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SEND & Inclusion Service
An evaluation of the Durham iPad Project

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Introduction

The Apple iPad is a multi-touch tablet device which has transformed the way we access audio and visual media e.g. books, periodicals, movies, music, games and web content. When first launched, the iPad was marketed as a platform for entertainment and social use. However, other applications have been realised and the iPad is increasingly used in the work place and school environment. The iPad uses a revolutionary 'app' approach to purchasing and using software. With thousands of apps available, many of which claim to have educational benefits, it is easy to purchase apps without fully realising their suitability for children or the school environment.

Context

The Durham iPad Project was launched in January 2012 to investigate some of the possible benefits of using the iPad in schools for children with Special Educational Needs (SEN). It was formed in response to an increasing number of teachers and parents seeking advice and support regarding the use of the iPad and appropriate apps for children with a range of learning difficulties and disabilities (LDD). A small number of iPads were purchased for the project and were loaned to schools on a short-term basis to be used in the following ways:

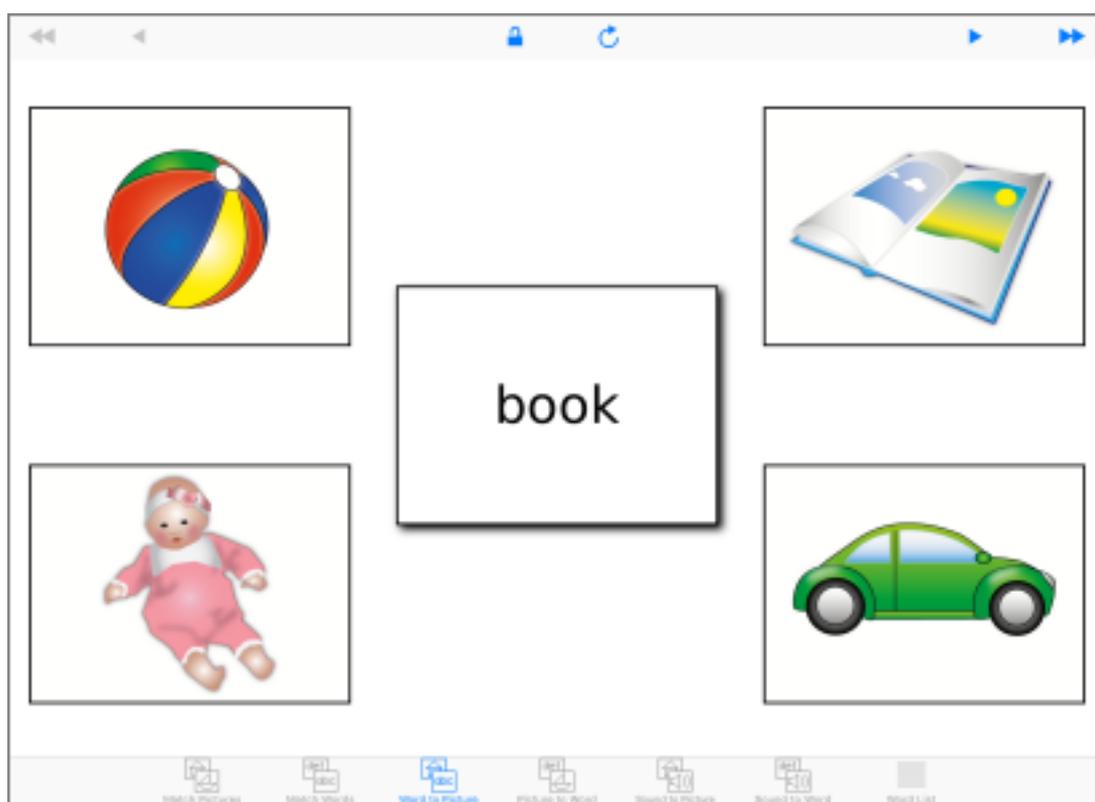
1. Instant access to the internet for research purposes to support an enquiry led curriculum.
2. Opportunities for remediation and 'over learning' to reinforce key concepts taught in class.
3. Alternative methods of recording and presenting class work.
4. Reading electronic books.

The project was set up in partnership with Bev and Colin Dean from Special iApps* to trial and evaluate their Special Words app. This app was developed to support language development for children with LDD. Special Words features four matching games; picture to picture, word to word, word to picture and picture to word. These structured activities contain 96 key words and are designed to develop language, reading and speech by utilising visual approaches to learning.

* A UK-based community interest company and social enterprise, Special iApps C.I.C. develops educational apps, particularly for children with SEN and LDD. For contact information, see p.24.

The picture to picture and word to word matching games focus on the visual presentation of language; the word to picture matching game focuses on developing meaning and understanding of language; and the picture to word matching game focuses on the development of sight vocabulary and reading. The app also has additional features which allow further vocabulary, pictures and sounds to be added, and complete new word lists to be created.

Example of the word to picture matching game:



The project was led by Julie Brown, Advisory Inclusion Teacher for Assistive Technology, from the Cognition & Learning Team within the SEND & Inclusion Service in County Durham.

Project objectives

- To evaluate the success of utilising the 'Special Words' app to enhance the development of communication, language and literacy skills.
- To provide evidence of some of the benefits and uses of the iPad with children and young people who experience communication, language and literacy difficulties.

Outline of the project

The project was a small scale project, involving six schools from different localities across the county for the duration of one school term. Thirteen children in total participated, consisting of twelve boys and one girl aged 3-7 years. The children had a range of communication, language and literacy difficulties, including specific speech and language difficulties, general learning difficulties and Down Syndrome. In addition, one child had recently moved to this country and was introduced to English as an additional language. Each pupil was required to use Special Words for 10-15 minutes a day for the duration of the project. Staff were free to utilise the iPad in other ways to support learning if they so wished e.g. instant access to the internet, reading stories, audio recordings and taking pictures.

To obtain baseline data, schools were required to undertake a pre-assessment task with each child participating in the project before the project commenced. They were also required to complete an identical post-assessment task at the end of the project to obtain impact data (see p.7-8).

***Schools involved**

Acre Rigg Infant School

Acre Rigg Infant School is a large infant school with an accompanying nursery unit, located in Peterlee. The school has 184 pupils on roll and an additional 52 place nursery unit. Pupil population is relatively stable with a larger number of boys than girls (103 boys, 81 girls). The majority of pupils attend the nursery on a part-time basis before transferring to the school's Reception classes.

Attainment on entry to nursery is low in all areas of learning but particular problems centre on speech and language delays. 39% of pupils are on the SEN register (national average 19.3%) and 0.5% of pupils use English as an additional language.

The school serves an area of high deprivation and low economic circumstance. 79% of children reside in areas deemed to be high deprivation postcodes (RAISEonline data) and 29.5% of pupils are entitled to free school meals (national average 19.2%).

Beechdale Nursery School

Beechdale Nursery School is an extremely popular Nursery school which gives part-time education to 78 children aged 3-5 years old. It also offers ten full time childcare places. It is located in Consett, County Durham and serves the immediate surrounding area. The school is an outreach centre for children with SEN and/or disabilities and supports at least eight other settings in Consett and beyond.

The proportion of children with SEN and/or disabilities is 10% and all of these children have a Statement of Special Educational Needs. Most children are White British; however, a small number learn English as an additional language, with Polish and German spoken at home.

* Information supplied by each school

Durham Gilesgate Primary School

Durham Gilesgate Primary School has 173 pupils aged 3-11 years on roll; this includes pupils who attend a 26 place nursery. The school is located a mile north of Durham City Centre and serves the local wards of Pelaw and Gilesgate. Some nursery aged pupils live in Belmont or Carville as there is no nursery provision in that area. Other children come from further a field in order to attend the school's resource base for pupils with a hearing impairment. The school also runs outreach nursery provision for **Community of Learning 13 and was previously a Resource Base Nursery. The school has a commitment to inclusion and as a consequence 11.5% of the pupils attending have Statements of Special Educational Needs.

Attainment on entry at age three is well below national averages with the large majority of children attaining below age expectations in personal, social and emotional development (PSE) and communication, language and literacy (CLL). 49.5% of pupils are eligible for free school meals and 4.6% of pupils speak English as a second language.

St Andrew's Primary School

St Andrew's Primary School is a smaller than average primary school located in Bishop Auckland. Most of the 133 pupils on roll are from White British backgrounds. The proportion of pupils from minority ethnic groups is below average and few speak English as an additional language. The largest minority group is of Traveller heritage. The pupil population is transient in nature and more pupils than usual join or leave throughout the academic year. The school runs a breakfast club before the start of the school day.

The proportion of pupils known to be eligible for free school meals is 52%, this is significantly higher than the national average of 19.2%. Above average proportions of pupils have special educational needs and/or disabilities (36%, national average 19.3%) and more than average have Statements of Special Educational Needs.

** Schools in County Durham are organised into Communities of Learning (CoL). There are 15 CoLs in total. Each CoL consists of a geographical cluster of cross-phase schools which have delegated funding that is jointly used to meet identified additional SEN.

Thornhill Primary School

Thornhill Primary School is a popular school situated in Shildon and has 210 pupils on roll. The school serves an area that is characterised by a mixture of private and public housing. RAISEonline data indicates Thornhill has a deprivation indicator of 0.32 compared to a national figure of 0.23.

Children enter the Reception class in the September prior to their fifth birthday and most children have not received nursery experience before starting school. When children start in the Reception class their attainment is generally below what might be expected nationally. The school has 19% of pupils on its SEN register; of these two children have a formal Statement of Special Educational Need. There are no pupils with English as an additional language and 17.6% of pupils are entitled to a free school meal (national average 19.2%).

Woodlea Primary School

Woodlea Primary School is a school of 239 pupils aged 3-11 years. These pupil figures include 33 part time nursery children. The school is located in the north of County Durham and mainly serves the immediate local community which includes Woodstone Village, Bournmoor and Fence Houses. The majority of pupils attend the nursery on a part-time basis before transferring to the school's Reception class. The school is popular and enjoys a high local reputation for its academic standards, behaviour and opportunities offered to the children.

A relatively low number of pupils are eligible for a free school meal (10.6%, national average 19.2%) and a lower than average proportion of pupils have LDD. 12% of pupils are recorded on the SEN register with no children with a Statement and no children with English as an additional language. RAISEonline 2011 stated that Woodlea had a deprivation indicator of 0.16 compared to a national figure of 0.23.

The pre and post assessment task

In order to evaluate the impact of Special Words, staff were asked to use the app once with each pupil before the project commenced and record their responses in an assessment grid. They were asked to repeat this task again at the end of the project and record pupil responses in the same assessment grid. This formed the basis of a criterion referenced test, designed to measure how well each pupil performed against a criterion (the list of 96 words) rather than a norm-referenced test, designed to measure how well pupils perform against each other e.g. End of Key Stage SATs.

Example of the Special Words assessment grid:

Please indicate which pictures and/or words the child/young person can recognise and successfully match. **Pre-assessment** in **black** ink. **Post-assessment** in **coloured** ink.

	picture to picture	word to word	word to picture	picture to word
ball	✓ ✓	✓ ✓	✓ ✓	✗ ✓
book	✓ ✓	✓ ✓	✓ ✓	✗ ✓
dolly	✓ ✓	✗ ✓	✗ ✓	✗ ✓
car	✗ ✓	✗ ✓	✓ ✓	✗ ✓

The other sections of the pre and post assessment task consisted of a series of rating questions using a Likert-type scale (where a level of judgement is given using a simple scale e.g.10 point scale). Rating questions were used as this offered a consistent, meaningful approach for staff completing the task, and thus would provide measurable, reliable data for the areas of fine motor skill development, impact on levels of concentration, pupil confidence and motivation to learn.

Example of a rating question using a Likert-type scale:

1. On a scale of 1-10 (1=very poor, 10=very good), rate the child/young person's ability to perform the following tasks on an iPad.

	Pre- assessment	Post- assessment
• Consistently point to an item on screen with index finger	6	9
• Move an item on screen by dragging finger	5	8
• Use a swipe motion to move from one screen to another	3	8
• Use a 2-fingered pinch action to zoom in/out	4	7
• Use a single tap to open an app	6	8
• Use a double tap to zoom in	4	7
• Judge and apply appropriate force to the touchscreen	6	8

Outcomes of the pre and post assessment task

Special Words assessment grid

Two children (15%) used Special Words for 10-15 minutes on a daily basis.

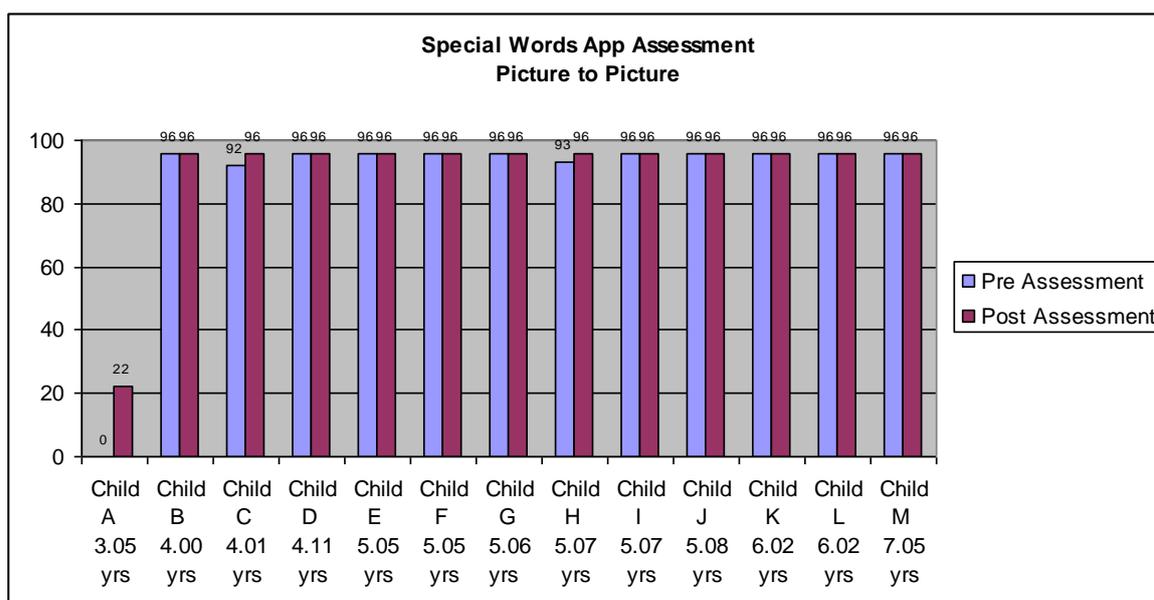
Eleven children (85%) used Special Words for 10-15 minutes at least 3 times per week.

Language and reading

Special Words - picture to picture matching		
no change	improved	regressed
10 children (77%)	3 children (23%)	0 children (0%)

The ten children with scores that did not change, successfully matched all 96 picture to picture cards in both the pre and post assessment task, and therefore, could not improve on their scores.

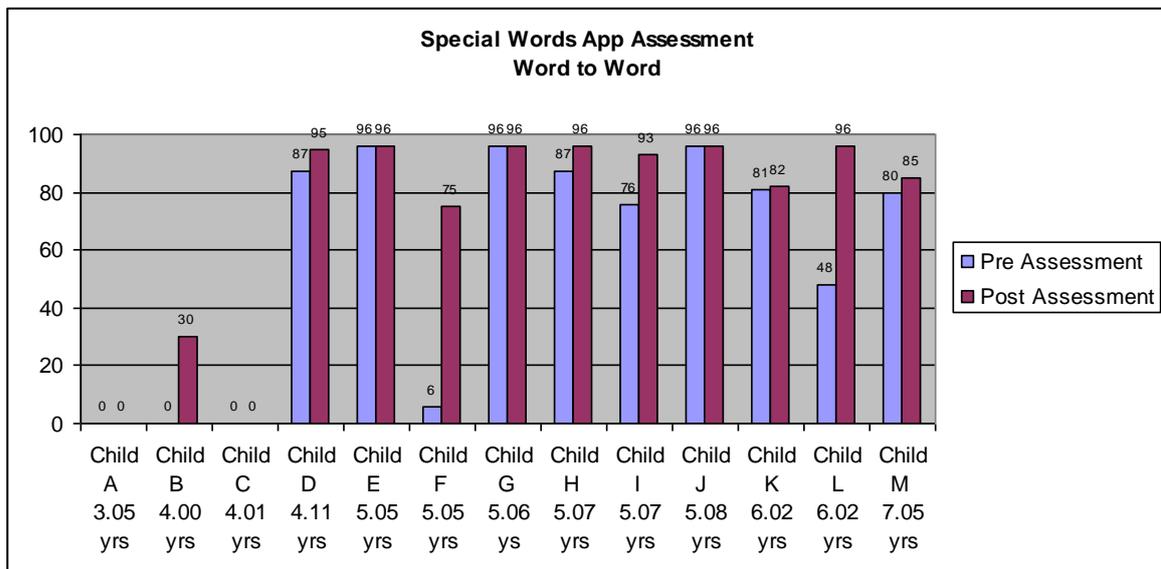
Of the three children who improved, two correctly matched all 96 picture to picture cards in the post assessment task, making an improvement of 3% and 4% respectively (Child H and Child C). One child made a significant improvement, having scored 0 in the pre assessment and 22 in the post assessment (Child A).



Special Words - word to word matching		
no change	improved	regressed
5 children (38.5%)	8 children (61.5%)	0 children (0%)

Of the five children with scores that did not change, three successfully matched all 96 word to word cards in both the pre and post assessment task, and therefore, could not improve on their scores. The other two children showed no improvement, having scored 0 words in both the pre and post assessment tasks.

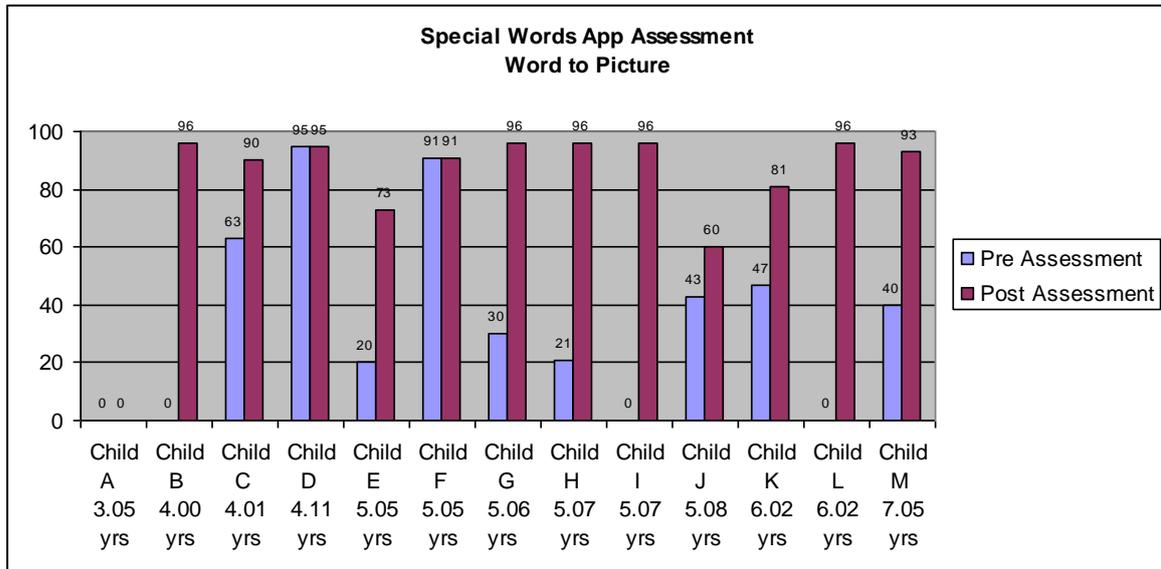
Eight children showed improvements as illustrated in the bar chart below. Child B, Child F and Child L made significant progress.



Special Words - word to picture matching		
no change	improved	regressed
3 children (23%)	10 children (77%)	0 children (0%)

Three children scored the same results in both the pre and post assessments, and thus made no improvement.

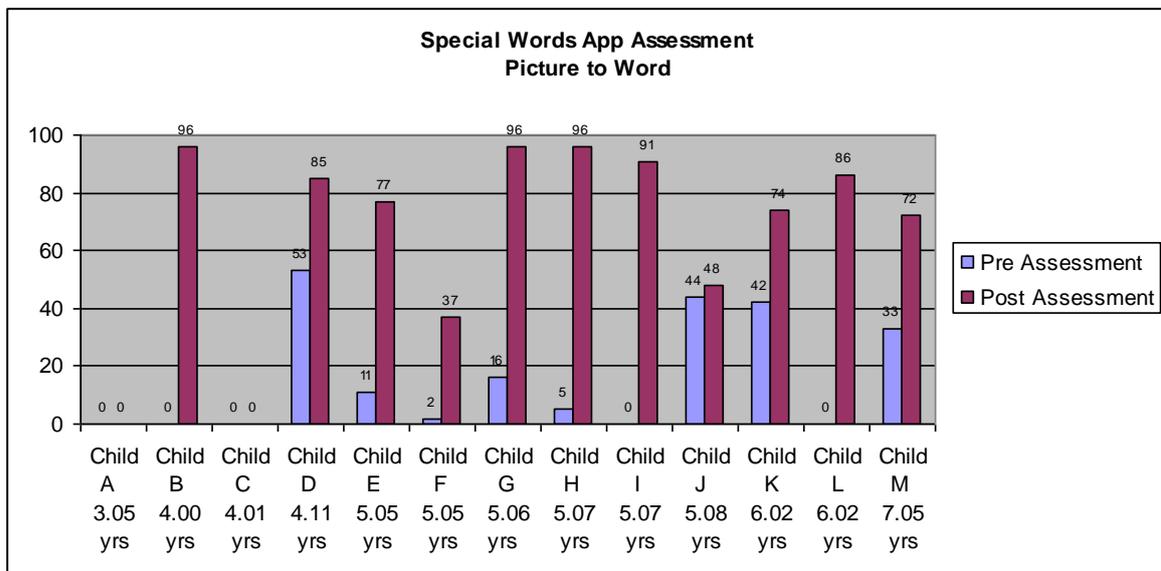
Of the ten children who improved, three made exceptional progress. They scored 0 in the pre assessment and correctly matched all 96 words in the post assessment (see Child B, Child I and Child L). The other seven children showed varying degrees of improvement as illustrated in the bar chart below.



Special Words - picture to word matching		
no change	improved	regressed
2 children (15%)	11 children (85%)	0 children (0%)

Two children were unable to score any correct answers in both the pre and post assessment tasks, and thus made no improvement.

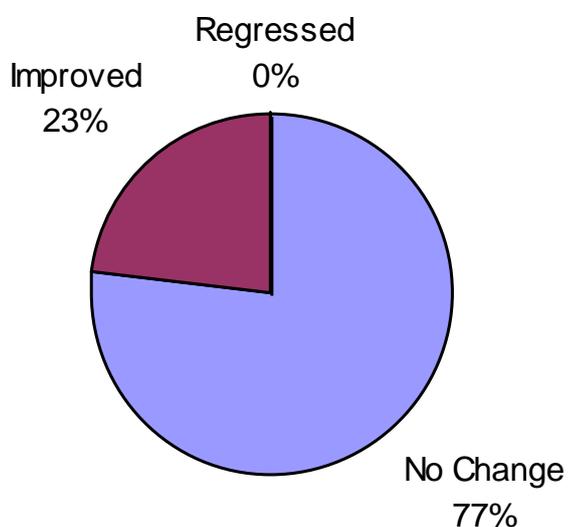
Of the eleven children with improved scores, three successfully matched all 96 words in the post assessment, having previously only scored 0, 5 and 16 in the pre assessment (see Child, B, Child H and Child G). The other eight children made significant progress as illustrated in the bar chart below.



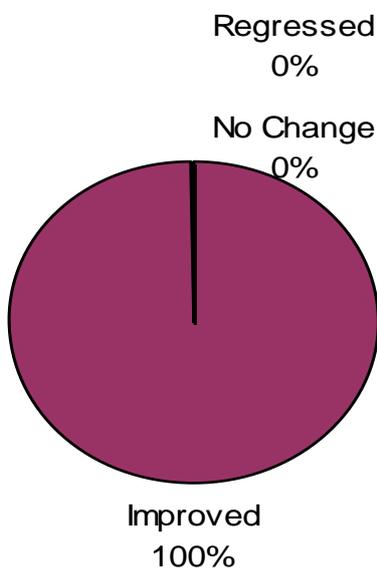
Outcomes of the rating questions using a Linkert-type scale

Fine motor skill development

General fine motor skills e.g. the ability to pick up small objects, turn pages, use a pencil/crayon etc.

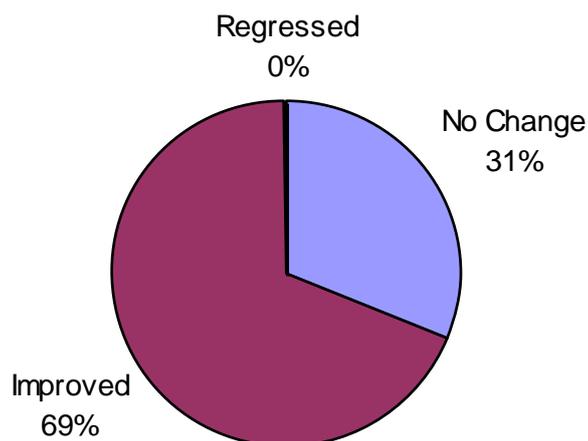


iPad specific fine motor skills e.g. isolate index finger, use swipe motion, use pinch action etc.



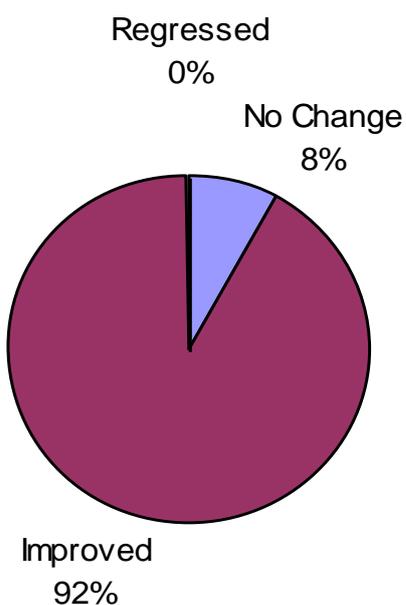
Of the thirteen children (100%) who improved, ten children (77%) improved in all areas and three children (23%) improved in only some areas.

Concentration skills



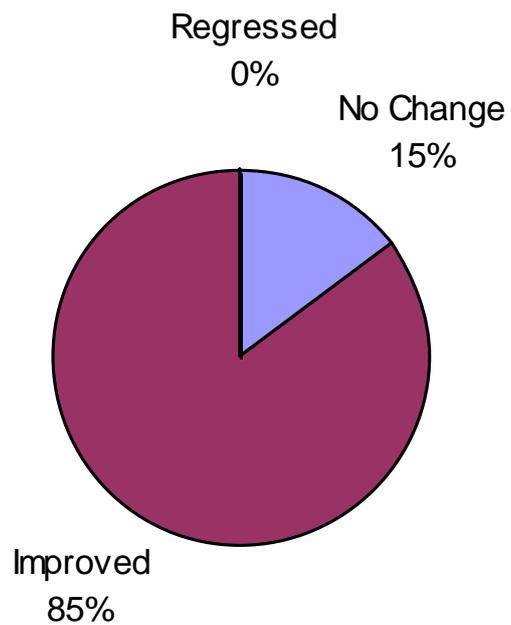
Staff judged nine of the children (69%) to have improved levels of concentration throughout the school day. Concentration skills remained the same for four children (31%) and zero children (0%) regressed.

Pupil confidence



Staff reported twelve children (92%) were more confident throughout the school day. Levels of confidence remained the same for one child (8%) and zero children (0%) experienced a decline in their confidence level.

Motivation to learn



Staff judged eleven children (85%) to have an increased motivation to learn throughout the school day. Levels of motivation remained the same for two children (15%) and zero children (0%) experienced a deterioration in their motivation levels.

Other outcomes of the project

Staff views

In addition to the pre and post assessment task, staff were asked to complete a semi-structured questionnaire consisting of a variety of open-ended questions. This allowed staff the opportunity to comment in their own words and share their views, opinions and experiences of the project.

Staff from all six schools completed the questionnaire. Responses were overwhelmingly positive and all staff indicated the project had met its intended objectives and had been very worthwhile.

“My three children have shown good progress and have enjoyed using the iPad. It has proven a beneficial experience.”

“The project has benefitted the two children I worked with particularly with their literacy skills. It has been easy to monitor their progress from the beginning to the end and it has also improved the children’s skills in using the iPad.”

“The boys have been talking more and have enjoyed working with a supervising adult. Their fine motor skills have shown lots of improvement and the project has encouraged me to use our school iPads more.”

“Both our pupils have enjoyed working on the iPad Project. The benefits have been numerous. Our school is now going to purchase some iPads of our own.”

“I feel that the project has been a great success and really worthwhile. The children have developed in different areas and the iPad has helped them to achieve where they usually struggle.”

“The project has given the opportunity to use new technology and has helped with many aspects of learning. The Special Words app has helped in the development of sight reading and he enjoys the app.”

Staff reported many advantages to using an iPad with their pupils and listed the following benefits:

- improved concentration span
- better listening and attention skills
- improvement in following instructions
- increased co-operation with adults and peers
- improvement in sharing and turn taking
- increased confidence
- enjoyment of learning
- increased motivation and enthusiasm
- stimulated discussion
- increased use of expressive language
- better initial sound awareness
- improved word recognition
- improved hand-eye co-ordination and fine motor skills
- importance of accuracy- iPad specific skills e.g. pinching, zooming, dragging
- increased sense of responsibility
- perseverance to finish a task
- increased problem solving skills
- presenting information and learning in a new and interesting way

Two members of staff reported they had experienced some limitations but these centred on the actual iPad itself.

- no USB port to connect a memory stick
- no VGA port to connect to an interactive whiteboard or screen projector
- many of the other apps (not Special Words) were free 'lite' versions and contained distracting adverts, pop-ups and buy-now upgrade features.

Detailed analysis showed the iPad had been used to support learning in a variety of ways, in addition to the Special Words aspect of the project.

How used	Number of schools	How often
Small group work	4	daily, weekly
Individually with support	6	daily, weekly
Individually without support	5	daily, weekly
Paired work	3	daily, weekly
Internet use	1	weekly
Reading books, stories and texts	5	weekly, occasionally
Taking photos	5	weekly, occasionally
Making audio recordings	4	weekly, occasionally
Remediation & consolidation of skills	4	daily, weekly
Presenting work	2	occasionally
Other (please give details) Literacy, Numeracy, Reading and Speech therapy sessions	4	daily, weekly

Staff were asked specific questions related to the Special Words aspect of the project. The following responses were given.

Do you think the pupils involved in the project would have achieved the same results using a paper based version of the vocabulary featured in Special Words? Why?

Five of the six schools reported NO and believed the app had enabled their pupils to make more progress than if they had used traditional paper based flashcards.

“The iPad allowed them to learn in a very visual/kinaesthetic way and the children’s enthusiasm was high throughout.”

“Special Words on the iPad was more interesting to our children and maintained their attention.”

“The boys were more motivated by using technology than paper and pencil.”

“The interactive nature of the app engages the children.”

“We feel the children benefitted from Special Words on the iPad more than a paper based activity as it was more interesting for them and they took notice of the speaking element of the device.”

One school reported YES as they believed their pupils would have made the same amount of progress, but reported the app had been useful.

“Yes, as I also use word cards/picture cards and a Velcro board to learn sight words, but the app has been very useful in that it has given variety.”

What is your professional opinion of Special Words?

“Special Words is a very useful app for teaching reading skills using sight vocabulary with picture and auditory cues.”

“It is a useful tool to develop phonological awareness (listening for initial sounds).”

“It is a good app to use for both reading and motor skills/co-ordination development.”

“A good tool for assessment and teaching.”

“It is a really useful app. The pictures are clear and easily recognisable for young children.”

“I like the app but have seen progression when other resources have been used alongside it.”

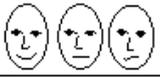
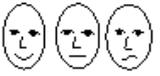
In addition, five of the six schools reported their pupils had begun to use more expressive vocabulary and believed this was directly related to the app as their pupils often spoke the words aloud and/or chatted to an adult as they used the app.

However, one member of staff reported her pupils had begun to memorise the order in which the words appeared within the app and therefore, she was unsure how accurately her pupils could read the words. Special iApps have now developed a way to overcome this problem by introducing a ‘shuffle cards’ option within the app which randomises the order, if staff/parents wish to use this mode.

Pupil views

Staff were asked to complete a simple questionnaire with their pupils (if appropriate). This consisted of a number of 'I like' and 'I can' statements with symbolised faces for pupils to indicate their response. In addition, staff could record pupils' oral responses in a comments box.

Example of pupil questionnaire:

		Comments
I like using an iPad		
I like using Special Words		
I can open Special Words by myself		

Eight of the thirteen children completed a questionnaire with a member of staff. Pupil responses were as follows:

Eight children (100%) indicated they liked using an iPad.

Eight children (100%) indicated they were able to open an app independently.

Five children (62.5%) indicated they could close an app independently.

Two children (25%) indicated they could close an app with some adult support.

One child (12.5%) indicated they relied on an adult to close an app for them.

Six children (75%) indicated they were good at moving items on screen with their finger.

Two children (25%) indicated they were able to move items on screen with their finger, but were not confident at it.

Six children (75%) indicated they liked using the Special Words app.

Two children (25%) indicated they did not like using Special Words but gave no additional comments or reasons for this.

When asked, “**I would like to get better at....**”, seven of the children answered and gave the following responses.

“...dragging with my finger.”

“...drawing.”

“...getting faster.”

“...reading words and matching.”

“...reading and adding-up games.”

“...my skills.”

“...being fast.”

When asked, “**I like/do not like the iPad because...**”, all eight children indicated they liked the iPad and gave the following responses.

“...it is awesome and fun.”

“... it has some more games on.”

“...I can touch the screen and I like the pictures.”

“... I like to play on it.”

“... I can use my finger to tap.”

“... it is fun.”

“... I’m good at it.”

“... I can touch it and I like the sounds.”

Conclusion

The Durham iPad Project has been a very worthwhile project with overwhelming positive feedback from both the staff and pupils involved. It has given children and young people (aged 3-7 years) with language, communication and literacy difficulties the opportunity to develop essential literacy skills through the use of motivational, digital technology.

The project has successfully met its intended objectives and has effectively evaluated Special Words as a learning tool. It has demonstrated Special Words is an effective resource to enhance communication, language and literacy skills, and has a positive impact on the development of expressive language, receptive language, word recognition, reading and listening skills.

In addition, the project has provided evidence of the iPad's impact on levels of concentration, confidence, motivation and fine motor skill development. It has also highlighted many other benefits of using an iPad with children and young people in educational settings, including increased social skills (i.e. sharing, turn taking, co-operation with adults/peers and following instructions) and increased self-awareness skills (i.e. perseverance to complete a task, sense of responsibility, enjoyment of learning).

The project has shown the iPad is a valuable learning tool with many different uses. The most popular uses were: small group work, paired work, individual work (both with and without adult support), reading of electronic books, taking photos, making audio recordings and utilising opportunities for remediation/consolidation of key skills. However, the project also identified some limitations of the iPad. These centred on the actual iPad itself and Apple's design which does not feature USB or VGA connection ports. Another constraint identified was the quality of some apps (not Special Words), many of which were free or low costing and contained distracting adverts, pop-ups and buy-now upgrade features.

The need to formulate a list of appropriate apps has been recognised and would be a welcomed tool for both staff and parents. Cognition & Learning Team hope to undertake this work in the near future, working in partnership with a number of schools that have purchased iPads, and will continue to inform good practice in the use of digital devices and the implementation of apps as a learning tool.

Finally, I would like to take this opportunity to thank all the schools involved, their staff and pupils, for their enthusiasm, support and commitment throughout the duration of the project. The Durham iPad Project has been hugely successful and this is largely due to the dedication and hard work of the staff and pupils involved. Thank you all for your invaluable input.

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Special iApps C.I.C. is a UK-based community interest company and social enterprise. Founded in 2011, it develops international-award-winning educational apps for Apple and Android mobile devices, particularly for children with SEND.

Registered Address: Portland House, Belmont Business Park, Durham DH1 1TW

Website: www.specialiapps.org

Email: support@specialiapps.org

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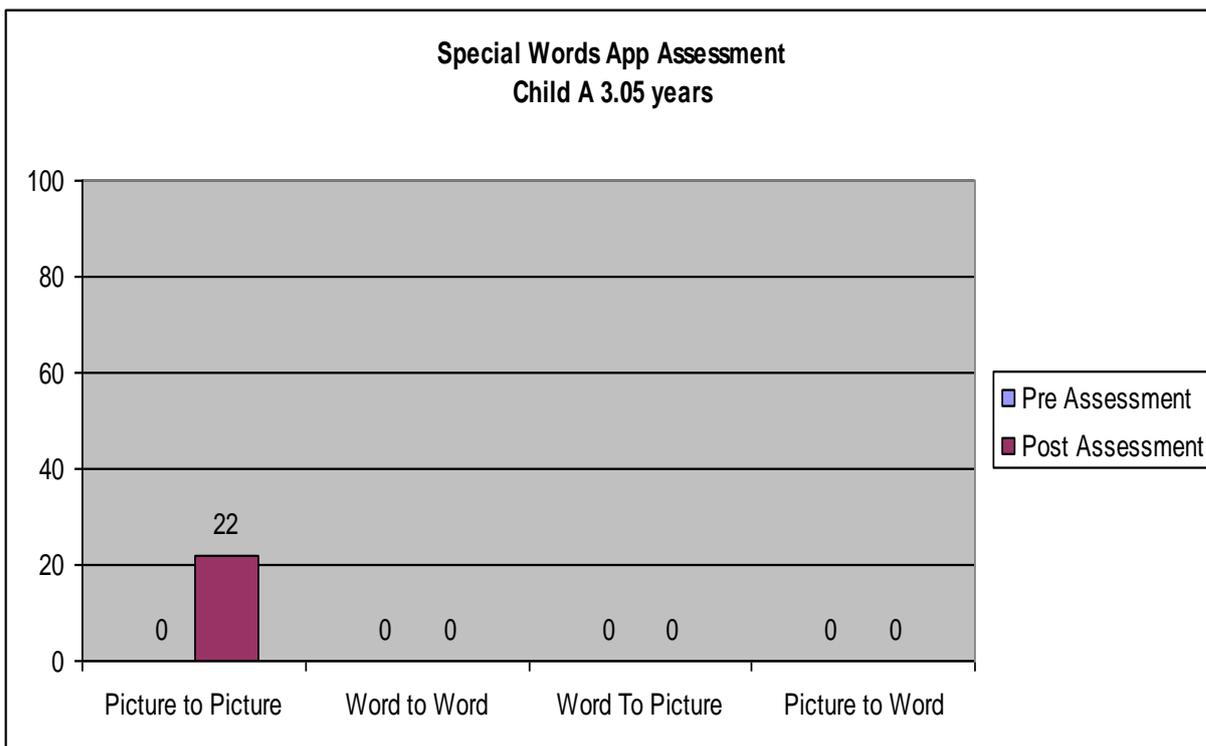
Appendix

SEND & Inclusion Service

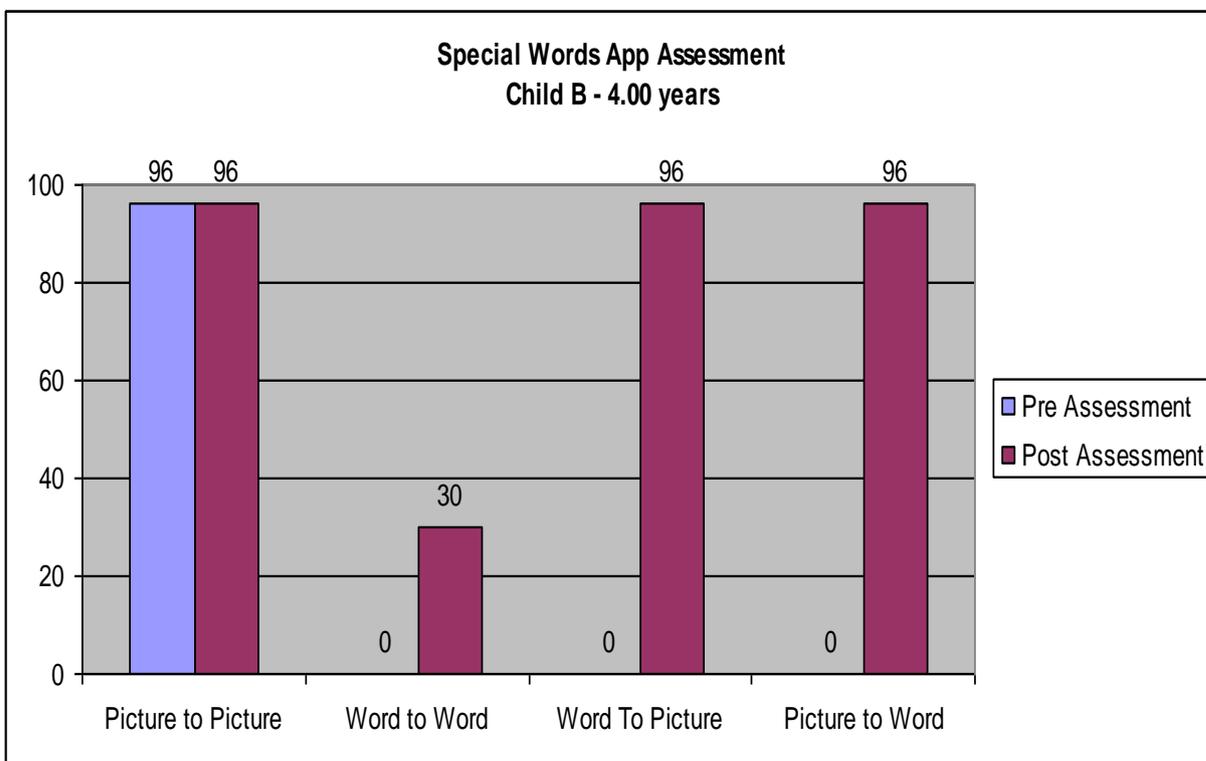
The Durham iPad Project Special Words Assessment Outcomes Child A - M



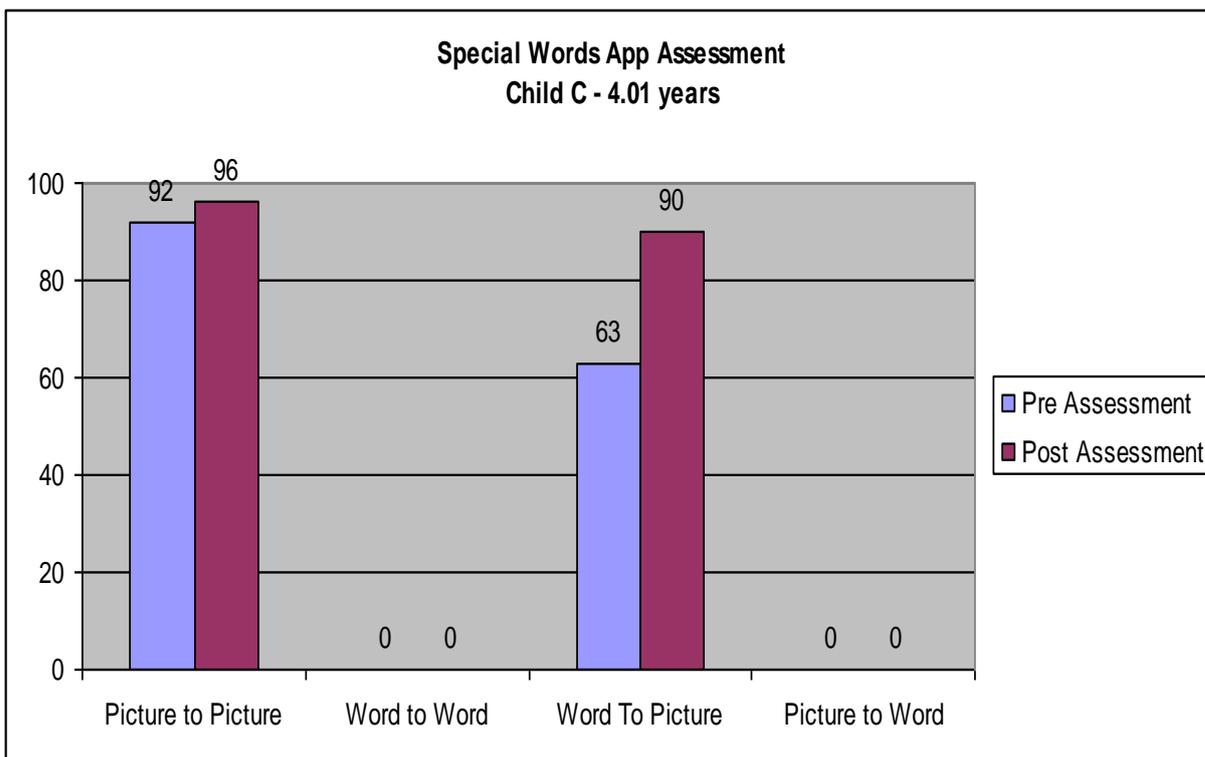
Child A



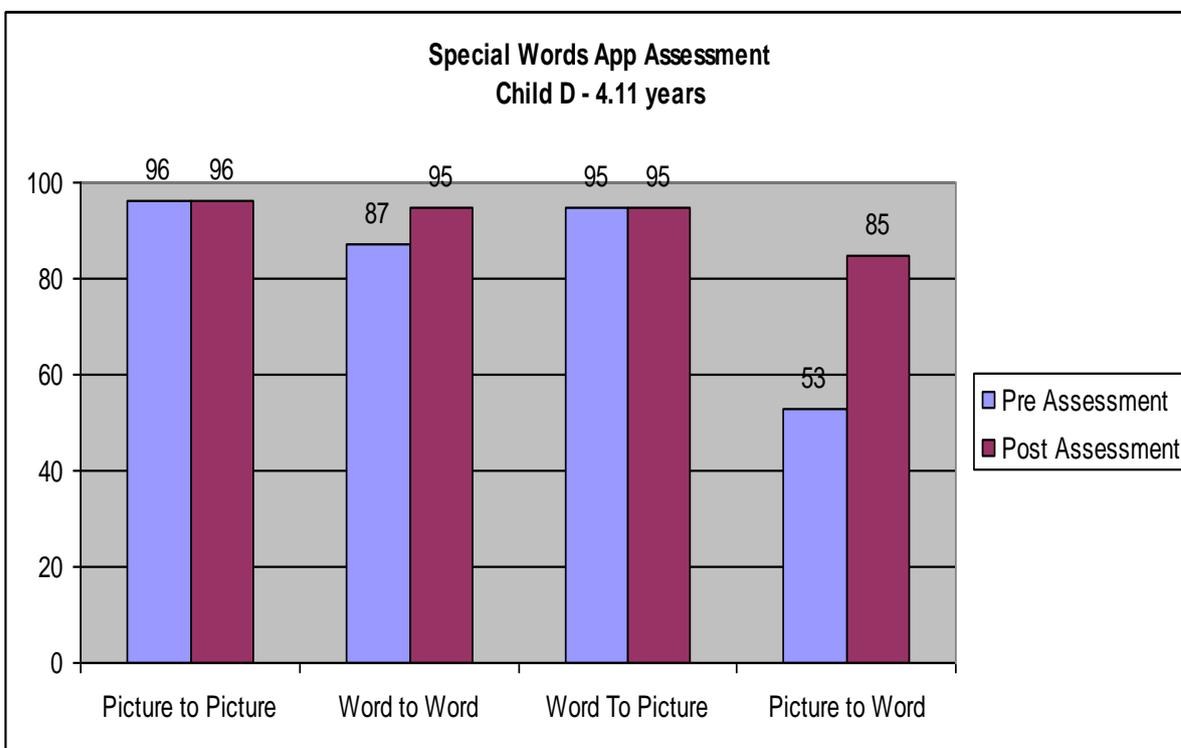
Child B



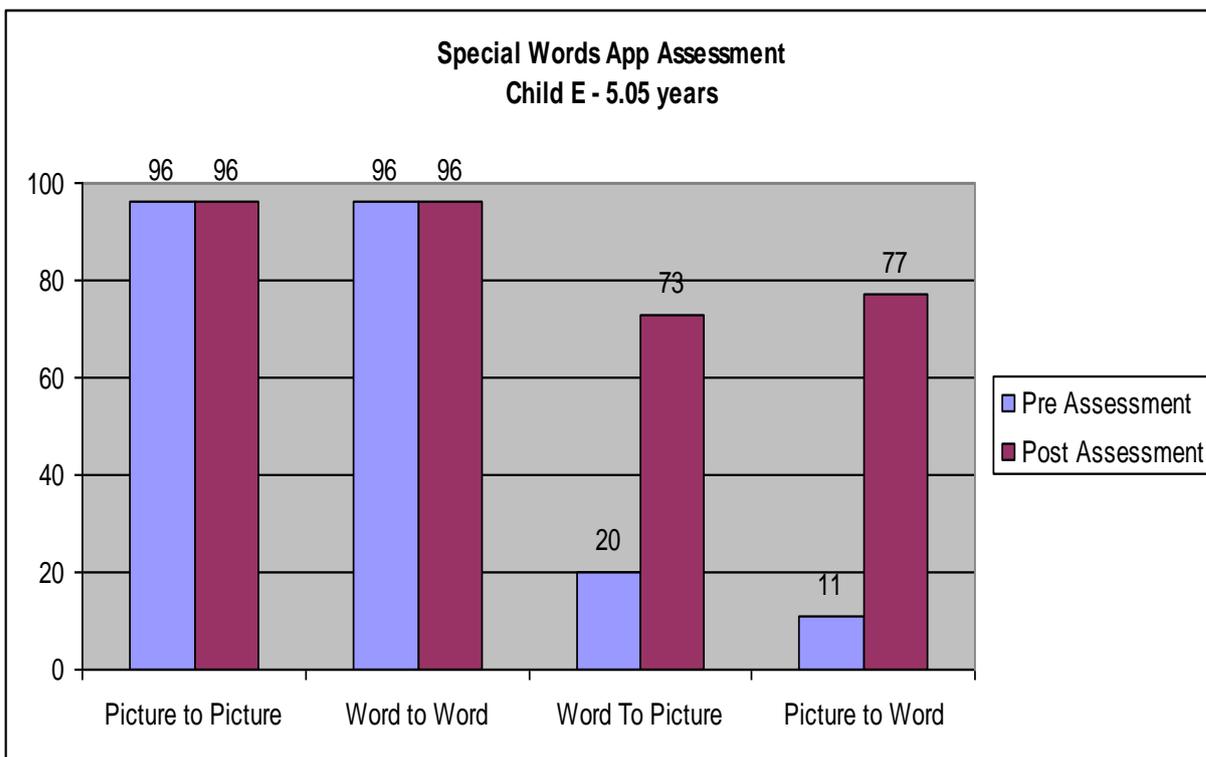
Child C



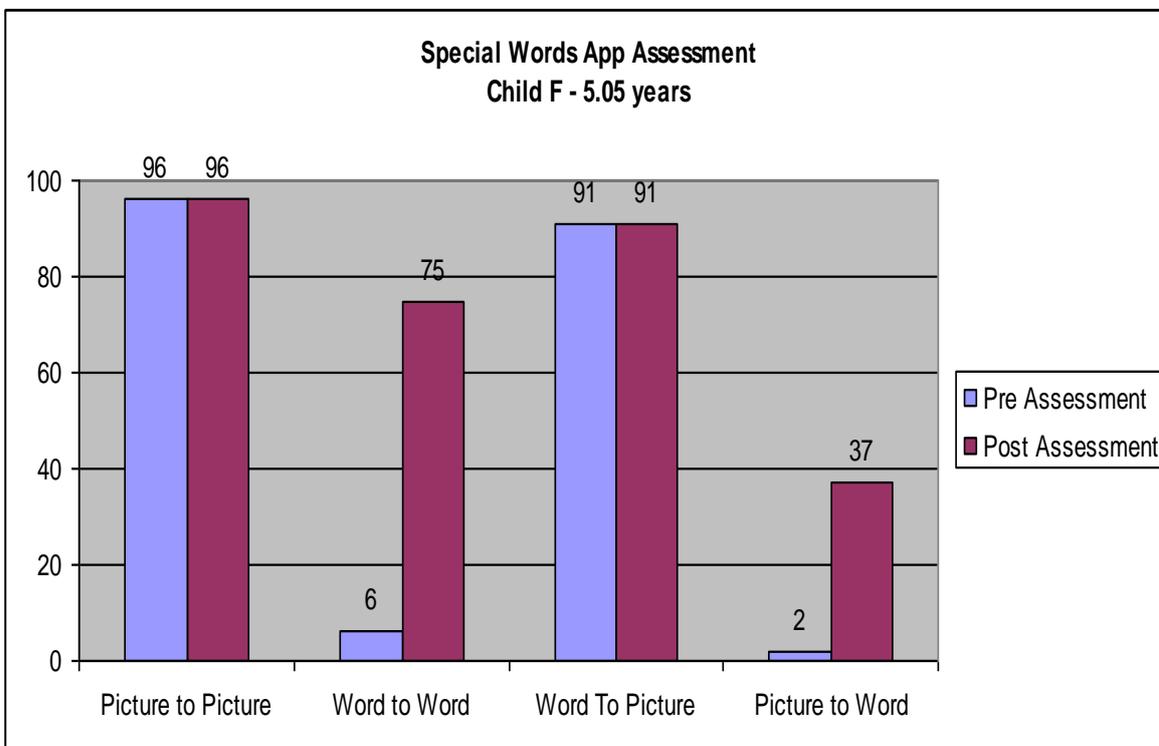
Child D



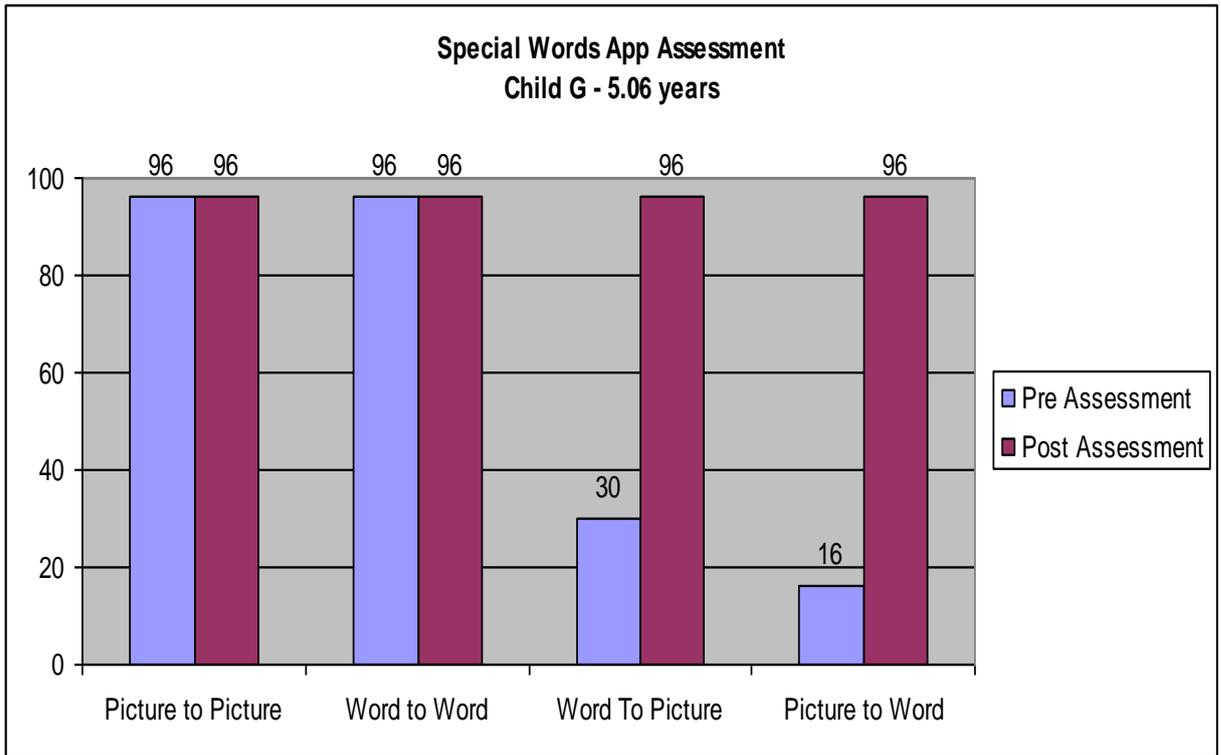
Child E



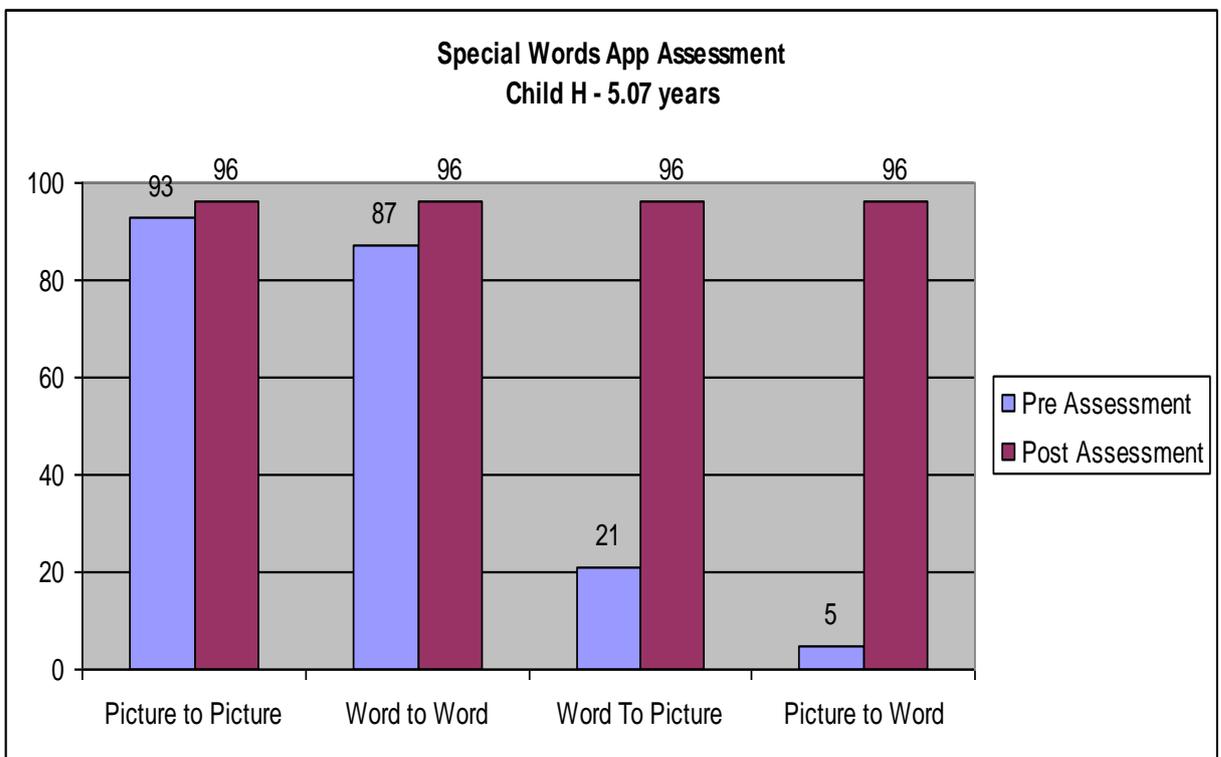
Child F



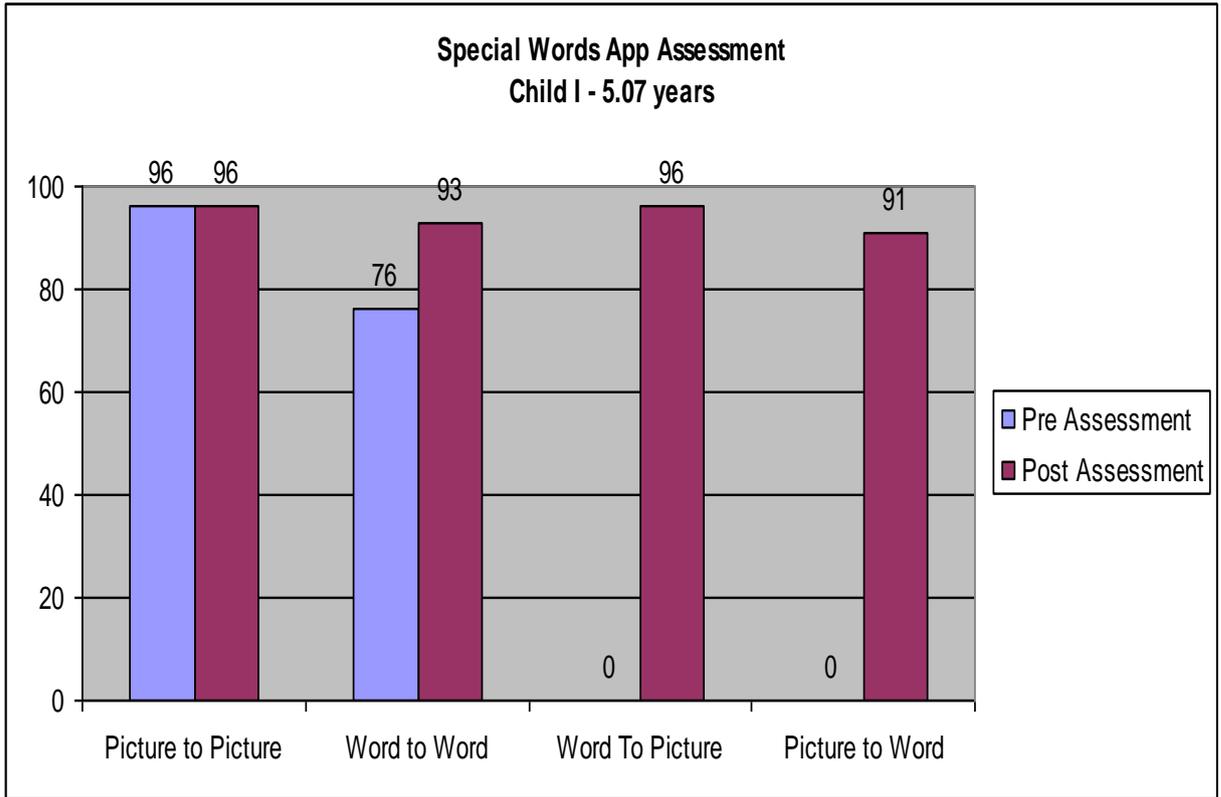
Child G



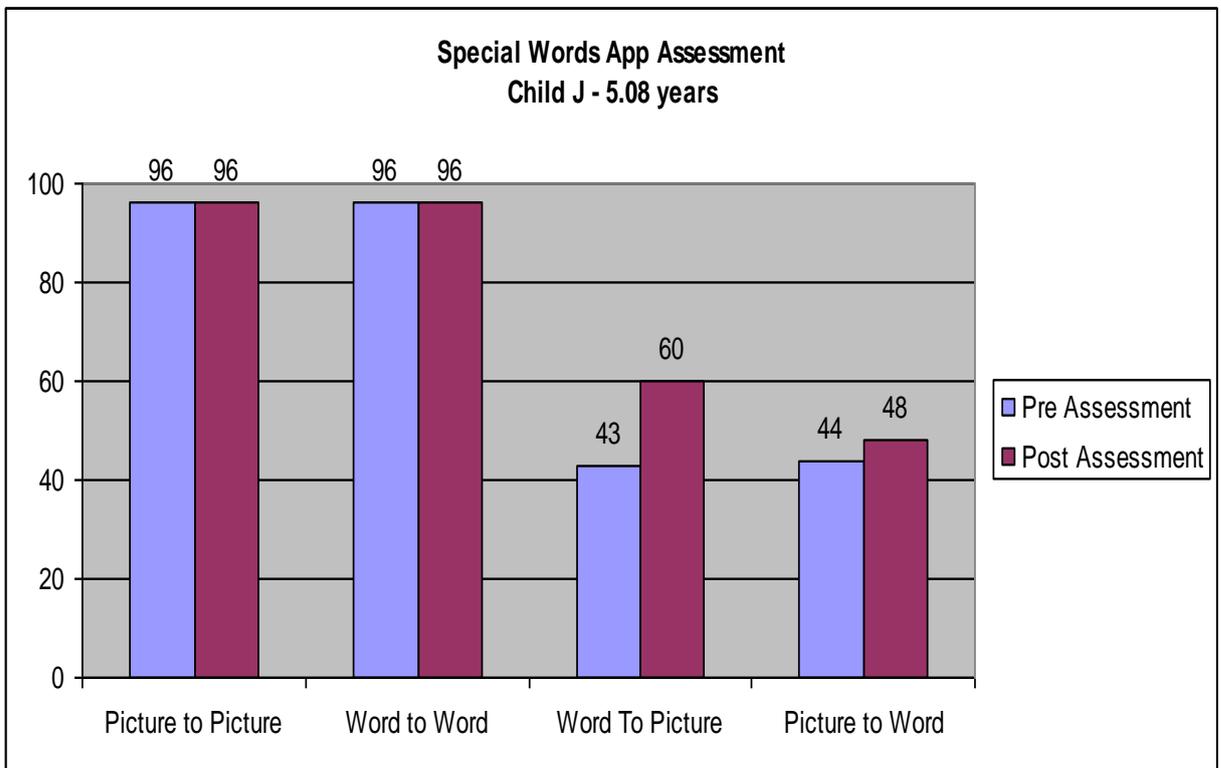
Child H



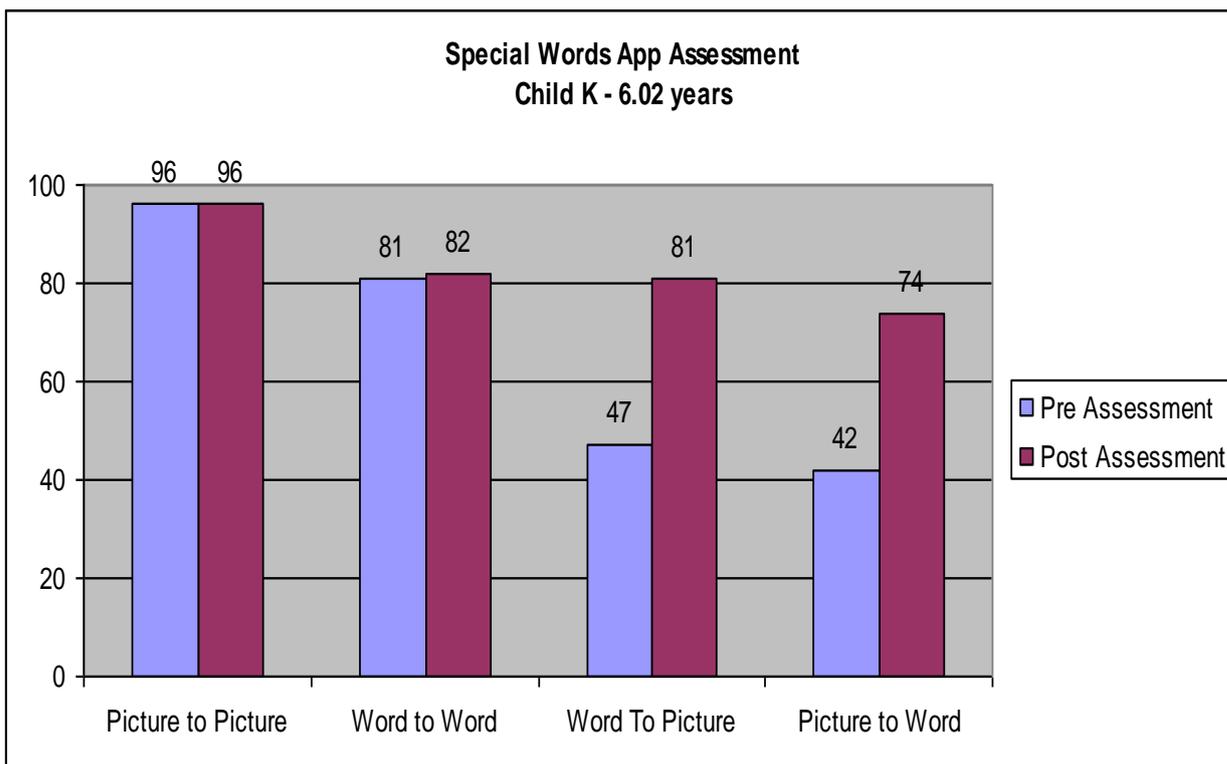
Child I



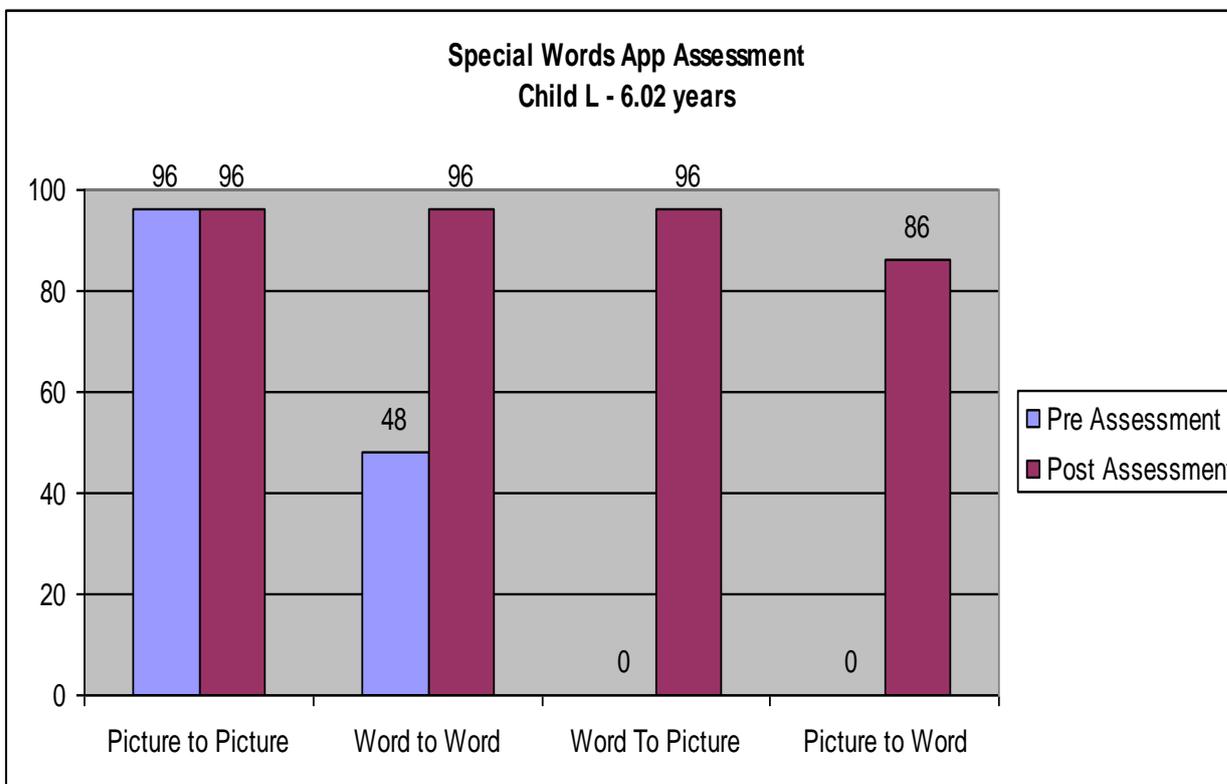
Child J



Child K



Child L



Child M

