process, looking at both child and early childhood staff outcomes. Achievement of these aims is important due to the significant research evidence that links early language difficulties to later learning, academic and literacy difficulties. The research also indicates that up to 50 % of pre-school aged children have a communication difficulty.

*Talking Together* was initiated as a result of positive outcomes achieved for a 16-week local project in 2001. In this project, a group of children received collaborative speech pathology services within a preschool setting. All targeted children showed improvement in their communication skills and educators reported significantly improved confidence in managing children with speech/language impairments within the preschool context. However, due to many confounding factors and the

different services provided across the various preschool sites, this project's outcomes were difficult to objectively evaluate.

Since this time, a comprehensive literature review was undertaken, and a further local pilot project was implemented to objectively answer and analyse questions regarding the effectiveness of a collaborative speech pathology service within the early childhood setting. Funding from the Illawarra and Shoalhaven Early Intervention Consortium, grants from the Wollongong University/ Illawarra Health Research Directorate, and in-kind support from the SESIAHS Northern Illawarra Speech Pathology Department took the project into 2005. At this point, it became obvious that in order to produce replicable and useful information to influence speech pathology practice in this area, a larger, wider scale project was required. This larger scale project began in 2006 as *Talking Together – Phase I*.

*Talking Together – Phase I* commenced in 2006 with the aim of providing education to the staff and management of up to 60 Early Childhood Centres around the state of NSW. The education was provided by NSW Health speech pathologists to teach early childhood staff to identify language disorders in children early in their development.

It was planned that up to 600 children between the ages of 2 and 4 years would receive a professional speech pathology assessment on-site at their pre-school. The assessment results were compared to language skill checklists completed by the early childhood staff regarding the same children. This comparison formed part of the evaluation to investigate the effectiveness of the education provided by the speech pathologists.

This project was developed and implemented within a research framework, with a view to publish the findings in appropriate journals and conferences. There has been little published research evidence to date regarding the effectiveness of speech pathology services consulting with Australian early childhood centres to provide an effective collaborative service for children with language difficulties. There is a high need for this evidence as currently the need for speech pathology services in the state of NSW (and indeed nationally) is at a level that cannot be met with traditional one to one appointments in the public health sector.

Currently, there is also no validated educational tool available for use in this area. Thus, a further outcome of this project (providing the research outcomes are favourable), will be to produce a validated educational tool for use by speech pathologists in Early Childhood Centres.

# Part B

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## Executive Summary of Project

### **Aims & Objectives**

The objectives of the *Talking Together Project – phase 1 (2006)* were as follows:

1. To enhance a training tool used in a previous pilot study to educate early childhood professionals to identify language difficulties in children attending preschool or childcare.
2. To conduct research across the state of New South Wales to test the effectiveness of the in-service training in accordance with the guideline of the National Health and Medical Research Council (NHMRC) guidelines for human research.
3. To utilise working speech pathologists (within NSW Health) to implement the project.
4. To provide training to early childhood professionals working at up to 60 early childhood centres (preschools and child care) across NSW.
5. To provide speech pathology assessments to up to 600 children attending the pre-schools included in the project.
6. To analyse the results of the project and present the research for publication in appropriate journals and professional conferences.
7. To market the training tool if the research validates its usefulness.
8. To plan and raise support for future phases of the Talking Together Project

### **Processes (Objectives 1 to 5)**

The processes involved in completing these objectives were typically more complicated than first anticipated. The following is a summary of these processes as they related to each of the above objectives.

Firstly, the training tool used for the project was enhanced based on the findings of the pilot study conducted in 2004 (*the pilot study was submitted as an attachment with the Project Plan, October 2005*). Enhancements included the production of a professionally filmed and authored DVD of children's language examples and refinement of the content and format of the training and accompanying resources. The training slides were professionally formatted in preparation for publishing.

Secondly, prior to the commencement of the project in January 2006, submissions were lodged and approval granted by the joint Illawarra, University of Wollongong (UOW) Human Research Ethics Committee (HREC) to conduct the research across NSW. However, subsequently there were requests from three area health services outside SESIAHS for submissions to be lodged to individual HRECs within each health service prior to the commencement of the project in these areas. Included in this was a negotiation process with the University of Newcastle to include final year speech pathology students in the project to assist speech pathologists in Greater Newcastle to operationalise the project in their area. A further submission was also required by Kindergarten Union (KU) to conduct the project in their preschools. Whilst approval was granted in each case, these unforeseen subsequent submissions represented a lengthy and arduous process that impacted significantly on the timely achievement of the project milestones.

Processes for the third and fourth objectives were impacted by the delays of the additional submissions mentioned above. Invitations were extended to speech pathology clinics around NSW

Health to participate in the project prior to the official commencement of the project. At the conclusion of the first quarter, 46 NSW Health speech pathologists had volunteered to participate in the project. However, 20 withdrew throughout the course of the project. A total of 6 final year speech pathology students from the University of Newcastle also participated in the study. Reasons for speech pathologists' withdrawal included other clinical demands, staff shortages and the delays that occurred in the administration of the study (see above). This affected the timing required for the speech pathologist's participation.

There were 60 early childhood centres recruited to the project in February 2006 using a random selection process. A total of 31 centres (approximately 270 early childhood professionals) received the training from speech pathologists, and 27 completed the project. The most common reason a centre did not receive training was that the local speech pathology clinic had withdrawn or reduced its capacity in the study. Some withdrew due to internal factors such as accreditation or staffing issues. New centres were recruited to the project if the capacity of the local speech pathologists and project time-line permitted.

Participating speech pathologists attended education provided by the Early Childhood Communication Research Centre to administer the training appropriately to the early childhood professionals. The training was provided using *telehealth*. This is a multimedia video teleconferencing facility available within NSW Health. It effectively provided face to face training to speech pathologists across the state without the need for travel.

The fifth objective was to provide assessments to children aged 2 to 4 years attending the included preschools and child care settings. The participating speech pathologists were provided training (utilising *telehealth*) to reliably assess the children using the Preschool Language Scale – 4<sup>th</sup> Edition (PLS-4). PLS-4 test forms were distributed to the clinics following a successful submission to Harcourt Assessment for a research discount on forms and test materials. One PLS-4 test was also ordered for a clinic that was otherwise without. Twenty percent of these assessments were also video recorded and analysed for reliability purposes.

A total of 230 assessments at 27 early childhood centres were completed by the speech pathologists across NSW. This was less than half of the anticipated maximum. The primary factor affecting this was the withdrawal or limited capacity of the local speech pathologists to complete the assessments.

The results of the project, including data from checklists and questionnaires completed by the early childhood professionals, and the speech pathology assessment results were statistically analysed. The University of Wollongong Centre for Statistical and Survey Methodology were recruited to perform the analysis. Some of the analysis was also completed by the chief investigator. These analyses were delayed due to maternity leave taken by the chief investigator from December 2006 to April 2007. Results were not available from some participating areas before December due to the above-mentioned delays encountered in the administration of the project. The analysis was finally completed on the 29<sup>th</sup> June 2007. Details of the analysis are included in a formal report entitled *Talking Together: The effectiveness of Inservice Training to Improve the Identification of Language Disorders in the Early Childhood Setting*. This has been included as an attachment via e-mail, and additionally mailed via post).

### **Outcomes & Recommendations (Objectives 6 to 8)**

The outcomes of the research have been written into a formal report and submitted to the appropriate HRECs. Results indicated that whilst the early childhood professionals perceived the training improved their knowledge in the targeted areas, it did not improve their skills to identify language difficulties in the children included in the project. Whilst the drop-out rate of subjects

included in this study was significant, calculations indicated that there was enough statistical power to detect if the training caused a worthwhile improvement.

The findings of the project were therefore contrary to initial hopes. Future marketing of the training tool will not be on the basis that it has been validated by research to improve the skills of early childhood professionals to identify language skills in children. However, it is an appropriate, and well presented tool to raise awareness of language difficulties amongst the early childhood profession. To this end, marketing through Speech Pathology Australia (the national professional association for speech pathologists) will be negotiated. A sample of the product to be marketed has been produced for this purpose. A copy has been sent to *Westpac Foundation* via *Australia Post*.

Additionally, interest in this training package has been expressed by TAFE NSW. The chief investigator has been invited to present on the possibilities of including the training as part of the curriculum for Certificate III and Certificate IV in Children's Services at a Heads of State meeting in August 2007. This followed her attendance at the Community Services and Health Industry Skills Council Review Draft I for the Community Service Training Package. This meeting held on 29<sup>th</sup> May 2007 allowed for comment and discussion amongst industry stakeholders regarding the structure and content of TAFE training courses. At present the curriculum for Certificate III and IV in Children's Services do not contain any significant education regarding early language development.

A submission for the publication of this study in *ACQuiring Knowledge in Speech, Language and Hearing* (known as ACQ) is due to be lodged by April 2008, for the October 2008 issue. This issue has an appropriate theme for the Talking Together Project: *Intervention – why does it work, and how do we know?* The ACQ is a major peer reviewed publication of Speech Pathology Australia. In addition, a submission to present an oral paper regarding this project at the Speech Pathology Australia National Conference entitled *Reflecting Connections* to be held in Auckland, New Zealand May 2008 will be lodged by the 31<sup>st</sup> August 2007. Notification of acceptance is due 14<sup>th</sup> December 2007.

Another outcome of the *Talking Together Project* in 2006 was a valuable lesson learned regarding capacity to successfully implement research within the context of NSW Health without consistent university support. The Talking Together Project has previously received support from Charles Sturt University. However, the supporting personnel were unable to continue in their role for the project in 2006. Subsequent attempts to gain consistent support for the project from several universities including University of Newcastle, University of Sydney, James Cooke University, and La Trobe University were unsuccessful. The academics and Heads of School approached all reported high interest in the project, however were unable to spare the time required to adequately support the study.

Future phases of the *Talking Together Project* (such as implementing collaborative intervention in prior to school settings) will be conducted on a project level within SESIAHS. Additionally, there is the possibility of implementing the training through NSW TAFE. Coordination for this will be sought through Speech Pathology Australia. Research opportunities will continue to be sought through appropriate universities. The implementation of further research requires committed academic support (for example, the supervision of a masters or PHD student conducting the study).

# Part C

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## Detailed Report of Entire Project

*A detailed report of the objectives, methods, results, evaluation and recommendations follows. This is a copy research report that has been included as a separate document in the attachments. The abstract and appendices have been removed from this section.*

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### Introduction

Many publications attest to the need for training early childhood professionals to identify and work with communication difficulties in children (e.g. Hall, 2005; Girolametto, Weitzman, & Greenberg, 2006; Letts & Hall, 2003). A study of training needs for 25 interviewed early years professionals (Mroz, 2006) reports that early years professionals “...specifically want more training in identifying children with communication difficulties and opportunities to work more closely with speech and language therapists” (p. 155). There are other studies indicating shortcomings of early childhood staff to meet the needs of children with communication difficulties (e.g. Locke, Ginsborg, & Peers, 2002; Conti-Ramsden & Taylor, 1990). Locke, Ginsborg, & Peers (2002) expressed concern at the lack of training and education of nursery staff regarding early communication development, and how to facilitate later language development in these children.

The importance of obtaining an efficient and effective model for early intervention in speech pathology is highlighted by many studies (e.g. Mendoelson, et al., 2001; Rescorla, 2002; NSW HEALTH, 1999; Stothard, Snowling, Bishop, Chipchase & Kaplan, 1998; Tepperman, 1997; Nelson, Nygren, Walker, & Panoscha, 2006). Researchers emphasise that language and literacy as well as academic, social and economic factors arise from or are correlated to early communication difficulties. Research by Mayberry, Lock, & Kazmi (2002) indicates that the ability to learn language is significantly hampered when language experiences do not occur prior to admission to school.

Whilst the need is clear, whether speech pathologists can effectively or reliably educate ECPs to identify language disorders in children remains an unknown in the literature. Nevertheless, the provision of inservice training to ECPs is common practice for Australian speech pathologists. It is widely believed that this service will assist in the appropriate referral and management of children with communication difficulties.

However, there are several published studies (e.g. Letts & Hall, 2003; Mroz, 2006) which indicate confidence levels of ECPs to work with children who have communication difficulties are often disproportionate to their level of experience or skill in the area. In fact, some with significant experience reported little confidence, whilst those with less experience felt greater confidence to work with these children.

A pilot study conducted in the Illawarra region, NSW (Collier, Halloran, & Bradd, 2004) indicated that there was no change in the rate of early childhood professionals to correctly identify language difficulties in children following the training received. This was despite the ECPs perceiving a significant increase in their levels of knowledge regarding language development in children. However, there were only nine children with identified language delays included in the study. These small numbers prevented reliable statistical analysis, and conclusive findings.

The present study further explores the topic of effective inservice education for early childhood professionals (ECPs). The particular interest is the effective training of early childhood staff to

identify language difficulties in children attending their centres. The term Early Childhood Centres (ECCs) is used to refer to both preschools and child care centres in this paper.

Language difficulties were chosen as the focus area of the training in this study, rather than attempting to cover the broad spectrum of communication difficulties. In practice, expressive or receptive language difficulties may appear more covert than other communication difficulties such as a lisp or stutter. Yet the impact of early language difficulties in the long term has been documented to be significant (Stothard, Snowling, Bishop, Chipchase, & Kaplan, 1998). Many studies have linked early language difficulties to other key developmental areas including social, cognitive, perceptual and attentional (e.g. Locke J. L., 2001; Olswang, Rodriguez, & Timler, 1998). There are also strong links in the literature between early language difficulties and later learning, academic and literacy difficulties (e.g. Locke, Ginsborg, & Peers, 2002; Mendelsohn, et al., 2001; Rescorla, 2002; Schoenbrodt, Kumin, & Sloan, 1997).

This study also examines two modes of presentation for the training. On-site consultation is compared to the use of video examples in the teaching of ECPs to identify the presence and severity of language difficulties in children. The value of collaborative service provision between health providers and the community has been well documented in the literature. To improve services to children with language difficulties, Locke, Ginsborg, & Peers (2002) express the need for speech and language pathologists to be based in schools in the role of consultant/facilitator. Radovich (2001) discusses the benefits of speech pathology collaborative consultation within the environment where the child is experiencing difficulties. She also describes an environment of mutual respect and knowledge sharing between professionals as members of one team.

A true model of collaborative consultation is outside the scope of this study. However, the success of training which included a 45 minute on-site consult between a speech pathologist and ECPs to discuss familiar children (called treatment B in this study) is examined. This is compared to training which consisted of a 45 minute viewing and discussion of video examples of children with varied language skills interacting with a speech pathologist and in the preschool setting (called treatment A in this study). Both treatment A and treatment B in this study are designed to convey the same information, and take the same amount of time. Only the mode of presentation differs.

There are three hypotheses this study examines:

- H<sub>O(i)</sub>: Training provided by the speech pathologist in either format (video examples or on-site consultation) will make no significant difference, or worsen the ability of Early Childhood Professionals to identify language difficulties in children attending early childhood centres.
- H<sub>O(ii)</sub>: Training provided by the speech pathologist in either format (video examples or on-site consultation) will make no significant difference, or worsen the perceived knowledge levels of Early Childhood Professionals regarding key areas of language development, delay, disorder and appropriate referral (as covered in the training) .
- H<sub>O(iii)</sub>: The training format (whether it utilises video examples, or an on-site visit to discuss the presentation of language disorders in children) will not make a significant difference to the ability of Early Childhood Professionals to identify language difficulties in children.

These are tested against the alternatives:

- H<sub>A(i)</sub>: Training provided by the speech pathologist in either format (video examples or on-site consultation) will significantly improve the ability of Early Childhood Professionals to identify language difficulties in children attending early childhood centres.
- H<sub>A(ii)</sub>: Training provided by the speech pathologist in either format (video examples or on-site consultation) will significantly improve the perceived knowledge levels of Early Childhood Professionals regarding key areas of language development, delay, disorder and appropriate referral (as covered in the training) .
- H<sub>A(iii)</sub>: The training format (whether it utilises video examples, or an on-site visit to discuss the presentation of language disorders in children) will make a significant difference to the ability of Early Childhood Professionals to identify language difficulties in children.

## Method

### Design

A pre-test post-test quasi-experimental design with two treatment groups and the comparison of measures to a criterion standard was used in this study. Speech pathologist assessments acted as the criterion standard for the pre and post training measures. Cluster randomisation was used to select the ECCs from geographically appropriate areas, which were then randomly assigned to the two treatment groups.

Blinding was used to protect the study from the effects of bias on several levels. ECPs were blinded to their pre-test data when completing post test data in two ways. Firstly, the pre-test data was collected prior to the receipt of training or the post test forms. Secondly, the order of the Likert scales on post test forms was reversed to counter the effect of pre-test conditioning. Speech pathologists did not sight the checklist data to avoid possible bias when assessing the children. The researcher received all data labelled with codes rather than identifying information to avoid possible bias at the time of data entry.

### Limitations

The first limitation of this study is that the design omitted use of a control group. This introduces the possibility of alternative explanations for effects than the training provided. However, it maximised subject numbers in the treatment groups, thus improving the power of the study. The power of the study needed to be sufficiently high to demonstrate the occurrence or absence of a treatment effect. Due to the relatively small portion of randomly selected children expected to be diagnosed with a language delay or disorder, the measured effect of the training was also anticipated to be small.

The study initially aimed for a cohort of 400 children to detect a treatment effect to a 0.05 significance level with 80% power. The drop-out rate was higher than anticipated. However, calculations performed by the University of Wollongong Centre for Statistical and Survey Methodology indicated that the present study was sufficiently powerful to detect an improvement from the training for both groups combined of 7 or more percentage points, and a difference between the training groups A and B of 15% with 80% power.

Some unique threats to the study which pose a potential risk to internal validity are also acknowledged. For example, the training and assessments were administered by 26 different speech pathologists, and occurred in the varied settings of the included ECCs. This was considered an

acceptable risk to improve the external validity of the study across geographical areas and to test the effectiveness of the training as it is designed to be used: by working speech pathologists.

Additionally, there were limitations of the sampling frames used for the random selection process. The sampling frame for the children selected was constrained to those who had signed parental consent. The ECC controlled the distribution and collection of the consent forms under the instruction of the researchers. Whilst actively discouraged, this allowed ECPs opportunity to encourage certain children over others to be included in the study. The selection of the ECCs was also constrained to areas where speech pathology clinics agreed to participate. Finally, selection of included speech pathologists, speech pathology students and ECPs was on a voluntary basis following invitation from the researchers.

Selection mortality is an unlikely threat as there was an even drop-out rate between the treatment groups, and the majority of the withdrawals occurred prior to the completion of pre-test data. The study design accounted for many of the threats to multiple group experiments such as selection history, selection testing and selection regression by the use of random selection and random assignment to treatment groups. Maturation was accounted for in the research protocol. The timeline for the completion of pre and post-testing, and the speech pathologist's assessment within an ECC was to occur within a twelve week period of time.

### **Setting, Subjects and Selection**

The study was conducted in Early Childhood Centres across the state of NSW in geographical areas where the NSW Health speech pathology clinics indicated they were willing and able to participate in this research. Clinics were initially invited to participate via an information pack disseminated through NSW Health speech pathology regional advisors. This was followed by telephone calls and e-mail or postal correspondence to individual clinics.

The subjects included the Early Childhood Professionals (ECPs) at each of the selected ECCs and children aged between 2 and 4 years attending the selected centres. Participating speech pathologists and speech pathology students were also subjects in the study. All subjects participated in the research on a voluntary basis, and were free to decline at any time. The receipt and storage of personal information such as names on consent forms or assessment data is regarded with strict confidence. All data is kept securely and labelled with codes rather than identifying information.

A total of 46 NSW Health speech pathologists initially volunteered to participate. However, 20 withdrew throughout the course of the study. Reasons included other clinical demands, staff shortages and some unforeseen delays that occurred in the administration of the study, thus affecting the timing required for the speech pathologist's participation. Delays included submissions and additional levels of ethical approval required for the study to be conducted in area health services outside the South Eastern Sydney Illawarra Area Health Service (SESIAHS).

The University of Newcastle posted an invitation for fourth year students to participate in the study as an optional clinical placement. A total of 6 fourth year speech pathology students volunteered to participate in the study whilst under supervision at a speech pathology student unit.

60 Early Childhood Centres were randomly selected from the geographical areas appropriate to the participating speech pathology clinics. The sampling frame was a data base of all government and privately owned preschools and child care centres in New South Wales obtained from Our Lady

Gowrie Child Centre. This data base was then augmented to exclude all centres outside the geographical reach of the speech pathology clinics.

The remaining ECCs were categorised into geographical areas and assigned a random number using the random function in Microsoft Excel. The ECCs were then ranked in ascending order according to the value of the random numbers and selected in proportionate numbers from each of geographical area. The proportions reflected the total number of listed ECCs within each of the participating geographical areas.

Selected ECCs were contacted by telephone and sent an information package regarding the project. This package was sent by post or e-mail, depending on the preference of the centre. It included an information letter and consent forms for management and staff at each centre. If an ECC declined, the next randomly selected ECC in that area was contacted. Random assignment of the ECCs to a treatment group followed the receipt of signed consent from ECPs.

A total of 27 ECCs completed and provided the setting for the study. The most common reason for ECC withdrawal was that the local speech pathology clinic had withdrawn or reduced its capacity in the study (23 centres). 14 centres withdrew due to internal factors such as accreditation or staffing issues and 1 was excluded following a breach in the research protocol (training was received prior to the collection of pre-test data).

If a centre withdrew from the study, the next randomly selected centre within the area was recruited provided the research timeline and the local speech pathology clinic capacity permitted. A total of 6 ECCs were recruited in this way. One of these centres withdrew due to difficulty recruiting children to participate. This centre was from a culturally and linguistically diverse area, and cited this as the primary reason for parents not responding to the information given. Although an on-site meeting with interpreters to assist in this matter was offered more than once, the centre declined to accept this service.

All ECPs working at the selected ECCs who provided signed consent were included in the study. From the 14 centres comprising Treatment Group A, 45 of 119 ECPs completed the study. Of the 13 centres that comprised Treatment Group B, 43 of 113 ECPs completed the study.

A maximum of 10 children were randomly selected for inclusion in the study from the total number of consented 2 to 4 year old children at each selected ECC. Consent forms were distributed and collected via the ECPs. Inclusion criteria for the children were communicated to the ECPs by telephone or e-mail at the commencement of the study and in the information packs they received. The criteria stated the child must be at least 2 years old at the time of consent, not turn 5 until the following year. 14 children were excluded from the results analysis because they were too old.

95 children from 14 centres were included in treatment group A, and 99 children from 13 centres were included in treatment group B. 51 children (33 of group A and 18 of group B) were excluded from analysis in the results following incomplete data provided. Most often, the exclusion occurred when the speech pathologists assessment was not completed. Occasionally ECP checklist data was absent or incomplete.

## **Measures**

There are three key constructs this study endeavours to measure. These include firstly the ECPs' ability to accurately identify language difficulties in children. Second is the ECPs' perception of their own knowledge about language difficulties in children. Finally, the actual language skill levels of the

children included in the study are measured as the criterion reference for the first measure. The ECP measures were collected twice for pre and post-treatment data. In addition to these, an inter-assessor reliability scale was developed to measure the reliability of the standardised assessments conducted by speech pathologists in the study. All the measures apart from the criterion reference were developed specifically for this study. These are discussed below, and presented in their entirety in the Appendices.

*(i) The ECP Checklist.*

ECPs' ability to accurately identify language difficulties in children was measured using a checklist. This checklist was developed for completion by the ECP regarding the children included in the study (see Appendix A). The checklist recorded information such as whether or not the ECP identified a communication difficulty in a given child, the area and severity of difficulty identified, and whether speech pathology referral was indicated. The checklists primarily utilised Likert scales to record information, with some binary (or binary plus neutral) choice questions. These checklists were designed to be easily completed within 5 or 10 minutes during routine observation times. They were to be completed by the ECP who acted as the child's main carer within the centre.

It was also specified that the same ECP should complete both pre and post checklists for each included child. This stipulation was followed by 19 of the 27 included ECCs. The centres that did not comply were not excluded from the results. These centres were evenly distributed between the treatment groups. 38 data sets from treatment Group B and 41 from treatment Group A were affected. A total of 74 ECPs completed checklists for the study, 37 from each treatment group.

*(ii) The ECP knowledge questionnaire.*

ECPs' perception of their knowledge about language difficulties in children was measured using a questionnaire. The Questionnaire recorded information regarding ECPs perceived level of knowledge in key areas of children's language development before and after receiving the training (refer to Appendix B). The questionnaire included 11 questions, which were divided into 5 topics. Some topics included *how to identify language difficulties in children 2 to 4 years* and *understanding the impact of early language difficulties*. ECPs were asked to rate their perceived levels of understanding on a five-point Likert-type Scale. For example, "How well do you understand the concepts receptive and expressive language?" The pre-test questionnaires equated a score of 1 to 'little understanding' and a score of 5 to 'excellent understanding' for each question. No further labelling of the scores was provided. A score of 3 acted as the neutral. In the post-test questionnaire the order was reversed, so that a score of 1 was equivalent to "excellent understanding".

A total of 124 ECPs completed these questionnaires, however only 88 provided both pre and post training responses. 45 were from Group A, and 43 Group B.

*(iii) Speech Pathology Assessments – the Criterion Standard.*

The Pre-school Language Scale – Fourth Edition (PLS-4) (Zimmerman, Steiner, & Pond, 2002) was the chosen language assessment instrument. This is a well researched language assessment instrument standardised for use with children aged birth to 6 years 11 months. At the time of this study, no standardised language test for this population was available with Australian normative data. However, the PLS-4 with Australian adaptations was used for the study. This eliminated American influences on the test language and picture stimuli.

The PLS-4 Examiners Manual reports high test-retest reliability. This was indicated by high stability coefficients ranging from .82 and .95 for subscale scores and .90 to .97 for the Total Language Scores (p187). Internal consistency measures included reliability coefficients which ranged from .83 to .95 for subscale scores, and .86 to .97 for composite scores in the age range 2;0 to 6;11. Inter-rater reliability measures are reported for the subjected open-ended Expressive Communication items, and the correlation between scorers was 99%. “The high correlation indicates that the scoring rules are well developed, allowing consistent scoring by different examiners” (p190). In addition to these reliability measures, the PLS-4 Examiners Manual also reports evidence of high validity for the test content, response processes, internal structure, relationships with other variables and consequences of testing.

Speech Pathologists participating in the study used the PLS-4 to assess the language skills of the included children. Other areas of communication development (e.g. speech clarity, fluency) were observed during the assessment. Additional communication difficulties that were apparent during the assessment were noted by the speech pathologist on the assessment feedback form (see Appendix C). This was designed to communicate assessment results to the care-givers of children included in the study. It also provided a measure to the researchers of whether a communication difficulty was identified, the type of communication difficulty, and whether referral to local services was recommended.

As such, data from the assessment feedback form together with the PLS-4 record form provided the criterion reference for the checklist data returned by the ECPs.

#### *Assessment reliability*

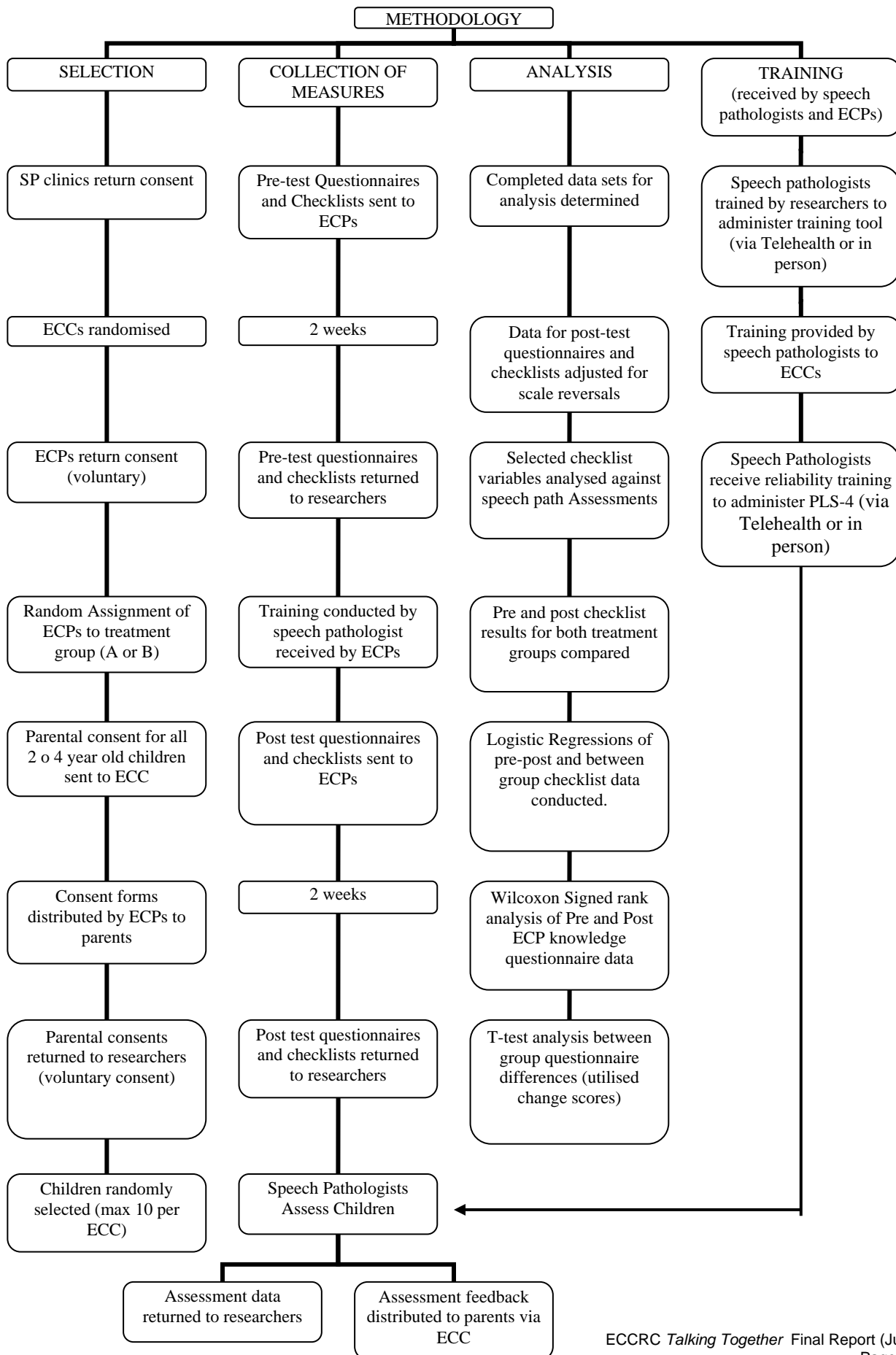
The reliability of the assessments conducted for this study was analysed using video recordings. Speech pathologists were asked to record 20 consecutive minutes for 3 out of 10 assessments conducted for each included centre. The assessment subjects allocated for recording were randomly selected by the researchers. The recordings were assessed against stringent criteria based on the PLS-4 Examiner’s Manual administration guidelines. The results of each recording was scored against 8 set criteria on a pass/ fail basis (see Appendix D). A second section of 6 set criteria was included for cases where a language sample and parent questionnaire were used for the assessment. The total score (out of 6 or 8) was calculated as a percentage of compliance to the set criteria. Each reliability assessment was conducted by the chief researcher and another qualified speech pathologist from SESIAHS.

A total of 27 assessment videos were examined against the reliability criteria. None of the assessments scored used the language sample and parent questionnaire. Results indicated a mean compliance rate of 87% to the criteria set. The most common administration error recorded was the use of additional cues to prompt a child where no response or an error response was given. None of the recorded administration errors resulted in a difference of the PLS-4 score. However, one assessment misreported information on the assessment feedback sheet.

#### **Procedures**

Refer to diagram 1 (over page) for an overview of the procedures employed in this study.

**Diagram 1: Flowchart of procedures conducted for the study (January to December 2006)**



### *The Training Tools for the Treatment Groups*

The format of the training was developed and enhanced from the inservice established and used for the pilot study (Collier, Halloran, & Bradd, 2004). This tool was a 2.5 hour training inservice including a power point presentation and video discussion of children with language delays. The topics covered in the presentation reflected learning outcomes developed for the pilot study by a multi-agency collaborative steering committee for the Talking Together Project. These learning outcomes also formed the basis of the ECP questionnaires

Enhancements made to the training tool for the present study included firstly a review of the language development normative data used in the presentation. The text Language Development: An Introduction – Sixth Edition (Owens, 2005) was used as the basis for the revised language milestones. Secondly, the layout of presentation was enhanced, and the distinction between expressive and receptive language skills was further clarified. Third, a language development checklist including typical language milestones was developed as a resource for the ECPs (see Appendix E). Finally, the video examples of children with varied language skills was professionally re-filmed, edited and recorded into a DVD format. The new video examples included 4 children of varied language skill levels interacting with a speech pathologist. The same activities were used for each child. The same children were also filmed at pre-school or child care interacting with other children and their teacher in inclusive activities. A brief language history and description accompanied each example.

The training for Treatment Group A included the power point presentation and the video examples with guided discussion presented in one session. Treatment Group B received the same power point presentation, however did not receive the video examples. Instead a separate 45 minute on-site visit was arranged by the speech pathologist. This visit occurred within the office hours of the ECC. It involved a collaborative discussion about the language skills of three children attending the centre. The ECPs chose the children and completed language development checklists for each of them in preparation for the discussion. Both groups were encouraged to utilise the checklist provided at the training to help retain the knowledge and skills learned.

### *General Procedures*

Following the initial invitation, consent forms and information packs were disseminated to all NSW Health speech pathologists who indicated an interest to participate in the study. An approval process was entered with the University of Newcastle regarding the possibility of including fourth year speech pathology students under the supervision Greater Newcastle Speech Pathology Services. Additional appropriate ethical approval submissions were made regarding this. Further Human Research Ethics Committee (HREC) submissions were also requested by Sydney South West Area Health Service and Greater Southern Area Health Service to conduct the research within these area health services. An application to request permission to conduct research in KU Children's Centres was also requested and submitted. Approval was granted in each case. However these processes marked significant delays of up to 6 months in some of the affected areas to administer the research.

Invitations to participate in the study were extended to the 60 selected ECCs by telephone, letter and e-mail. Invitations were followed by information packs and consent forms sent by post, e-mail or fax. The ECCs were randomly assigned to a treatment group once signed consent was received from the local speech pathology clinic.

A majority of procedures as they occurred are detailed in the following sections describing the roles of the speech pathologists, students and early childhood professionals.

### *The Role of the Speech Pathologists and Students*

The speech pathologists and fourth year students delivered the inservice training to the local ECCs, assessed the included children at these centres using the PLS-4, and liaised with researchers and ECPs at each centre regarding the arrangement and timing of these. Speech pathologists also invited parents or care-givers to attend assessments and provided feedback regarding assessment results when appropriate. All correspondence was negotiated through the ECC. The speech pathologists were also responsible for the videoing of assessments for reliability evaluations.

The speech pathologists and students attended two training sessions. The first provided instruction to conduct the training at the ECCs, including method of presentation and information to be conveyed. The second provided training for the reliable administration of the PLS-4. These sessions were convened by the researchers using telehealth video teleconferencing facilities in most cases due to distances between the areas involved. Speech pathologists in Sydney metropolitan and Illawarra areas received the same training on a face to face level. The training was accompanied by notes and handouts, and a time-keeping sheet to coordinate consistent time-keeping between presenters when administering the training.

A training pack was posted to speech pathologists prior to their attendance of the training to administer the training tools. The pack included a CD of the training tool containing several formatted versions of the Microsoft Power Point presentation. This was to ensure compatibility with a variety of widely used versions of Microsoft Power Point. Also included were a copy of the presenter notes to accompany the slides, a time-keeping sheet and the teacher handouts. The time-keeping sheet listed allocated times for each component to enable each speech pathologist to spend a standard amount of time presenting the various components of the training. Additional materials for training tool A included a DVD and handouts to accompany the DVD. Appropriate materials for the training tools A, B or both were sent to each clinic in accordance with the treatment groups of the ECCs assigned to the clinic.

Following the training, the speech pathologists were given details of their local ECCs and asked to make contact with these centres to arrange a suitable training date. Training dates were organised in collaboration with the researchers to ensure all pre-training data was completed and returned first. Once training was completed, the researchers posted the post-treatment questionnaires to the ECCs for completion within two weeks.

The training provided by the researchers regarding the use of the PLS-4 centred on the administration guidelines of the PLS-4 Examiners Manual. Additional handouts were provided to assist in the expedient administration of the PLS-4 for the ages 2 to 4 years. These were entitled “Quick Reference Guides” (Merryfull & Collier, 2006) and provided task administration instructions in 3 formats: chronological order; items involving manipulatives and items using the picture stimulus manual. The guides were developed for this study, and approved for use by Harcourt Assessment, Sydney Australia. The training also advocated the cessation of testing for children once they had reached the 50<sup>th</sup> percentile. This prevented unnecessarily long testing for children who presented with age appropriate or above average skills. This study required information only to determine if language skills were delayed or within the normal range for age.

The training also covered procedures in the event that a child was not compliant for the administration of the PLS-4. These included utilising appropriate toys and taking time to build rapport whilst collecting language sample information. If following 10 minutes, compliance was still not achieved, then another assessment time was to be scheduled. If compliance was not achieved on the second visit, then use of the PLS-4 parent questionnaire and language sample sections was recommended. The co-operation of children was not forced at any time by the speech pathologists.

Approximately one third of the speech pathologists reported no significant prior experience using the PLS-4, and did not have the test available at their clinic. Research funds were used to purchase a PLS-4 kit for one of the clinics to use. The other clinics organised to borrow one for practise and use to complete the assessments at the ECCs. PLS-4 forms were provided by the researchers to each clinic. Harcourt Assessment provided a research deduction on cost of test forms, and the chosen test instrument (Pre-school Language Scales – 4<sup>th</sup> edition *PLS-4*) for any clinic requiring it.

The assessments of the included children commenced following the return of post-test data by the ECPs to the researchers. The assessments occurred on site at the ECC, either in a corner of a room where other children were engaged in other activities, or in a private room (e.g. the tea room). A private room was used only when a care-giver or other staff member was present in addition to the speech pathologist. Parents or caregivers were invited to attend the assessments, although many did not.

The fourth year speech pathology students were responsible for activities deemed appropriate by their clinical supervisor. Assessment and training components delivered by the students occurred under the supervision. Supervising speech pathologists assumed responsibility for activities conducted in the ECCs under the guidance of the researchers.

### *The Role of the Early Childhood Professional*

Consenting ECPs at each of the included centres were asked to deliver, collect and return parental consent forms for all children aged 2 to 4 years attending the centre to the researchers. They also attended the training provided by the speech pathologists and submitted checklist and questionnaire data pre and post training. Additional consent forms regarding the videoing of the children were also distributed by ECPs for children without previous consent who may appear in the background of the video.

The timeline of the study allowed ECPs two weeks to complete and return pre-test data prior to the arranged training date. The post test forms were delivered two weeks following the training. The ECPs were allowed two weeks to complete and return these to the researchers. However, not all centres complied with these guidelines. Some areas took up to a month to return the data, and others quickly completed the data within a week. Centres that took longer to return the data cited reasons such as accreditation or other centre based issues which took precedence over their time to complete the forms. Some centres misplaced forms, and required new ones to be sent.

The method of delivery and return for the ECP questionnaires and checklists was usually fax or post. Occasionally the local speech pathologist was required to pick up or deliver the data and return it to the researchers. Where this occurred, the speech pathologist was given explicit instruction not to view any of the data, and the ECC was asked to deliver the data to the speech pathologist in a sealed envelope. In all included cases, it was ensured that the pre-test data was returned to the researchers prior to the receipt of training.

## Analysis

### ECP checklist data

From the total 245 children recruited to the study 490 total observations of pre and post training teacher checklists should have been collected. Each subject also required a speech pathology assessment qualifying their observation to be used. Of the 490 potential responses there were a total of 382 usable cases; this was a response rate of 78%. Of these cases 189 were in group A and 193 in group B.

Table 1 (below) describes the variables from the ECP checklists that were analysed. Each variable corresponded to a result from the speech pathologists assessment. The final column provides the rule to determine if the teacher checklist assessments are correct in comparison to speech pathologists assessment.

**Table 1: ECP Checklist and Speech Pathologist Assessment Variables Selected for Analysis.**

<b>ECP Checklist Variable</b>	<b>Levels of the variable</b>	<b>Speech Pathologist Variable</b>	<b>Levels of the variable</b>	<b>Correct ECP Response Definition</b>
<b>Q3</b> Choose a number on the following scale that best describes how well this child understands what other people say to them.	1= Always 2= most of the time 3= some of the time 4= rarely 5= never	Receptive Language (RL)	Within normal range Mild Moderate Severe	Q3 is 2 or higher whenever RL is mild, moderate or severe.
<b>Q4</b> Please choose a number on the following scale that best describes how well this child uses words and sentences when speaking.	1= Always 2= most of the time 3= some of the time 4= rarely 5= never	Expressive Language (EL)	Within normal range Mild Moderate Severe	Q4 is 2 or higher whenever EL is mild, moderate or severe
<b>Q5</b> Please choose a number on the following scale that best describes how clearly this child pronounces sounds in words when speaking.	1= Always 2= most of the time 3= some of the time 4= rarely 5= never	Speech Disorder	YES or NO	Q5 is 2 or more whenever Speech Disorder = yes
<b>Language difficulty identified by teacher</b> <sup>a</sup>	YES or NO	Language Difficulty	YES or NO	Teacher assessment and speech pathologist assessment are identical
<b>Q9</b> Would you refer this child to a speech pathologist?	YES or NO	Referral required	YES or NO	Q9 response should match speech pathologist recommendation of referral required

<sup>a</sup> Defined to be 'yes' when either Q3 or Q4 responses were greater than 2.

The correct ECP referral recommendations were calculated as a percentage, using the speech pathologist's assessment as the criterion standard. The diagnosis of any communication difficulty by the speech pathologist required a referral recommendation from the teacher to be counted as correct. The percentage of cases in which the ECP identification of language difficulties (including both expressive and receptive) agreed with the speech pathologist's assessments was also calculated. The analyses were broken down by group and by the speech pathologists assessment results. Comparisons were made between the treatment groups, and between pre and post training results.

Additional comparisons were made to determine if the training had a differential impact on the identification of either expressive or receptive language difficulties in children. This was to investigate the trend identified in the pilot study that ECPs found receptive language difficulties harder

to detect than expressive language difficulties. The tables are not shown as the results indicated no difference was evident following the training for either category in either of the training groups.

Logistic regressions were conducted to formally test whether there were significant differences between the pre-training and post-training results, or between the effect of training for groups A or B. The primary aim of logistic regression is to determine which explanatory variables had a significant effect on the ECPs' accuracy in identifying communication difficulties.

Two logistic regressions were used to determine the effect of the training on ECPs' accuracy in identifying communication issues. The response variable in the first logistic regression was "Correct Referral Decision". The data set used for this analysis contained both pre and post-training results for both groups A and B. A description of the explanatory variables used, and the rationale follows:

- (i) "Referral Required" (determined by the speech pathologist assessment). This was included because the ECPs' accuracy may depend on whether a communication disorder is present or not. For example, ECPs might correctly identify problems, but over-refer children without problems.
- (ii) "Any training" (equal to 1 for post-training measurements, and 0 for the pre-training measurements). This was included to measure whether the post-training results from either of the training groups were different from the pre-training results.
- (iii) "Training group B" (equal to 1 for the post-training results for Group B and 0 for all other measurements). This was included to measure whether the effect of training differed between training groups A and B.

Standard logistic regression assumes that all observations are statistically independent. This was not the case for this data because pre-training and post-training measurements were collected for each ECP. As such, the calculations of a simple logistic regression would be incorrect. A robust standard error estimation procedure (known as the Huber-White method) was used to give correct standard errors and p-values. The models were fitted using the R statistical system.

A second logistic regression model was fitted for the response "Correct Identification of Language Difficulties". The explanatory variables were similar to the first regression, apart from the first explanatory variable "Language difficulty" (including Expressive Language and/or Receptive Language delay or disorder as diagnosed by the speech pathologist). The data set again included both the pre-training and the post-training results for both groups.

#### *ECP knowledge questionnaires.*

From the total of 124 ECPs who completed these questionnaires, 88 provided both pre and post training responses. 45 were from Group A, and 43 Group B. Responses for all 11 Likert scale questions were analysed for pre and post training differences, and comparisons were made between the groups. Mean scores and the percentage of change for each question were calculated for both groups using pre and post training data.

The difference between the pre-training and post-training results was tested for significance using the Wilcoxon Signed-Rank Test. This is a non-parametric test appropriate to investigate differences in paired samples for ordinal data (such as Likert Scales).

Further testing was conducted to see if there was any significant difference between the groups (A and B). This analysis used change scores to mark the difference between pre and post scores for each group. The change scores for groups A and B were compared using unpaired t-testing.

## Results

### *ECP Checklist Results Before Training.*

Table 2 shows the percentage of correct Referral decisions broken down by training group, and whether or not the speech pathology assessment required a referral. The overall correctness of the ECPs referral decisions was roughly equivalent for groups A and B. This was 74% in total for both groups. Group A correctly identified 58% of cases that required referral and Group B correctly identified 70% of cases that required referral. Both groups over-referred cases that did not require referral. 15% of cases in group A, and 24% in Group B were incorrectly recommended for referral. However, both groups under-identified cases that required referral in greater proportions (48% in Group A and 30% in Group B).

**Table 2: Percentage of Correct Pre-training Referral Decisions, by Group and Referral Required.**

GROUP	Referral Required (by SP assessment)		
	YES	NO	TOTAL
A	58% (23/40)	85% (47/55)	74% (70/95)
B	70% (28/40)	76% (45/59)	74% (73/99)
BOTH	64% (51/80)	81% (92/114)	74% (143/194)

Table 3 shows the percentage of cases in which the ECPs' identification of language difficulties agreed with the speech pathologist's assessments. These could be either expressive and/or receptive language difficulties. The percentages are broken down by group and by the speech pathologists' assessment results. The table shows that only 23 children were assessed by the speech pathologist as having a language difficulty. The ECPs accurately identified 91% of all cases assessed by the speech pathologist as having a language difficulty. Of these 100% were by Group A and 80% by group B. However, the ECPs dramatically over-identified language difficulties in the children. A total of 153 cases were identified by the ECPs as having a language difficulty, compared to only 23 diagnosed by the speech pathologists. As would be expected, the results for Groups A and B were very similar.

**Table 3: Percentage of Correct Pre-training Identifications of Language Difficulties (EL or RL), by Group and Diagnosed Language Difficulty.**

GROUP	Diagnosed Language Difficulty (by SP assessment)		
	YES	NO	TOTAL
A	100% (13/13)	22% (18/82)	33% (31/95)
B	80% (8/10)	24% (21/89)	29% (29/99)
BOTH	91% (21/23)	23% (39/171)	31% (60/194)

### *ECP Checklist Results After Training.*

Table 4 shows the percentage of cases correctly identified for referral after training. The speech pathology assessments were again used as the standard. Table 5 is a similar comparison of the ECPs' identification of language difficulties (either expressive or receptive) and the speech pathologist's diagnoses. There is no clear effect of training, or difference between the two training groups in either table.

**Table 4: Percentage of Correct Referral Decisions After Training, by Group and Referral Required.**

GROUP	Referral Required (by SP assessment)		
	YES	NO	TOTAL
A	62% (25/40)	83% (45/54)	64% (60/94)
B	72% (28/39)	73% (40/55)	72% (68/94)
BOTH	67% (53/79)	78% (85/109)	68% (128/188)

**Table 5: Percentage of Correct Identifications of Language Difficulties (EL or RL) After Training, by Group and Diagnosed Language Difficulty.**

GROUP	Diagnosed Language Difficulty (by SP assessment)		
	YES	NO	TOTAL
A	100% (13/13)	26% (21/81)	36% (34/94)
B	80% (8/10)	24% (20/84)	30% (28/94)
BOTH	91% (21/23)	23% (41/165)	74% (62/188)

*Logistic Regression Analysis*

Table 6 shows the results of the logistic regression analysis for correct referral decision by the ECP. The table gives the estimates, the standard errors (SEs) of these estimates, the odds ratios, and the p-values. Significant variables, where the p-value is 0.05 or less are shown in bold. The table shows that the training did not have a statistically significant effect, and that there were no significant differences between the training groups A and B.

**Table 6: Logistic Regression of Correct Referral Decision by ECP.**

Explanatory Variable	Estimate (SE)	Odds Ratio	p-value
Intercept	1.35 (0.22)		
<b>Referral Required</b>	<b>-0.71 (0.30)</b>	<b>0.49</b>	<b>0.020</b>
Any Training	0.050 (0.22)	1.05	0.817
Group B	-0.120 (0.34)	0.89	0.722

Table 7 shows the results of the logistic regression for the correct identification of language difficulties by the ECPs. These indicate no significant effect of the training to assist ECPs correct identification of language difficulties, or differences between the treatment groups (A and B).

**Table 7: Logistic Regression of Correct Identification of Language difficulties by ECPs.**

Explanatory Variable	Estimate (SE)	Odds Ratio	p-value
Intercept	-1.22 (0.18)		
<b>Language difficulties</b>	<b>3.51 (0.76)</b>	<b>33.5</b>	<b>0.000</b>
Any Training	0.23 (0.23)	1.26	0.332
Group B	-0.25 (0.35)	0.78	0.489

In addition to the above analyses, some further testing was conducted to investigate possible interaction effects. For example, the training may have improved the ECP's identification of children requiring referral to a speech pathologist, but did not improve their incorrect identification of children

without problems. A subsequent logistic regression was fitted to test this hypothesis, however none of the interaction effects were significant. In the same way, it is possible that the training may have improved the identification of language difficulties in children, but did not improve false identifications of children without language difficulties. A chi-square test with Monte-Carlo calculation of p-values was used to test for this. These results were also found to be non-significant.

*Effect of training on ECP knowledge questionnaires.*

The mean scores for each question answered in the pre-training and post-training ECP questionnaires for groups A and B are shown in Table 8. The percentage change columns indicate the percentage difference between the mean pre and post scores for each group.

**Table 8: Mean Scores and Percentage Change for ECP Self-Assessed Knowledge Questionnaire pre and post training**

QUESTION *	Mean Scores (1=little understanding, 5=excellent understanding)					
	Pre-training		Post-training		Percentage Change	
	A	B	A	B	A	B
1	3.7	3.9	4.2	4.4	10.7	10.7
2	3.5	3.4	3.8	4.0	5.3	12.1
3	3.6	3.5	4	4.2	8.9	13.5
4	3.3	3.5	3.9	4.1	12.4	11.5
5	2.9	2.8	3.8	4.0	16.8	22.9
6	3.8	2.5	3.7	3.7	16.8	24.8
7	3.5	3.5	4.1	4.2	10.7	13.6
8	3.7	3.9	4.2	4.5	9.9	11.6
9	3.3	3.4	3.9	4.1	12.4	13.3
10	3.4	3.4	3.8	4.0	9.1	11.9
11	3.2	3.2	4.0	4.3	16.0	20.9

\* Refer to Appendix B for detail of questions

The table shows that both groups rated higher levels of understanding following the training on every question. Overall the results also show Group B rated marginally higher levels of understanding than Group A after the training.

Table 9 shows the results of the Wilcoxon Signed Rank Analysis for pre and post training comparison of the questionnaire responses. For all questions addressed in the questionnaire, the post-training results were significantly higher than the pre-training results ( $p < 0.05$  for Group A, and  $p < 0.01$  for group B). The negative z-score values are indicative of a positive training effect.

**Table 9: Wilcoxon Signed-Rank Analysis of ECP Self Assessed Knowledge Questionnaires Pre and Post –training.**

Question	GROUP A			GROUP B		
	n	1- tailed p-values	Z score	n	1 tailed p-value	Z score
1	45	0.0002	-3.58	43	0.0012	-3.03
2	45	0.0146	-2.18	43	0.0002	-3.52
3	43	0.0021	-2.86	43	<0.0001	-4.25
4	43	0.0009	-3.11	42	0.002	-2.88
5	44	<0.0001	-4.45	42	<0.0001	-4.7
6	44	<0.0001	-4.6	42	<0.0001	-4.46
7	44	0.0002	-3.5	42	0.0001	-3.68
8	44	0.0008	-3.17	42	0.0001	-3.64
9	44	0.0001	-3.82	42	0.0001	-3.87
10	42	0.0032	-2.73	42	0.0005	-3.28
11	42	0.0001	-3.85	42	<0.0001	-3.99

Table 10 shows the results of unpaired t-test analysis for the pre–post change scores of each group. The table shows there was no significant difference between the change scores for groups A and B using a  $p \leq 0.05$  significance level. Two-tailed scores were used as a directional effect was not predicted between the groups. However, the mean change scores were consistently higher for group B than A. Questions 2, 5 and 6 approached the significance level of 0.05 using 2-tailed testing, and surpassed it if single-tailed p-values were used.

**Table 10: T-Test Analysis of change scores between Groups A and B.**

Question	Mean change score		t-statistic	p-value (two-tailed)
	Group A	Group B		
1	0.49	0.53	-0.24	0.81
2	0.28	0.60	-1.90	0.06
3	0.43	0.64	-1.25	0.21
4	0.5	0.54	-0.17	0.86
5	0.79	1.14	-1.82	0.07
6	0.79	1.23	-1.93	0.06
7	0.5	0.62	-0.70	0.49
8	0.48	0.51	-0.21	0.83
9	0.60	0.63	-0.21	0.83
10	0.38	0.40	-0.07	0.94
11	0.76	1	-0.95	0.34

## Discussion and Conclusions

The results of this research replicated the findings of the pilot study (Collier, Halloran, & Bradd, 2004). There was no significant change in the checklist data following the training. As such, the skills of ECPs to accurately identify language difficulties in children or to make appropriate referral decisions were not improved following either type of training. However, the results did indicate that the ECPs from both groups perceived a significant improvement in their knowledge of the key training areas covered.

This research concludes that the training made no significant improvement to the ability of ECPs to identify language difficulties in children attending ECCs. The format of the training (video examples or on-site consultation) also made no significant difference. Thus two of three null hypotheses tested in this study must be accepted. However, the remaining null hypothesis can be rejected in favour of the alternative: Training provided by the speech pathologist in either format significantly improved the perceived knowledge levels of ECPs regarding key areas of language development, delay, disorder and appropriate referral.

Initially, it seems unlikely to have a significant improvement in perceived knowledge levels that is not reflected in measurable skills. However, the findings of this study support earlier studies (e.g. Collier, Halloran, & Bradd, 2004; Hall, 2005; Letts & Hall, 2003; Mroz, 2006) that have found perceived confidence or knowledge levels of ECPs to be disproportionate to their skill levels for identification or work with language difficulties in children.

This prompts a consideration of the methods working speech pathologists employ to measure training success. Anecdotal evidence suggests that the provision of inservices to early childhood staff is common practice. Current notions of capacity building, improving service access and early intervention are implicit in the planning and provision of such inservices. Many speech pathologists

routinely evaluate the success of inservice training by using satisfaction surveys. The surveys frequently yield positive results that deem the provision of inservices is a worthwhile use of speech pathology time.

Another key consideration is the time expended in training. For example, this study examined the outcomes of training for the single topic of identifying language difficulties in children. This training was conducted in less than 3 hours. However, many inservice formats utilised by speech pathologists target multiple areas of communication development and strategies to improve children's skills in a similar time-frame. Results of this study prompt the question: Can these inservices really impact the skills of ECPs in each of the topics covered? This requires an answer to prevent inappropriate expectations of ECPs who have attended speech pathology training. Mroz (2006) discusses the "tension between empowering early years educators and leaving them vulnerable to inappropriate demands" (p. 169). Furthermore, speech pathology time is limited with the current level of service demand. As such, it needs to be clear that time spent training ECPs is indeed impacting their skills, and thus achieving an outcome for children with communication difficulties.

Evidence in the literature suggests more time is required to support and improve the skills of ECPs to identify and work with communication difficulties in children. For example, research by Girolametto, Weitzman, & Greenberg (2006) investigated the effectiveness of the 'Learning Language and Loving it' (Weitzman & Greenberg, 2002) model of inservice education. The total time commitment expected from ECPs in this inservice program is up to 25 hours divided between 8 group sessions and 6 video-feedback sessions. It was concluded that this model "effectively improves adult-child interactions and promotes children's use of language in naturalistic activities and peer interactions" (Girolametto, Weitzman, & Greenberg, 2006, p. 44). However, follow-up studies indicated that the retention of skills was not consistent for all participants.

The present study findings indicate that the value of a single training session provided to ECPs is limited. The bridge is yet to be built between time efficient in-service training and the effective provision of sustainable and accessible services in early intervention. Models of collaborative training and intervention, such as 'Learning Language and Loving It' and the 'I-Can Early years evaluation project' (Law, Dockrell, Williams, & Seeff, 2001) provide some examples of success in this area, although the research evidence for these programs is still being gathered. In conclusion, there is a challenge posed to the speech pathology profession to conduct further studies to provide evidence for an efficient service delivery model to meet the goals of effective early intervention and access to services.

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## Future Plans & Financial Sustainability

Negotiations with NSW TAFE are scheduled to commence in August 2007. It is hoped that the results of these negotiations will result in the inclusion of *Preschoolers Talking and Listening* training for Certificate III and Certificate IV courses in Children's Services, where the curriculum does not include specific training regarding early language development.

Coordination of the training to be conducted at TAFE colleges by speech pathologists will then need to occur at a state level. A submission to Speech Pathology Australia is planned to assist in this coordination, as well as to support the implementation of a follow-up campaign to assist in the generalisation of this training to the early childhood setting.

The *Preschoolers Talking & Listening* follow-up campaign was planned by an interagency committee convened in November 2006 to discuss the future directions of the *Talking Together Project*. It will include a poster series of 5 posters to represent each stage of language development from 0 to 4 years of age. Each poster will capture 3 key points from the *Preschoolers Talking and Listening* training session. The posters will also convey the same picture images presented in the training. The posters are to be used on a rotating basis, so a new poster/ focus theme can be followed each month by different early childhood centres. Once a centre has received all five posters, another centre can

have a turn, and so on. Ideally, each child care centre would receive one round of the posters annually. The posters are planned to be delivered and rotated by local speech pathology clinics.

This follow-up campaign has been chosen due to the simplicity and efficiency of the design to reach a potentially large number of early childhood settings. It encourages informal on-site interaction between speech pathologists and early childhood professionals, whilst not requiring busy NSW Health speech pathologists to spend a large amount of time away from the office or in preparation. In addition, the method of delivery and rotation of the posters encourages heightened awareness of the messages contained on the posters for early childhood staff. It avoids the situation of a poster that consistently stays in the same place on a wall until it is no longer noticed

The *Preschoolers Talking & Listening* training has been formatted for publishing, with only minor alterations required. It includes a DVD movie of four children demonstrating varied levels of language skill; a data DVD including the presentation slides, a Presenter's Manual, a booklet of Participant Resources and a copy of the research study findings (an example of this pack has been sent to Westpac Foundation via Australia Post). Due to the research indicating that the training did not significantly impact the skills of the early childhood professionals, it is less marketable than originally hoped. However, once the posters are produced, they can be added to the package to make it a marketable resource amongst the speech pathology community. All funds received would be directed to further the progress of the *Talking Together Project*.

Funding to print posters has been discussed with Families First and the Illawarra Early Intervention Consortium. Additional funding from Speech Pathology Australia and organisational support from NSW Health speech pathology clinics would see this program in operation by mid 2008. However, further submissions are pending discussions with NSW TAFE.

## **Project Summary for Public Release**

The Talking Together Project is an initiative of the Early Childhood Communication Research Centre (a unit of South Eastern Sydney and Illawarra Area Health Service). Ultimately this project aims to improve the outcomes for young children with significant language difficulties. It endeavours to gather evidence to guide an effective model of treatment for communication difficulties in young children within the pre-school environment using the skills of speech pathologists and early childhood professionals working together.

Early identification and treatment of language difficulties has been shown in the research to improve education and literacy outcomes for these children. It has also been shown in the literature that language difficulties are often harder to identify than other communication disorders such as stuttering or speech clarity. However, children who have difficulty understanding what people say, or have difficulty using correct sentences and vocabulary are at risk for on-going language learning difficulties, literacy problems, social difficulties and academic failure.

In today's society, it is evident that health services must examine alternative ways to achieve optimal therapeutic outcomes. For young children with communication difficulties, there is a need to address the issue of access to speech pathology services in areas where public services are stretched to capacity, there are long waiting lists, and the cost of private speech pathology services are out of reach for many families and most child care centres or preschools.

The Talking Together Project was developed with these thoughts in mind, and following a review of current research in this area. This project exists within a research framework with the aim of collecting robust and relevant evidence for effective speech pathology practice. It aims to work collaboratively with early childhood professionals to provide effective identification and treatment for young children with communication difficulties.

In 2006, the Talking Together Project developed and tested a training package to assist early childhood professionals working in preschools and child care appropriately identify language difficulties in young children. The training is titled *Preschoolers Talking & Listening*. Twenty six speech pathologists across the state of NSW participated in the project and provided the training to 270 early childhood professionals on site at their preschool or child care centre. There were also 230 children between the ages of 2 and 4 years who received a professional language assessment by a speech pathologist on site at their pre-school.

Results of the project indicated that the early childhood professionals who received the training enjoyed it, and felt it had significantly improved their knowledge about language difficulties in children. However, the work has just begun. The study also indicated that a single training session was not enough to significantly change how accurately the early childhood professionals identified language difficulties in the children. As such a follow-up campaign for the *Preschoolers Talking & Listening* training package is being planned. In the meantime, work is under way to widely distribute the training package for use by speech pathologists nationwide.

Australia's young children are our most precious resource. The Talking Together Project is working to find an effective way to provide early access to treatment for children with language difficulties in order to prevent later complications.

## Final Budget

Total Project Budget		\$103 000
Total Expenditure		\$101,761
<b>Funds</b>	<b>Promised</b>	<b>Received</b>
Westpac Foundation	\$55 000	\$55 000
Families First	\$14 700	\$13 668
Children's Services Funds	\$ 5 000	\$ 5 000
Northern Illawarra Speech Pathology Department	\$28 300 <sub>(IN KIND)</sub>	\$28 093
<b>Total</b>	<b>\$103 000</b>	<b>\$101 761</b>

The table below details the expenditure of the funds for the Talking Together Project. These funds received from Westpac Foundation have been spent in accordance with the funding agreement. However, the time-line of the project changed due to some delays that occurred in the administration of the project (as outlined previously in this report).

The dispersion of promised funds to the participating clinics was not approved by management of SESIAHS until all other outstanding invoices costed to the project were cleared. As such, approval was not granted until mid June 2007 (following payment of the statistical consultancy). The process of invoicing and raising cheques between the area health services involved is lengthy. As such only seven of the twelve invoices for payment have been received to date. However, all invoices will be paid to the clinics in accordance with the funding agreement.

The allocation of project funds differs slightly from the projected use of the funds in the initial project plan. For example, there was initially planned to be a total of \$20 000 dispersed between 28 clinics. However, due to the large number of participating clinics that withdrew from the project, and some other unplanned project expenses, this amount was reduced. The final figure for dispersion to the clinics represented the balance of the funds received from Westpac Foundation.

**Allocation and use of funds for the Talking Together Project  
(January 2006 to July 2007)**

Project Item	Total cost	Westpac funds	SESAHS speech pathology	Families First	Children's Services funds
<b>Personnel</b>					
Project officer (incl April to July 2007) NSW Clinics*	\$54,138	\$32,265	\$10,362	\$11,511	
	\$12,059	\$12,059*			
<b>Equipment</b>					
PC/ software/ maintenance	\$3,705	\$3,705			
Preschools data base	\$1,300		\$1,300		
Test forms clinics	\$2,962	\$2,962			
tapes/frieght	\$135		\$135		
<b>Administration</b>					
Clerical support	\$13,895	\$674	\$13,221		
Telehealth	\$6,756		\$1,756		\$5,000
Miscellaneous/ stationary	\$327	\$327			
<b>Production</b>					
DVD production	\$2,800	\$2,243		\$557	
DVD copies	\$400	\$200		\$200	
<b>Printing</b>					
Articles	\$26		\$26		
Formating for publication	\$490	\$490			
printing samples	\$193		\$193		
<b>Other costs</b>					
Conference attendance (present project)	\$1,500		\$100	\$1,400	
Statistical consultancy	\$1,000		\$1,000		
Freight	\$75	\$75			
<b>TOTALS</b>	<b>\$101,761</b>	<b>\$55,000</b>	<b>\$28,093</b>	<b>\$13,668</b>	<b>\$5,000</b>

\*This figure was signed off 14<sup>th</sup> June 2007 for dispersion between the 12 clinics that participated in the project. Payment is pending the receipt of invoices from the clinics. To date 7 of the 12 required invoices have been received. The remaining invoices are expected to be paid within the next month. The funds are locked for this sole purpose.

A document to certify all funds have been expended in accordance with the funding agreement can be obtained from SESIAHS management once the final payment to the NSW Health clinics has been made.

### **Copies of significant documentation & project materials**

A copy of the *Preschoolers Talking & Listening* training package has been sent to Westpac Foundation Attention: Dr. Gianni Zappala via Express Post on 30<sup>th</sup> July 2007.

A copy of the research report has been sent as an e-mail attachment, in addition to a hard copy in the training package.

On behalf of the Talking Together Project, and the many individuals and organisations that have been affiliated with it, I would like to thank Westpac Foundation for the opportunity you have provided us. We are now immeasurably closer to the goal of finding an effective model of service for young children with language difficulties. Also, a great resource has been developed that can potentially impact the lives of thousands of children, and influence the practice of early childhood professionals nationwide.

Best Regards,

*Jo Collier*

Jo Collier  
Chief Investigator  
Talking Together Project  
SESIAHS ECCRC