Sound Systems – A phonemically-based approach to adult literacy tutoring at the LINC

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Abstract

A speech pathologist was brought into the adult literacy program at the Glenorchy LINC for the purposes of observing and learning from current practice and exploring the best ways in which strategies to enhance phonemic processing and language can be incorporated into the program for clients who exhibit significant gaps in these skills. Speech pathologists are specialists in the clinical and educational application of the knowledge-fields of language and phonemic processing and the processes and sequences in both their normal development and impaired development. The observation identified need for Literacy Coordinators to have increased knowledge and understanding of learning disorders, the phonemic and linguistic bases of literacy and direct-teaching techniques. Four clients, two Literacy Coordinators and three volunteer tutors completed participation in the *Sound Systems* project which dynamically demonstrated this knowledge and these techniques in action. This was done through direct teaching of clients and coaching and mentoring of Literacy Coordinators and tutors. The results and learnings were overwhelmingly empowering and positive – described as the 'missing piece' in the adult literacy puzzle. This evaluation, by all who participated in the project, is a match for the evidence in teaching reading and writing to those who haven't been able to learn it at school for whatever reason – which is that with systematic, engaging support built from the phonemic and linguistic bases of literacy, skills and literacy practice can be significantly and swiftly increased in adults.

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Background and Informing Principles for Sound Systems

Writing is just language which has been placed upon a page or screen using, in the case of English, a code based upon the spoken speech sounds – the phonemes. Reading is the ability to *decode* writing back into its spoken language form; and writing is the ability to *encode* spoken language into its written form. Literacy is the skill of both encoding and decoding language in the fullness of all that language is and can be used for.

Spoken language develops best and is mastered most readily by surrounding a developing child with language-saturated experiences mediated by positive relationship (Hart & Risley 1995). Mastery of literacy, however, requires explicit teaching by which to reveal the link between the visual code and the source information – namely, language (Munro, 2011). The visual units of the code – the graphemes (letters) – are symbols which represent the phonemic structure of language. The link between these two forms is the key to the code – and so in the case of English, the key is the phonemic structure of spoken language and the mapping of that structure onto the graphemes. This process of linking sounds and letters is also known as phonics. It follows, therefore, that a learner must be able to perceive and understand the phoneme-grapheme key, if she is to become an effective user of the code (Nevola, 2007). And to achieve mastery a learner must be able to *effortlessly* discern, discriminate, remember and manipulate sequences of phonemes and match that information onto sequences of graphemes, and vice versa (Learning Point Associates, 2004; McGuiness, 2004).

Mastery of the code is the essential basic skill of literacy. Mastery of all of the other skills of spoken language, and their transfer into and out of written form via the code, comprises the rest of literacy skill (Cook-Moats, 2010; Munro, 2011).

Some human brains are not set up – or 'wired' as is now popular to say – to discern, discriminate, remember and manipulate phonemes and sequences of phonemes with ease. This may be because of an individual's genetically-endowed predisposition to weak phonemic processing at a neurological level (Felton et al, 1990; Catts et al, 2002); and/or to paucity or degradation of the language environment which also contributes to the development of an individual's phonemic processing capacity (Gopnik et al, 1999). Individuals with such neurologically-based differences are at disadvantage – often to the point of disability – for learning literacy. To learn it, they need to receive intervention which is tailored to their individualised phonemic processing and language-knowledge start-points – and which systematically builds from there (Hempenstall, 2009).

The human brain is not a one-channel processor. It has multiple input channels, via the senses, to receive information about the external world. If it cannot create order and make sense of the world through one sensory channel, it will seek to do so via the incoming information from other sensory channels.

The written code is present in the world in visual form (NOTE: in tactile form in the case of Braille), but it represents information which has auditory form. As learners – whether children or adults – are learning to read, their brains are being stimulated by information from both the auditory and visual

channels (Cook-Moats, 2010). If their processing in the auditory channel is impaired, their systems will seek to create order via the information in the visual channel. As a result many who struggle with processing the phonemic structure of language can nevertheless gain some literacy skills through remembering what written words look like. This method has serious limitations, however, because it does not work to decode words which one has never seen before, it is unreliable for mastery of spelling, is limited by visual memory, and it weakens confident knowledge of the use of the phoneme-grapheme link as the key for decoding and encoding (Nevola, 2007). But it is the method which individuals with poor phonemic processing or poor understanding of the key phoneme-grapheme link may come to rely upon because of their inability to access systematic information in the auditory channel. In relying upon a visual basis for decoding, unhelpful habits which will unfortunately not maximise literacy efficiency – such as guessing – frequently establish (Nevola, 2007).

Adults who are functionally illiterate have often cobbled together the literacy skills they do have in this, or similar ways. They have not understood the sound-letter (phoneme-grapheme) link inherent in the written code (Greenberg et al, 1997). It is true that in English, because of its history of having borrowed words from other languages, the logic in its written system is particularly opaque (Nevola, 2007). Unfortunate as this may be for modern learners, it does not alter the fact that the system is based upon the phonemic structure of the spoken language. These phonemes, no matter how complex the word is, can be mapped onto the graphemes, and if this relationship is taught systematically starting from words with a one-to-one relationship between sounds and letters and methodically adding the complexity of English's phoneme-grapheme links until any word can be both read and spelled, then even struggling literacy learners can be explicitly and systematically taught to crack the code and become independent users of literacy (Nevola, 2007). And thus they become beneficiaries of all that literacy can cause to flow into their lives (Munro, 2011).

This method – also known as synthetic phonics (Johnston & Watson, 2005) – of breaking words into their component phoneme parts and systematically teaching the hierarchy of complexity in English's phoneme-grapheme patterns and the language forms thus represented, is the understanding which informed the *Sound Systems* project with a view to "*young people and adults having the literacy skills they need to fully participate in their family life, the community, learning and employment*".

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Genesis of the Sound Systems Plan

During 2013 Hugh Fielding and Rosalie Martin came into professional contact and informally shared information from their fields of specialty, about literacy intervention. Hugh and other LINC coordinators identified that the starting point for intervention from a speech pathologist's phonemic processing framework was not part of the suite of interventions available for use by LINC coordinators, but that it appeared to be important for supporting more efficient progress in a subset of adult literacy learners who made slow, limited, or no progress. It was identified that speech pathologists have skills in assessment and intervention for neurologically-based learning impairments and bring evidence-based approaches (Greenberg & Laures-Gore, 2011) which could partner harmoniously with the approaches of adult literacy teachers for the support of these clients (Balmuth, 1986). Back to Contents

The Plan

A two-stage plan was developed:

1. A speech pathologist would be embedded within the existing Glenorchy LINC literacy service to work alongside the two Glenorchy-based Literacy Coordinators, observe and learn from their practice, and gather information by which to create enhancement of the use of language and phonemic processing strategies within their practice for clients who exhibited significant gaps in these skills. Language, phonemic-skills and reading-skills assessment would then be used to identify five clients for whom the alternative, *Sound Systems* phonemic and language-based delivery of intervention may be appropriate. This information would inform the planning of the methodology of stage two – an approach by which to support low literacy clients at the Glenorchy LINC. These results can be found in Stage 1.

2. The speech pathologist, in conjunction with the two Literacy Coordinators, would work intensively with five clients and their volunteer tutors, to demonstrate, model, mentor and train the application of a suite of assessments, teaching strategies and resources; and to sample this model of intervention within the LINC context in order to gather information about its fit, as well as its implementation challenges, from which to:
   a. raise awareness about phonemic processing and language processing issues
   b. build capacity for literacy coordinators and volunteer tutors
   c. make recommendations for support of low literacy clients on a LINC-wide model.

   These results can be found in Stage 2.

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Stage 1

What Happened

Two days were spent at the Glenorchy LINC in consultation with the Literacy Coordinators - including orientation to the tools and practice of the LINC literacy program, and meeting and observing tutors at work. These observations are documented below in Stage 1 Results – Report of Current Practice and its Challenges.

Five clients were selected for language, phonemic processing and reading-skills assessment based on:

- The Literacy Coordinators knowledge of the complexity of the literacy challenges being experienced by each.
- Minimal-responsiveness to input from the regular literacy intervention program.
- Level of interest in and commitment to participating in the new model.

The results of the assessments of these five clients can be found in Stage 1 Results – Participant Data.

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Stage 1 Results – Report and Recommendations

Report of the Challenges which Current Practice presents to a Phonemically-based Approach and Recommendations

The LINC Literacy Coordinators displayed passion and insightful awareness of the challenges they face in the delivery of literacy intervention. They have drawn these insights from their experience working with tutors and learners, as well as from their professional reading and learning. Both Literacy Coordinators expressed desire, arising from professional passion in their work, to continue to gain skills with which to discharge their duties with maximum efficacy for the benefit of the learners. Both stated that they recognise current limits to their capacity to serve lower-level learners well, because the knowledge and tools they have at their disposal are not sufficient to analyse and respond to the complexity of the literacy problems which those learners display.

Following are challenges to the effectiveness and efficacy of adult literacy teaching, which were identified in stage one of the project, from a metacognitive, language and phonemically-informed framework. These challenges are set out together with recommendations and rationales for addressing each challenge. The recommendations are summarised at the end of this document.

1. The problems which many clients have in acquiring literacy are broader than staff within the LINC service are trained to understand and respond to. Many clients have learning disabilities. The Literacy Coordinators have enough experience and care to gain a sense of when they are dealing with a person who might have a learning disability, but they do not have formalised pathways of referral for more specialised support; and they are not trained with the skills to deal with the problem without specialised support. They observed that they have worked with a number of clients who come from a history in special schools, but who don't seem to have intellectual disability – and they noted that this population is particularly motivated to learn. They have also informally observed that of those who are motivated to learn, a large proportion have issues with the basics of phonemic awareness.

    Recommendations: Screening of the phonemic awareness of all adults who present for literacy intervention/support and provision of specialist assessments where indicated. This is recommended because poor language-based skills, including phonemic awareness, are the fundamental root causes of all literacy problems (Snowling & Hulme 2011). Many students who have had reduced success in mastery of literacy may not informally appear to show these problems because the problems can be masked by social interaction – thus systematic screening is necessary to reveal the starting points for intervention.

2. The focus on training received by Literacy Coordinators in the establishment phase of the LINC Literacy Network, has been adult learning principles and strategies to help re-engage adults who have disengaged from formal learning. The Literacy Coordinators were very candid in identifying that they do not have training in the phonemic basis of literacy, and stated their understanding of its centrality for effectiveness. For low-level learners certainly, this situation runs contrary to the evidence for efficacious teaching of literacy (Snowling & Hulme, 2011).

Recommendations: Literacy Coordinators receive specific training in the phonemic structure of English and its patterns of phoneme-grapheme relationships. Speech pathologists become part of the specialist, multi-disciplinary team available to the Literacy Coordinators for training and mentoring in client assessment, intervention planning and trouble-shooting.

3. There is reportedly minimal, if any, teaching to tutors about sounds and phonology – and so tutors are constructing their own intervention programs with clients based on what they, the tutor, might happen to know or not know. The success of some clients depends on the pre-existing knowledge-base of the tutor. This creates a random basis for success, not an informed, efficacious, scientific basis. It is probable that some clients, whilst perhaps enjoying and benefiting from the relationship with their tutor, are not receiving as efficacious a literacy intervention as possible. Comments made by tutors were suggestive of gaps in their awareness of, and knowledge about, the sound structure of English.

Recommendation: Tutors are screened for phonemic awareness before entering tutor training. Only those with phonemic awareness within the normal range be engaged as tutors. They be given specific training in phonemic and phonological awareness as well as language structure, as part of their basic training – ideally, this training should be delivered as part of the national, accredited VET training package. They receive regular coaching from the Literacy Coordinators and from a speech pathologist.

Willing volunteers who do not have normal phonological awareness could be supported to undertake phonological awareness intervention for themselves. This would value and honour the volunteers' willingness to offer themselves as helpers and simultaneously create a general pro-literacy spreading of knowledge of the phonemic basis of literacy into other areas of the community – the tutors' own children, grandchildren and social circles. Volunteers unable to achieve 'normal range' phonemic processing skills could be given other specific and supportive tasks to contribute in the volunteers program – but it is not suitable to have them tutoring the most vulnerable learners if those learners are indeed to be supported to make progress.

4. Tutors may have poor clarity of the specific literacy goals which will best support the accomplishment of their student's other education, employment and personal goals. Tutors were often observed to make ambiguous goal statements. They routinely used language which does not have clarity of meaning, such as "things like that", to refer to tasks they were undertaking with students. They offered such language with obvious desire to be doing well with their students, and serving them well; but students' learning cannot be progressed without clarity of goals.

Recommendations: More and explicit, goal-setting take place with tutors. The programs tutors conduct be overseen more rigorously by the Literacy Coordinators in conjunction with specialist input for phonemic processing and language intervention. Tutors should always be clear about what goals they are working toward and why. It is also recommended that frames be developed for supporting tutors' use of language and terminology in ways that give clarity, support and respect to all participants – including the tutors themselves – and avoid judgment.

5. It was stated that "there is no curriculum here, we just follow their [the clients] interests". While this approach has been deliberately taken to ensure the model of learning offered suits the individual needs of the adult clients presenting, it potentially creates a random approach for the achievement of specific literacy goals from within the structuring of the clients' overall learning goals and pathways.

> *Recommendations: Specific curriculum in the evidence-based interventions of phonemic awareness, and development of language knowledge, orthographic knowledge and metacognition be developed (Apel et al 2012). Self-presenting clients arrive with a combination of unconscious incompetence and conscious incompetence. They require specific, explicit direction and teaching to reach competence and they are dignified by receiving it.*

6. There was evidence that tutors did not always know how to manage client behaviour in ways that directed the client to the learning tasks at hand whilst simultaneously permitting respect toward the client in a way which both client and tutor could feel comfortable with. One tutor said this: "He doesn't stop talking! He wastes the whole session with talking." This client had communication challenges in the form of excessive talking, which could indeed be managed, but using different strategies than for persons without these challenges, and requiring specialist support to do so.

> *Recommendations: Specialist knowledge and support be available for the benefit and efficacy of the learnings of both clients and tutors. Speech pathologists are the specialists who have knowledge and skills in all areas of interpersonal communication.*

7. The assessments that are currently undertaken routinely with clients either do not examine phonemic processing and language at all, or do not examine it incisively enough to adequately ascertain the client's specific skill-base for then planning an intervention pathway. I did see one assessment which comes close to this (part of the Lexia assessment), but the Literacy Coordinators involved with the project were not trained in how to then use this information to set up an intervention pathway. One Literacy Coordinator said: "A lot of what I've been doing I've learned by trial and error."

> *Recommendations: Specialist assessment and pathway-planning needs to be included routinely in the LINC program for vulnerable learners. Ideally it would be included for all learners, so that none who would benefit from this evidence-based model of intervention slip through undetected; socially competent learners with good expressive language skills often present informally as though they are not part of the vulnerable group – and they have often become adept at actively masking and compensating for their weaknesses. Ideally, a speech pathologist would be engaged to undertake this assessment and participate in intervention planning as part of the multi-disciplinary team.*
>
> *Speech pathologists have high-level training in analysis and intervention for phonemic processing and language problems. Further, having speech pathologists working alongside of Literacy Coordinators and tutors creates opportunity for applied knowledge-sharing and mentoring for the professional strengthening of the intervention team, as well as for improving client outcomes.*

> *Moreover, a speech pathologist could also intervene for speech production and, verbal language impairments – both of which contribute to impaired literacy.*

8. There was evidence that assessment results may play little, if any, role in determining intervention pathways. One tutor, after listening to an explanation of a client's assessment results from the Literacy Coordinator, said: "I can't set up a lesson plan until I meet him" and "I'll need to get him to read so I can see what he can do". These comments suggested that the assessment results which had just been shared would not form the basis of the decision-making that the tutor would use for lesson planning.

> *Recommendations: That a scientific basis be brought to lesson planning, and that specialist knowledge guide this process and guide the volunteer-administered program. That is to say, that the volunteers do not make decisions about what to do in the program, but they are supported to implement a program which is set by the Literacy Coordinators on the basis of assessment with specialist consultative input.*

9. Staff identified that community perception of what a literacy problem means for an individual, including the perception amongst employers and policy-makers, is very narrow. They note that the general community has an impression that if "punctuation can be taught, then everything will be alright". Staff at the LINC recognise that they are dealing with problems which are much more complex, and from a deeper source of impairment, than punctuation. They are aware, therefore, that they cannot effectively respond to the presenting needs in the way that the community, an employer, and even the learner, might be expecting, based on such pre-existing perceptions.

> *Recommendations: Ongoing community awareness-raising and education – as is currently happening through channels such as the 26TEN initiative – continues to be required to address this narrow understanding of literacy problems and its causes. It is also recommended that, where possible, family members and employers be invited to attend literacy development sessions with clients so that the roots of literacy disorders can be revealed and explained – in a manner that is supportive of the learner. Once again, specialist assessment, direction and knowledge-sharing is essential to support community members and learners themselves to make meaning of the problems in a way which matches the evidence. Such respectful sharing of accurate information is potent as part of a positive ripple effect in the development of supportive community awareness.*

10. Backing the previous observation, it was noted that tutors frequently placed focus upon correction of grammatical features in students' writing in a way which was too high-level for the student. That is to say, that the student did not have the linguistic context to make sense of the information being given by the tutor. An over-focus on correction of these features was noted – for example 'he hasn't got no...' corrected to 'he hasn't got any...'. This information was likely to be experienced by the learner as confusing and 'hard'. Two possible reasons are offered for this characteristic in the work tutors undertake with the lower-level learners:
    a. They do not know what else to do with that learner.
    b. They demonstrate culturally-based judgment and bias in making meaning of the students' 'bad grammar' as the root of the presenting problems. As a result, they set goals which are not informed by a hierarchy of task-difficulty and do not know to let

some errors pass in order to allow and create joy in the flow and establishment of other more foundational or functional skills.

Recommendations: That tutor programs be tailored to the individualised needs of the learner, based on the learner's scientifically established learning-skills profile. Literature in this area clearly shows that the roots of literacy challenges most often lie in language-based difficulties and sound processing (Snowling & Hulme, 2011).

11. Tutors may know little about how to conduct enjoyable skills drills. There was evidence of use of language frames about the clients' learning, such as "It's a hard slog". Such frames do not inspire hope and enjoyment. It is important that the outcomes for tutor and for client are not negative, so it is therefore important to support development of skill in positive language, enjoyable drills, and to teach more deeply about relationship, enjoyed engagement, reinforcement and motivation. It is also important to reflectively teach into what it might be for each tutor that makes this work feel difficult, what each tutor's own blocks to positivity might be, and about how each tutor makes meaning in ways that are un/helpful to self and other.

Recommendations: That specific training about positive language and skills drills be developed for tutors. It is also recommended that guided reflection sessions for Literacy Coordinators and for tutors be held on a regular basis to celebrate that which has worked well, and to reflect on the challenging components of the work with the collegial support of a group (Hattie, 2008; Palmer, 2007)*.*

12. In the LINC currently, there is only very limited access to a knowledge base by which accurate and realistic information can be given to clients within the low-progress group about the nature of their problem, what might have caused the problem, pathways to remediation, prognosis and likely commitment of time and effort for the remedial process.

Recommendations: Specialist knowledge is required and needs to be taught to the Literacy Coordinators.

13. It was reported that many students drop out from the current program after their assessment or after just one or two sessions – particularly younger students. Challenge exists to develop means by which to adequately inspire and give hope to these students in order to support their ongoing participation. The following conversation was had with one of the Literacy Coordinators about a student's overall presenting needs which included mental illness as well as literacy and other life challenges: "She's very needy, so we probably won't be able to give her all the service that she wants and she will probably wander off to another service". "What other service?" I asked. "Well, that's the thing, there isn't really another service." The presenting clients often have highly complex needs, the variety and interaction of which can reduce or prevent opportunity to deliver literacy services efficiently.

Recommendations: This challenge can be supported through increasing the knowledge-base of the LINC staff – knowledge of direct-teaching of the subskills of literacy, the sequence in which to teach those skills, the integration of subskills drills with functional literacy tasks and understanding of engagement of the learner in the session using principles of authentic reinforcement. These techniques give a more sure base from which Literacy Coordinators can most confidently make statements of hope and positive prognosis for clients whose learning needs are very complex. At

the same time, it should be noed that LINC Tasmania is not attempting to, and cannot, meet all needs for all people.

14. There is uncertainty in some staff about the dignity for the learner in being assessed analytically and then directly taught the subskills of literacy. This uncertainty sometimes presented as rationalised reluctance. This arises from a feeling that overcoming alienation and disengagement from learning is the primary challenge, and from a lack of knowledge of what exactly it is which is being assessed, taught, and why; and of how foundational the literacy subskills are, the sequence in which to teach them, rationales to make to the client for teaching them, how to teach them engagingly and with accurate feedback, and how to reinforce this teaching in ways that become aspirational for the learner. This is very important. One of the Literacy Coordinators commented that: "Clients are aware of the gap between the person they are presenting themselves as and the person they are on the page. They are much simpler in their language on the page."

> *Recommendations: Increased knowledge-base and specialist support for Literacy Coordinators and tutors in the subskills of literacy is essential. Specialist teaching and mentoring are recommended about the practice, attitudes and confidence with which to make detailed assessment and intervention in such a way that it is not perceived by either the client or the Literacy Coordinator as confrontational; but rather, that it is seen as supportive without fear that it will upset the client. The client already knows he has a problem and is best supported by kind, honest, matter-of-fact feedback. Working knowledge of the hierarchy of skills-difficulty supports this type of responding in the Literacy Coordinator, because this knowledge allows them to show the client the direction the intervention will take, and to give hope.*

15. Deep understanding of the foundational importance of therapeutic intensity was not evidenced – either in practice or in comment. Rather, surprise was expressed. To create neuroplastic change – which is the biological basis of new learning – regularity of practice is essential. To be effective, intensity needs to be built into the programs clients undertake. Further, and these are the other conditions for neuroplastic change, this intensity needs to take place at the just-right level of challenge, and needs to be provided with kind, engaging and accurate feedback. Interventions at a frequency of once per week with only limited influence upon home-based practice do not meet the neurologically-understood conditions for maximal efficacy or best-practice. Some skills-change may be effected for some clients through a methodology of weekly meetings, but this approach will fall well short of inducing and inspiring the hoped-for release of potential and heights of independent learning which are being sought for Tasmania and for the individual adult learners who vulnerably present for support.

> *Recommendations: Training about the efficacy of intensity of input be provided to Literacy Coordinators and tutors. Systems for delivery of adult literacy services be structured to include increased intensity of input.*

It is essential to note that the clients presenting at the LINC services are the most courageous and best endowed with self-confidence of all the potential adult literacy learners who would benefit from supportive input. The others don't self-present. Nevertheless, these clients are vulnerable learners. They are vulnerable in their psycho-emotional state – they have usually experienced years

of failure and trying to hide that failure. They are vulnerable in the complexity of their literacy problems and require specialist knowledge to help them advance.

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Stage 1 Results – Participant Data

Participant Data

Five courageous participants were invited to participate in the *Sound Systems* project. Australian Core Skills Framework (ACSF) data was already held on each of the clients and is included in the results tables set out below. This data can also be found in full in Appendix A. Assessment of the participants' skills was carried out by the speech pathologist in the following areas:

- Receptive vocabulary – using the Peabody Picture Vocabulary Test – version 4. This test was used to provide a broad, but standardised, measure of language knowledge.
- Reading skills – using the Woodcock Reading Mastery Tests – version 2. This test was used to provide a standardised measure of two subskills of reading and a measure of functional reading comprehension.
- Phonological processing – using the Test of Auditory Processing Skills – version 3. This test was used to provide descriptive information about auditory processing skill for the purposes of planning intervention. It does not provide standardised data for adult students, but does provide age-equivalent information – which while not as statistically rigorous, provides a broad sense of each participant's performance level for each skill.

For further information about what the ACSF and each of these tests and their subtests assess, see Appendix B.

The following results were obtained:

Participant 1:

Test	Skill/Subtest	Standard Score (mean:100, normal range: 85-115)	Percentile Rank	Age Equivalent (years:months)	Performance
Peabody Picture Vocabulary Test4	Receptive Vocabulary	76	5	12:7	Moderate impairment
Woodcock Reading Mastery Tests2	Word Identification	55	< 1	7:4	Severe impairment
	Word Attack	57	< 1	6:7	Severe impairment
	Passage Comprehension	56	< 1	7:10	Severe impairment
Test of Auditory Processing Skills3	Phonological Segmentation	-	-	4:10	Severe impairment
	Phonological Blending	-	-	7:4	Severe impairment
	Number Memory Forward	-	-	3:10	Severe impairment
	Number Memory Backward	-	-	6:0	Severe impairment
	Word Memory	-	-	5:0	Severe impairment
	Sentence Memory	-	-	5:7	Severe impairment
Australian Core Skills	Learning	-	-	-	2.01

Test	Skill/Subtest	Standard Score (mean:100, normal range: 85-115)	Percentile Rank	Age Equivalent (years:months)	Performance
Framework					2.02
	Reading	-	-	-	2.03 2.04
	Writing	-	-	-	1.05 1.06
	Oral Communication	-	-	-	3.07 3.08

Participant 2:

Test	Skill/Subtest	Standard Score (mean:100, normal range: 85-115)	Percentile Rank	Age Equivalent (years:months)	Performance
Peabody Picture Vocabulary Test4	Receptive Vocabulary	94	34	23:11	Average
Woodcock Reading Mastery Tests2	Word Identification	87	19	14:7	Borderline
	Word Attack	73	4	9:0	Severe impairment
	Passage Comprehension	90	25	15:1	Low average
Test of Auditory Processing Skills3	Phonological Segmentation	-	-	7:3	Severe impairment
	Phonological Blending	-	-	16:2	Moderate impairment
	Number Memory Forward	-	-	6:6	Severe impairment
	Number Memory Backward	-	-	10:1	Severe impairment
	Word Memory	-	-	7:7	Severe impairment
	Sentence Memory	-	-	10:1	Severe impairment
Australian Core Skills Framework	Learning	-	-	-	2.01 2.02
	Reading	-	-	-	3.03 3.04
	Writing	-	-	-	3.05 2.06
	Oral Communication	-	-	-	3.07 3.08

Participant 3:

Test	Skill/Subtest	Standard Score (mean:100, normal range: 85-115)	Percentile Rank	Age Equivalent (years:months)	Performance
Peabody Picture Vocabulary Test4	Receptive Vocabulary	92	30	20:11	Low average
Woodcock Reading Mastery Tests2	Word Identification	55	< 1	7:10	Severe impairment
	Word Attack	57	< 1	7:0	Severe impairment
	Passage Comprehension	56	< 1	7:10	Severe impairment
Test of Auditory Processing Skills3	Phonological Segmentation	-	-	7:3	Severe impairment
	Phonological Blending	-	-	7:11	Severe impairment

	Number Memory Forward	-	-	7:3	Severe impairment
	Number Memory Backward	-	-	9:2	Severe impairment
	Word Memory	-	-	6:3	Severe impairment
	Sentence Memory	-	-	6:0	Severe impairment
Australian Core Skills Framework	Learning	-	-	-	2.01 2.01
	Reading	-	-	-	2.03 2.04
	Writing	-	-	-	1.05 1.06
	Oral Communication	-	-	-	3.07 3.08

Participant 4:

Test	Skill/Subtest	Standard Score (mean:100, normal range: 85-115)	Percentile Rank	Age Equivalent (years:months)	Performance
Peabody Picture Vocabulary Test4	Receptive Vocabulary	89	23	18:11	Low average
Woodcock Reading Mastery Tests2	Word Identification	55	< 1	8:3	Severe impairment
	Word Attack	59	< 1	7:2	Severe impairment
	Passage Comprehension	62	1	8:9	Severe impairment
Test of Auditory Processing Skills3	Phonological Segmentation	-	-	6:7	Severe impairment
	Phonological Blending	-	-	9	Severe impairment
	Number Memory Forward	-	-	7:3	Severe impairment
	Number Memory Backward	-	-	7:6	Severe impairment
	Word Memory	-	-	6:3	Severe impairment
	Sentence Memory	-	-	8:6	Severe impairment
Australian Core Skills Framework	Learning	-	-	-	1.01 1.02
	Reading	-	-	-	1.03 1.04
	Writing	-	-	-	1.05 1.06
	Oral Communication	-	-	-	2.07 2.08

Participant 5:

Test	Skill/Subtest	Standard Score (mean:100, normal range: 85-115)	Percentile Rank	Age Equivalent (years:months)	Performance
Peabody Picture Vocabulary Test4	Receptive Vocabulary	96	39	>25	Average
Woodcock Reading Mastery Tests2	Word Identification	58	< 1	9:1	Severe impairment
	Word Attack	65	1	7:9	Severe impairment
	Passage Comprehension	77	6	11:9	Moderate impairment
Test of Auditory Processing Skills3	Phonological Segmentation	-	-	6:10	Severe impairment
	Phonological Blending	-	-	16:2	Severe impairment

	Number Memory Forward	-	-	9:2	Severe impairment
	Number Memory Backward	-	-	6:7	Severe impairment
	Word Memory	-	-	5:0	Severe impairment
	Sentence Memory	-	-	8:0	Severe impairment
Australian Core Skills Framework	Learning	-	-	-	1.01 1.02
	Reading	-	-	-	2.03 2.04
	Writing	-	-	-	2.05 1.06
	Oral Communication	-	-	-	3.07 3.08

The assessment results revealed significant impairment in phonemic processing for each of the participants. Four participants – 2, 3, 4, 5 – demonstrated receptive vocabulary within the normal range. One participant – participant 2 – demonstrated functional reading comprehension within the low average range and word identification in the borderline range. All other participants displayed skills in all three of the functional reading measures within the moderately impaired or severely impaired ranges.

These self-presenting learners each took up invitation to participate in the *Sound Systems* program.

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Stage 2

What Happened

Schedule and Overarching Plan

Following the assessment of the five participants, appointments were made with each in which to give them feedback about their results, and to outline the rationale and structure for the plan of intervention that they would undertake in the *Sound Systems* program. Participants were given opportunity to ask questions about their results and were given estimations of their prognoses and the time and effort required to make gain in literacy skills. Discussion also included information about the likely reasons they had each experienced these difficulties in acquiring literacy as part of their personal histories. These discussions particularly centred on the genetically-imbued bases of literacy skill and the variety of early experiences which contribute to its development, or impair its development.

This information was all shared in a way which laid no judgment upon the client – either as child or adult – the client's family, teachers or others. Rather, information was shared which actively honoured each individual in the challenges each had faced during his/her literacy journey. This allowed the client to understand that no matter what the circumstances of the past, it is never too late to work intentionally upon the development of literacy skill. It also permitted the giving of hope and aspiration through sharing a clear confidence that there is a known pathway, replete with scientific evidence (Hattie, 2008), by which to develop literacy, and that the steps of this pathway

would be undertaken based upon the results of the individualised assessment (Hempenstall, 2009) that each had just completed – thus "fitting programs into adults, not adults into programs" (Reder 2014).

Meetings between the client, tutor, literacy coordinator, and the speech pathologist were held once in every three weeks. On some occasions the state-wide senior literacy coordinator, an extra tutor or another LINC-based coordinator were also present. The purpose of the initial meeting was for setting each client's program, and then each three weeks thereafter for dynamically updating each client's program based upon their progress. Between these meetings the tutors and literacy coordinators met with the clients to ensure that three, hour-long, individually-focused interventions were accordingly delivered per week. The structure for the meetings with the speech pathologist was as follows:

- In the initial meeting the starting-point activities were demonstrated and directly taught to the clients. In doing this, the clients' individualised patterns of responding could be judged and adjusted for. This then supplied information to explicitly teach the tutor and Literacy Coordinator so they would be well-equipped to effectively deliver those interventions to the client and in a way which was sensitive to individual differences, in the ensuing three week interval.

- In subsequent meetings, the session started with demonstration by client and tutor of the tasks which had been set for them in the previous meeting. This allowed the speech pathologist to assess the client's progress in the target skills as well as to assess the accuracy of the tutor's administration of the task.

- Feedback was then given to each on what they were accomplishing well and how that had just been demonstrated. This allowed the speech pathologist to reinforce activities and progress that were proceeding well and to support both client and tutor to bring further reflection and metacognitive awareness to the tasks and the performance of them. This was delivered with positivity and energy in order to support the client's engagement, knowledge of achievement and aspiration, as well as to honour and support the tutor's willingness to voluntarily give of her time and to learn new skills.

- Instruction was then given to each participant on any aspect of the previously set tasks which had not made the expected progress or which needed trouble-shooting in any way. This included the speech pathologist demonstrating how to modify or troubleshoot the task.

- Verbal explanation was given by the speech pathologist of the tasks to be included in the sessions for the upcoming three weeks. These explanations were often supported visually by using diagrams and drawings to capture and illuminate key concepts. Selection of these tasks was based upon the progress demonstrated, integrated with understanding of the learning sequence.

- Demonstration was then made by the speech pathologist of any new tasks to be included in the sessions for the next three weeks. This included coaching of the tutor and/or Literacy Coordinator in their administration of the new tasks to the client – this was done to build and ensure both accuracy and consistency of administration of the critical learning tasks.

- Written summary of the tasks to be undertaken in the program until the next meeting three weeks hence.

- Each client had a total of five, 1-1½ hour intervention sessions with the speech pathologist – spread over 15 weeks.
- All of the above in an intentionally created atmosphere of humour, enjoyment, respect, and care of psycho-emotional fragility, balanced with encouragement and reinforcement with which to challenge the individual to try beyond what he thought he could accomplish; and all open to discussion and questioning about the goals for each meeting, as well as any other part of the program or area of concern for the client, the tutor or the literacy coordinator.

Participant 3 unfortunately, due to a change in housing circumstances, dropped out of the program after only two intervention sessions with the speech pathologist.

Activities Administered to Participants

All participants began their programs with activity to develop their awareness of and skill in manipulating the individual phonemes of words. Phoneme deletions activities were the first intervention for all of the participants. Other interventions were systematically introduced as the participants demonstrated that they were ready for the next level of challenge in the learning sequence. All of the interventions which were used in *Sound Systems* are detailed in Appendix C.

One of the Literacy Coordinators said this, which delightfully reflects the outcomes of a learning sequence which systematically builds from the phonemic base of literacy:

> "One thing that I heard myself saying to a colleague yesterday... I was reflecting on the journey that we've had [in the *Sound Systems* program]. I probably didn't expect that at the end of the project we would have three out of four people writing – lots! Writing *lots*! To be starting with a deletions activity (!)... well, I was thinking [at the beginning], what are we aiming for at the end of this? Are we aiming for reading or writing? And now these three people are writing a *whole* page. They would not have been able to do that before – and they're having a really good go and they're enjoying doing it. So they're writing! And they're reading! But mainly for the three that I'm talking about it's the writing that's at the heart – and they got there! Well, we've got Participant-5 – he's writing all the time."

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Stage 2 Results – Participant Data

Post-Program Participant Assessment Data

At the completion of the planned four-month intervention program, the participants' skills were reassessed – with the exception of receptive vocabulary. Receptive vocabulary was not reassessed because it was not reasonably expected that significant changes in this skill would be measurable in such a short time-frame of intervention. Over a longer time-frame, with the inclusion of new skills and thus regular reading in the participants' lives, it would indeed be anticipated that a change in receptive vocabulary would be measurable.

For ease of comparison, the table below records a summary of both the pre- and post-assessment data for each participant, including the ACSF data. The full post-assessment data for each participant's performance on the WRMT2 and the TAPS3 can be found in Appendix A.

Test	Subtest/Skill	Participant 1		Participant 2		Participant 4		Participant 5	
		pre	post	pre	post	pre	post	pre	post
Woodcock Reading Mastery Tests-2 Results given as standard scores	**Word Identification**	55	55	87	104*	55	63*	58	75*
	Word Attack	57	57	73	121*	59	82*	65	82*
	Passage Comprehension	56	60	90	106*	62	66	77	94*
Test of Auditory Processing Skills-3 Results given as age-equivalents: years:months	**Phonological Segmentation**	4:10	7:9	7:3	12:9	6:7	10:6	6:10	7:6
	Phonological Blending	7:4	8:3	16:2	>18:11	9	>18:11	16:2	>18:11
	Number Memory Forward	3:10	3:10	6:6	8:2	7:3	8:2	9:2	13
	Number Memory Backward	6:0	8:2	10:1	11:6	7:6	7:6	6:7	6:7
	Word Memory	5:0	4:0	7:7	7:7	6:3	9:7	5:0	7:7
	Sentence Memory	5:7	5:4	10:1	15	8:6	11	8:0	10:1
Australian Core Skills Framework	**Learning**	2.01 2.02	2.01 2.02	2.01 2.02	3.01 3.02	1.01 1.02	2.01 2.02	1.01 1.02	2.01 2.02
	Reading	2.03 2.04	2.03 2.04	3.03 3.04	3.03 3.04	1.03 1.04	2.03 2.04	2.03 2.04	2.03 2.04
	Writing	1.05 1.06	1.05 1.06	3.05 2.06	3.05 3.06	1.05 1.06	1.05 2.06	2.05 1.06	2.05 2.06
	Oral Communication	3.07 3.08	3.07 3.08	3.07 3.08	3.07 3.08	2.07 2.08	2.07 3.08	3.07 3.08	3.07 3.08

* Denotes statistically significant difference at 95% confidence level.

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Discussion of Participant Results, Learnings and Experiences

Gains were made by all participants, some more than others, and some in different areas to others. All participants presented with severely impaired skills in phonological blending and segmentation and with evidence of significant impairments in working memory. It would have been ideal to have included intervention for working memory as well as assessment and intervention for binocular functioning (eye tracking and convergence), but this was not possible in the scope of this action-research. These would be important considerations for a future project.

The activities set in the participants' programs particularly targeted phonological segmentation as the phonemic processing skill with the greatest potency to build the participants' awareness and manipulation of the phonemes – in preparation for direct integration of this skill and awareness into

their literacy knowledge. All of the participants independently expressed that they 'knew' this was the skill they needed. They stated that they 'knew' that understanding of the sound system was the skill they did not have. They stated that they 'knew' that this was the activity that they could not do when they were children at school, and that it still confused them. They all expressed relief and gratitude that this skill was to be tackled directly. They all expressed pleasure and pride in accomplishment as they began to succeed at it. This activity had high validity for each participant – on its face, in experience of it, and in the results accomplished.

As participants gained phonemic awareness, this new awareness and skill was directly and functionally integrated into reading, writing and spelling activities.

Participant 1

This participant made the smallest numeric gains of all the participants, but nevertheless experienced the program as successful. In her mid-thirties and with a moderate sensori-neural hearing impairment she stated that "when it got too hard at school, I'd just muck-up". She had attended a special school as a child but "hated school". She hated that her hearing impairment made her different and stated that she "never wore her hearing aids at school" and now "doesn't even have hearing aids". Her PPVT4 results were in the moderately-impaired range but informal interaction and conversation, suggested cognitive skills in the low average range. Ideally, there would have been opportunity to measure this but this was not possible within the scope of this project.

Participant 1's working relationship with her tutor was particularly close with strong foundations of trust. This was simultaneously strength and weakness for her progress in *Sound Systems*. It was strength when she was finding it difficult. She stated "Sometimes I was gonna give up – I thought it was getting too hard". When asked what kept her going, she responded "My tutor – she says to me 'you won't get in trouble'". It was weakness when at times it was not easy to determine with surety what proportion of specific *Sound Systems* work had been undertaken in each tutoring session. Participant 1 is the only participant who undertook none of her *Sound Systems* intervention with a Literacy Coordinator as well as her tutor.

Participant 1 was noted to change her physical appearance mid-way through the program – new hair colour and style, groomed eyebrows, make-up. Both she and her tutor put this change down to the new confidence which was arising from her success in the program. She also had her hearing re-assessed with a view to having modern hearing aids prescribed. This process was completed to the point of prescription, but Participant 1 didn't feel she was quite ready to start wearing hearing aids again. Her capacity to discriminate the phonemic roots of the literacy code can be expected to be greatly enhanced, if in time, she elects to once again use hearing aids regularly. Participant 1 also stated "I know I wouldn't have my driver's licence now if it wasn't for this [program]". And, "This is helping me know what to do to be able to help my kids with their reading and writing". She also shared that one of her friends had said to her "I can read your text messages easily now".

It can be seen from the assessment results that Participant 1 made the strongest gain in skills of phonological segmentation and phonological blending. These foundation skills, with ongoing practice and application, and with metacognitive support, can be expected to gradually drive further positive changes in both her literacy proficiency and in her life more widely as she has already begun to recognise and voice. During the post-program assessment, Participant 1 demonstrated significantly increased stamina and staying power in the application of processes to decode unknown words.

Participant 2

This participant made exceptional gains and experienced the program as highly successful. In her mid-thirties she presented with a sense of shame, anxiety and ready tears over her reading and spelling problems which she had been trying to hide from the notice of others all of her life. She avoided all reading and had never read a book; and she only wrote when she had to fill out forms, and then only with great embarrassment and anxiety about spelling. Her PPVT4 results – average – and informal interaction and conversation, suggested cognitive skills in the normal range.

This participant became excited at the prospect of learning how to understand the sound system of English, intuitively feeling that this was what she didn't 'get'. She questioned all the activities that were set and sought information on the rationale for all tasks. This was done primarily from desire to understand and metacognitively engage with her program, but was sometimes done in challenge when she couldn't see the logic of a task or when she felt that a task was too easy for her. She valued that her challenges could be responded to from a scientific base.

Participant 2 made exceptionally fast gains in this program. Once she had the 'key' to the phoneme-grapheme-based code she brought the full power of her intelligence and her knowledge of the world to the material that she read and wrote – using the code, once her barrier, as her new tool to wield with pleasure and mastery.

By the third intervention session with the speech pathologist, Participant 2 had read the first book of her life, was thrilled with her accomplishment, and had loved the content of the book. At this session she was also able to discuss her approach to unknown words and her use of metacognitive awareness to support herself to succeed at decoding these words. She stated "I am still running up to some words with some anxiety and so I'm still guessing at them". Metacognitive engagement was supported in the skills of steady approach, conscious choice for the application of her new tools and noticing how she used herself when she did this. In this session a dictionary app was introduced as she was asking for information about how to know how to pronounce words and find what they mean.

At the next session spelling lists were introduced for supporting independent, systematic practice of common spelling patterns. In this session she reported that she had read a second book in just two days – "Five hundred or so pages – in two days!" She had also been asked to write a journal on a daily basis and was complying with this. In the next session she asked if she was ready to be an independent learner and to continue her learning without such close program support. She felt that she was. She was.

At the final assessment session she stated "I've read about five books since I saw you last, the house looks like a bomb has hit it, I get the kids off to bed and then I just read – I don't even turn the telly on anymore. I get so excited about getting on the library website to put books on hold. Just the other night, I had like, an 'out of body experience' – I was seeing myself sitting at my computer just smiling and smiling and so excited because I was putting books on hold! Who would have thought that I'd be someone who would ever put books on hold!"

Participant 4

Participant 4 made strongest gains in his awareness of and ability to actively engage with the phonemic roots of the literacy code. This can be seen in his particularly strong changes in the skills of word attack, phonological segmentation and phonological blending. The acquisition of these skills, are expected, over time, to be drivers of his further engagement with literacy practices which will in turn continue to drive his literacy proficiency (Reder 2014).

In his mid-forties, of gentle demeanour, eager and with devoted application to practice and following given instruction, he said this of himself "I know very well that I am not stupid, and I can function well in the world, but I want to be able to understand what normal people can read and write like". His PPVT4 results – low average – and informal interaction and conversation, suggested cognitive skills in the normal range.

Participant 4 demonstrated particularly good metacognitive awareness and insight into his learning processes. Of the deletions activities in the TAPS3 pre-program assessment he said "It just doesn't seem like it [the deleted syllable or phoneme] wants to go anywhere when I take that wording away. Then it doesn't make any sense whatever. I just can't do it. It won't put the rest of the word back together". By the end of the program this confusion had yielded to clarity about, and mastery of, the phonemic structure of all words – he was able to sound them out phoneme-by-phoneme and fluently perform the most complex deletions.

Of the phoneme deletion activities presented in the first session of the intervention part of the program he commented "It gets your brain working doesn't it? It's like turning on an engine in there". In the second intervention session, with his good metacognitive skills he spoke up to set his own learning pace based upon his insight into his progress "I can feel that I am just keeping up with the work and don't want to make it go too fast – where I might lose it". This was intended as a positive comment about the experience of the practice striking incisively and supportively into his problem area.

By the end of the program Participant 4 was writing a daily journal. He had recognised that the key to mastery was ongoing engagement and active practice of the skills. He commented "I think my reading has come a long way in the last four months". It had.

Participant 5

Participant 5 made strong gains in reading skills as assessed by the WRMT2 and the phonological subskills of reading as assessed by the TAPS3 (with the exception of the Number Memory Backward task). Although these gains did not formally appear on the numeric data of the ACSF core skill of

reading, his Literacy Coordinator stated that he scored at a low level 2 on his pre-assessment, and at a high level 2 on his post-assessment. So whilst he did not progress from level 2 to level 3, progress against specific performance features at level 3 standard was also achieved – for example:

- he began to use writing as a tool for identifying issues and generating new ideas
- he began to attempt to spell unfamiliar words, using a range of strategies, including phonic and visual letter patterns, syllabification and word origin.

Both the Literacy Coordinator and Participant 5 stated their awareness of the significant functional gains made by Participant 5 over the course of *Sound Systems*.

In his early-fifties, with a talkative, playful, wise-cracking character, Participant 5 enjoyed the relationships and personal interaction that were embedded in the program methodology. His PPVT4 results – average – and informal interaction and conversation, suggested cognitive skills in the normal range. He complied with all set activities – in between stories of his lifetime of practical jokes – always seeking thorough explanations of the rationale for the activities that were presented. In the final intervention session it was suggested to him that his many stories become the topics of his daily writing. With his new skills for steadying himself and confidently approaching words – both in reading and writing – he began to do this, instantly producing pages and pages of enjoyable, original writing. In his case, once the key to the code was in place, he was able to direct the flow of his naturally abundant spoken language directly and engagingly onto the page. His Literacy Coordinator worded his success this way "he began to write hilarious anecdotes of his working life, amazing himself at his capacity to produce written material that others found entertaining to read".

It is especially important to note, of Participant 5, that he had been a regular, weekly attendee within the LINC adult literacy program for 14 months prior to the start of the *Sound Systems* program. In just four months of engagement with the *Sound Systems* methodology he made statistically significant changes in three areas of standardised measurement of reading skill – word identification, word attack and passage comprehension. This is a highly successful result in a very short time frame.

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Stage 2 Results – Learnings and Recommendations

Literacy Coordinators Learnings

The two Literacy Coordinators directly involved in *Sound Systems* were both fully engaged and eager for the opportunity to learn, expressing this in their comments and their responses. They each described that which unfolded, particularly the direct teaching of the phonemic basis of the literacy code and its explicit link to the graphemes, as the 'missing piece' in the adult literacy puzzle.

Further, the Literacy Coordinators identified that the configuration of that 'missing piece' also included the manner in which the teaching took place and the knowledge base surrounding that teaching. This included knowledge of the neurological and environmental bases of both function and impairment, understanding of the aetiology of learning disorders and their progression over time, as well as the neurophysiological bases of learning and the roles of positive relationship,

adaptive feedback and the use of a finely-graded hierarchical teaching sequence in order to create engagement and learning. They observed that respect, positive regard, enjoyment, playfulness and confident direction which gave hope and aspiration were all potent in the process.

It is certainly not that the Literacy Coordinators did not know that qualities such as respect and regard are essential in effective literacy teaching – they each displayed these qualities abundantly. What was identified was that such respect, integrated with the entire suite of the professional skills of the speech pathologist, supplied highly effective methodology and tools, which are not currently part of the adult literacy intervention systems. One of the Literacy Coordinators said this:

> "The speech pathologist's style of communicating was very different. It's not something I'd actually struck before in my working life. It was a different way... it was very specific and direct."

They recognised and stated, often, that the openness and honesty of directly addressing and discussing the presenting areas of deficit with the client was a new learning of high value. They also stated often that the phonemic and language knowledge, and communication skills and professional training which are stock-in-trade within the speech pathology profession, point towards speech pathologists having a centrally relevant place in the multidisciplinary team to increase the efficacy of adult literacy intervention. One of the Literacy coordinators said this:

> "The thing that really stood out to me is that using the deep knowledge of her area and the way it translates into literacy as the platform or base, [the speech pathologist] then had the capacity to genuinely engage with the individual on an honest and compassionate level. So that she was able to explain what it is the individual doesn't understand – and not confront them. Where as one of the things we are constantly dealing with in the adult literacy area is that we constantly pussyfoot around and avoid the real issues to try and make people feel good. But the speech pathologist could make them feel good genuinely because she was committed to knowing what it is they need to know, explaining it to them and then was able to go about putting in place the processes that enable them to build that knowledge. So I think that pussyfooting is a good expression, because I think that tutors feel that they have to do that a lot of the time. And I think the speech pathologist demonstrated to me that you actually don't. And she got results. People appreciate that, I think that it doesn't matter who you are, if you know you are getting honest advice based on knowledge, then... how can you not appreciate that?"

The results the Literacy Coordinators witnessed, took part in, and helped to bring about, and their positive evaluation of those results, are a match for the scientific research in teaching literacy (Camilli et al, 2003). Nothing was done in this study which hasn't been shown to be essential in the efficacious teaching of reading and writing in numerous studies (Hattie, 2010). This material is well-known within specialist fields and needs to become part of routine practice if adult literacy levels are to truly change in Tasmania, indeed Australia.

Other specific learnings of the Literacy Coordinators, together with recommendations and rationales for systematically bringing those learnings into their regular practice with clients are set out below. These recommendations are summarised, together with the Stage 1 recommendations, at the end of this document.

1. The high degree of speciality required to understand and teach the phoneme-grapheme code to lower-level and disadvantaged learners.

   Recommendation: That speech pathologists be employed to provide specialist consultative input to learners' individual programs and for the training, mentoring and support of Literacy Coordinators and tutors at a LINC-wide level.

2. How important it is to distinguish between sounds, letters and spelling patterns, to use consistent terminology which reinforces these distinctions, and to make sure that the distinctions are understood by the learner. One Literacy Coordinator said "I'm making the connection that to hear an individual sound within a word is so important to be able to decode – whether reading or writing. The learners hadn't made that connection. Neither had I! I didn't know it was in auditory processing – but that's what it is."

   Recommendation: Training in these distinctions becomes part of national accredited tutor training and professional learning for Literacy Coordinators. These trainings be regularly reviewed and refreshed for all tutors and Literacy Coordinators.

3. That there are a number of engaging and humorous anecdotes and techniques which can highlight these distinctions to the learner in enjoyable ways – such as writing a letter on the page and then listening to hear if the pen strokes then make any sound – 'you can't hear it, listen'. One Literacy Coordinator said "that was really good – a really important message".

   Recommendation: Training resources be developed to teach and model these techniques. Systematic trainings based on vimeo recordings of these techniques being used is one possibility. It is further recommended that a replication of Sound Systems be undertaken, with permissions in place to video-record all of the sessions, from which to draw-out examples of valuable teaching techniques in action, which can then be used to train tutors and Literacy Coordinators.

4. That deep trust was developed in the client when the client could understand that he was being supported from a strong knowledge-base, with compassion. One Literacy Coordinator said "they accepted that 'you need to do this'".

   Recommendation: Engagement of speech pathology personnel, and training, to establish this knowledge within regular LINC-wide adult literacy practice.

5. The resources used routinely by the speech pathologist were valuable, but they were difficult for tutors and Literacy Coordinators to organise and understand without extra support.

   Recommendation: A further project to develop resource packages in formats that can be easily accessed by Literacy Coordinators and tutors be undertaken. That this project also includes training in how to use those resources.

6. These new skills were learned much more completely by seeing them happen – one of the Literacy Coordinators often said "it's when I *saw* you do this", "when I *saw* him respond this way". It was recognised that there is failure to fully capture the richness of the gestalt of activity which is delivered through interaction and relationship when we write it down, but do not also see it happen.

   Recommendation: This learning and training need can be met through combinations of at-the-elbow support, coaching, mentoring and vimeo-based trainings.

7. That capturing explanations to the client by drawing the key concepts as the conversation was happening made difficult concepts clear for the client.

Recommendation: Techniques such as this one are stock-in-trade within the speech pathology profession. Engagement of speech pathologists within the LINC adult literacy programs will spread the use of communication-enhancing techniques such as this for the benefit of all staff and learners.

8. That actively naming up the respect the teacher has for the learner is important for establishing trust.

    Recommendation: That specific, evidence-based knowledge-building about the neurological bases of learners' personal literacy challenges become widespread and regular within the LINC adult literacy programs. Knowledge empowers; and thus accurate information – and confidence in using that information – most empoweringly gives rise to authentic and deep respect. Training, regular reviews and reflective professional learnings with the mentorship of a speech pathologist on the multidisciplinary team can bring this knowledge to the LINC teams and support its establishment within the LINC teams for the benefit of learners.

9. That observing the assessment provided a "real sense of what was going on". Observing a client's performance within the structure of an assessment always presents strong and systematic learning opportunity for those who will then work with that client.

    Recommendation: That the regular worker – Literacy coordinator, tutor, family member – who will deliver the intervention, has opportunity to sit in on assessments as a means of establishing a deep, shared understanding of the challenges and the beginning of trust and knowledgeable working relationship.

10. That the Four Keys to the English spelling system (Nevola, 2007) were a very valuable framework for Literacy Coordinators and tutors to better understand the logic of the written code. Understanding the logic in the opaque system that written English is, allows a teacher to explicitly teach this logic so that it becomes clear for the learner.

    Recommendation: That training in this system, which was explicitly requested by the Literacy Coordinators, be part of a future project for evaluation of its possible inclusion at a LINC-wide level.

The following learnings arise from the opportunities for personal mentoring which were created by the structure of the Sound Systems project. They all point toward a single recommendation, which is that:

Opportunity for mentoring and at-the-elbow modelling and support be included in future iterations of this project and its expansion to LINC-wide models of practice. Through the benefits of attentive, positive relationship, mentoring provides opportunity to learn and establish new skills thoroughly and rapidly. The need for establishment of a number of new skills within the Literacy Coordinators and tutors has been demonstrated by the Sound Systems project – mentoring is one of the most efficacious ways by which to achieve this.

11. One Literacy Coordinator said "I could see my confidence growing in how to support a learner with the sound segmenting".

12. One Literacy Coordinator said "I felt myself saying the same things [the speech pathologist] did – it gave me a script that I now feel comfortable in using. And [the learners] may have wanted to know 'why am I doing this – what will it lead it to?' – and I didn't know the

answer, because I was newly on board too and same with the tutor. I had lots of questions. With [the speech pathologist's] dialogue and the way in which she communicated that very clearly, it enabled me to support them.

13. One Literacy Coordinator said "Well, I think it's the way [the speech pathologist] imparted the knowledge to us, has made me feel honoured. Because really, it's been so valuable and I just feel I'm so much better at my job now."

14. One Literacy Coordinator said "The way in which [the speech pathologist] works with adults who struggle – it is such a strengths-based approach. It would give them such a strong feeling of achievement, even though they weren't necessarily making [big] achievements – [the achievements] were so slight – but not to give up. And, I've taken away that.

15. One Literacy Coordinator said "I have a confidence in having a conversation too, about what a learning disability is and what it isn't. [It's been positive] for them to go away thinking that it had nothing to do with them, that it was just the way they were born."

16. One Literacy Coordinator said "I saw that the engagement of the client was practical and with a sense of achievement. But engagement was really through conversation."

17. One Literacy Coordinator said "[I saw] the encouragement that [the speech pathologist] gave him... she told him what a good story writer-teller he is."

18. One Literacy Coordinator said "It seems to me that it is a little at odds with the adult learning principles that [are taught] in the tutor training, that this back-to-basics structured approach isn't what adults want – well no, they're quite fine with it, from what I can see. If you are bringing strong relationship factors, of enjoyment and respect, then actually you've got everything it takes for change to happen – to learn those skills. And it doesn't matter that it's drill."

19. One Literacy Coordinator said "Now I know what was missing. I'm not entirely confident in how I go about helping everybody yet, but I know what needs to be done now. I am *absolutely* sure that we are on the right track.

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Conclusion

It is concluded that the methodologies demonstrated in the *Sound Systems* program, arising as they do from a clear evidence-base, brought about success for all participants of the program. There was statistically significant success and 'felt' experience of success for the client-participants – both in their skills and in their engagement in literacy practice; and there was stated, positive and practice-altering learning success for the two Literacy Coordinators involved. It is concluded that the positive results of *Sound Systems* are a match with existing scientific evidence in teaching reading and writing to those who haven't been able to learn it at school. It is also concluded that there are many opportunities for further positive sampling and implementation of the *Sound Systems* methodologies within LINC Tasmania.

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Summary of Recommendations Arising from Stages 1 & 2 of *Sound Systems*

Recommendations have been made throughout this report, connected, by way of creating rationale, to the observations and learnings which gave rise to them. These recommendations are summarised below.

1. A second *Sound Systems* project be undertaken for uptake of further learnings, through replication, from within the LINC system – with a view to standardising the methodologies of *Sound Systems* and rolling out to LINCs state-wide.

2. A further project be undertaken to develop resources and training for LINC Literacy Coordinators to accompany *Sound Systems*. This would also include:
   a. Further training in the use of the resources which were introduced to Literacy Coordinators in the *Sound Systems* project.
   b. Collaborative development of clear systems for documentation and tracking documentation related to *Sound Systems*.
   c. Development of specific curriculum and training in the evidence-based interventions of phonemic awareness, language knowledge, orthographic knowledge, patterns of phoneme-grapheme relationships and metacognition.
   d. That speech pathologists have input into this curriculum and training development because they already have this knowledge and skill.
   e. Development of systems for the consistent implementation of evidence-based pathway planning.
   f. Development of training in the processes of reinforcement and the engaging delivery of skills drills.
   g. Development of training to embed understanding about the efficacy of intensity of input to stimulate learning – and to further embed this understanding in practice.
   h. Development of systems for combinations of at-the-elbow support, coaching, mentoring and vimeo-based trainings.

3. Speech pathologists be employed within the LINC adult literacy system to consult, guide and mentor the establishment of the *Sound Systems* process in conjunction with the state Senior Literacy Coordinator and become part of the specialist, multi-disciplinary team available to the Literacy Coordinators for training and mentoring in client assessment, intervention planning and trouble-shooting.

4. Tutor training be adjusted to include training of tutors in the methodologies and components of *Sound Systems* – that is, specific training in phonemic awareness as well as language structure, as part of basic training – ideally, this training should be delivered as part of the national, accredited VET training package. This should also include:
   a. Screening presenting volunteer tutors for phonemic awareness before they enter tutor training. Only those with phonemic awareness within the normal range be engaged as tutors.
   b. Those willing volunteers who do not have normal phonemic awareness be supported to undertake phonemic awareness intervention for themselves to support a general pro-literacy spreading of knowledge of the phonemic basis of literacy into the broader community.

c. Regular coaching from the Literacy Coordinators and from a speech pathologist.
   d. Training in systems to develop procedures for goal-setting and following remedial procedures set by the Literacy Coordinators and speech pathologists.
   e. Training in consistency of remedial terminology to use with learners.
   f. Training in the processes of positive relationship development.
   g. Training in the processes of effective, evidence-based reinforcement.
   h. Training in engaging delivery of skills drills.
   i. Exploring the implications for, and of, national adult literacy policy and strategies.

5. Consideration be given to a variation of the *Sound Systems* pilot which includes intervention for working memory as well as assessment of and intervention for binocular functioning.

6. Screening of the phonemic awareness of all adults who present for literacy intervention and support become part of the standard processes for adult literacy services.

7. Provision of specialist assessments, where indicated beyond screening, become part of the standard processes for adult literacy services.

8. A project to visually capture intervention techniques of particular importance via video recording for training purposes be developed.

9. Ongoing community awareness-raising and education – as is currently happening through channels such as the 26TEN initiative.

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Rosalie 'Rosie' Martin
Speech Pathologist

Appendix A

Full Pre- and Post-assessment ACSF data:

Sound Systems LSD Project Client ACSF Pre-Project Assessment Summaries:

Participant 1: Date: 15/7/2014

SKILL	SUPPORT (note level of support given during assessment)	NOTES	ACSF LEVEL (note both indicators)
Learning		Confidence improving. Did did not get flustered during assessment. No longer asks for regular reassurance but still has difficulty backing herself when decoding new words. Completes weekly homework.	2.01 2.02
Reading	Some prompting provided.	Reading not fluent. Comprehended assessment tasks provided but omitted and added in many small words. Had some difficulty sounding out unfamiliar and multi-syllable words.	2.03 2.04
Writing		Short, but well sequenced paragraph with poor syntax, many small words omitted and numerous spelling errors that interfered with meaning. Many examples of phonetic spelling (e.g. wood/would; simu/simmer) and poor sound symbol correspondence (sasue/sauce, heit/heat). Limited use of punctuation. Clear handwriting with mixture of upper and lower case used.	1.05 1.06
Oral Communication		Able to respond appropriately to questions and provide clear and detailed responses.	3.07 3.08

Participant 2: Date: 23/6/2014

SKILL	SUPPORT (note level of support given during assessment)	NOTES	ACSF LEVEL (note both indicators)
Learning		Self-referred, saw TV ads. Clear goals. Not confident in her own abilities. Has an understanding of the impact her literacy issues have had on her and initially very anxious when talking about her experiences.	2.01 2.02
Reading		Reading fluent. While expressing concern at her level of comprehension, client was able to provide a good summary of content. Unable to read sound for 'u' and 'i' when tested	3.03 3.04

		using *Toe by toe.*	
Writing		Clear and well-sequenced paragraphs. Mostly correct punctuation and grammar used. Some spelling errors in multi-syllable words that did not interfere with meaning.	3.05 2.06
Oral Communication		Articulate, providing detailed responses and asking relevant questions.	3.07 3.08

Participant 3: Date: 26/5/2014

SKILL	SUPPORT (note level of support given during assessment)	NOTES	ACSF LEVEL (note both indicators)
Learning		Also participating in SEE program when able. Recognises the importance of improving literacy and computer skills to regain employment.	2.01 2.02
Reading	Some prompting provided	Reading aloud generally fluent. Able to sound out most unfamiliar words and comprehend texts used. Further testing needed with higher level tasks.	2.03 2.04
Writing		Numerous spelling errors which interfered with meaning. Many examples of phonetic spelling (e.g. wood/ferst/nok) and some examples of poor sound/symbol correspondence (feast/fest for first/heve for heavy). Paragraph well sequenced but minimal punctuation used throughout. Wrote in capitals.	1.05 1.06
Oral Communication		Able to respond appropriately to questions and provide clear and detailed responses, digressing occasionally.	3.07 3.08

Participant 4: Date: 9/05/2014

SKILL	SUPPORT (note level of support given during assessment)	NOTES	ACSF LEVEL (note both indicators)
Learning		Willing to 'have a go' at attempting new tasks. Able to demonstrate some good learning strategies. Identified some achievable goals and pathways e.g Learners licence.	1.01 1.02
Reading		Reading slow and not fluent. Difficulty decoding unfamiliar words. Missed out some words, read others incorrectly or incompletely but able to comprehend tasks provided.	1.03 1.04
Writing		Poor sound/symbol correspondence. Some instances of phonetic spelling (e.g. gunkion for junction) and poor sound/symbol correspondence (e.g. fill instead of full). Extremely reluctant to write anything.	1.05 1.06
Oral Communication		Clear responses to questions but not much detail offered.	2.07 2.08

Participant 5: Date: 27/3/2014

SKILL	SUPPORT (note level of support given during	NOTES	ACSF LEVEL (note both indicators)

SKILL	SUPPORT (note level of support given during assessment)	NOTES	ACSF LEVEL (note both indicators)
		assessment)	
Learning		Now interested in undertaking a computer class.	1.01 1.02
Reading		Reading aloud not fluent. Able to comprehend tasks provided.	2.03 2.04
Writing		Detailed and well sequenced set of instructions. Instances of phonetic spelling (e.g. drecly/propelly) and poor sound symbol correspondence (spaner for spanner). Many occurrences of inappropriate punctuation use. Writing all in capitals. Limited proofreading of work.	2.05 1.06
Oral Communication		Clear and detailed responses to questions.	3.07 3.08

Sound Systems LSD Project Client ACSF Post-Project Assessment Summaries:

Participant 1: Date: 8/12/2014

SKILL	SUPPORT (note level of support given during assessment)	NOTES	ACSF LEVEL (note both indicators)
Learning		Motivated participant in Sound Systems LSD project. Confidence growing and no longer requires regular reassurance when completing tasks. Did not get flustered during assessment. Completes weekly homework.	2.01 2.02
Reading	Some prompting and advice provided.	Reading slow and not fluent. Mostly comprehended assessment tasks provided but did miss some detail. Omitted, added in and reversed many small words. Had some difficulty sounding out unfamiliar and multi-syllable words. Able to scan for information in linear text, but not in non-linear (poster)	2.03 2.04
Writing	Some prompting and advice provided.	Short paragraphs with poor syntax, word endings omitted, and numerous spelling errors that interfered with meaning. Many examples of phonetic spelling (e.g. diffrent, slad) and poor sound symbol correspondence (cutting/cutting, bandish/bandage). Limited use of punctuation. Clear handwriting with mixture of upper and lower case used.	1.05 1.06
Oral Communication		Able to respond appropriately to questions and provide clear responses.	3.07 3.08

Participant 2: Date: 8/12/2014

SKILL	SUPPORT (note level of support given during assessment)	NOTES	ACSF LEVEL (note both indicators)
Learning	Independent	Highly motivated participant in the Sound Systems learning disability project. Has developed a good understanding of the auditory processing problems that have contributed to her literacy issues and is now a confident, independent learner who believes she has acquired the skills to keep developing her literacy skills without attending tutoring. Enrolled in IT course in 2015.	3.01 3.02
Reading	Independent	Participating in Sounds Systems project has resulted in improved decoding of unfamiliar multi-syllable words	3.03

		through an awareness spelling patterns and sound/symbol correspondence. Able to scan and locate information.	3.04
Writing	Independent	Clear, thoughtful, well-structured and informative paragraphs. Correct punctuation, grammar and capitalisation used. Minor spelling errors in 2 multi-syllable words that did not interfere with meaning and which client was able to recognise.	3.05 3.06
Oral Communication	Independent	Articulate, providing detailed responses and asking relevant questions.	3.07 3.08

Participant 4: Date: 10/12/2014

SKILL	SUPPORT (note level of support given during assessment)	NOTES	ACSF LEVEL (note both indicators)
Learning		Recognises that he is responsible for his own learning. He is prepared to invest time outside of tutoring, and appears actively engaged with the Sound System project with Rosie Martin.	2.01 2.02
Reading		Is reading regularly. Signed up with LINC to borrow books. Evidence suggests that he uses a range of strategies to decode unfamiliar words. Comprehension & fluency of reading has improved using techniques practiced through Sound Systems project – repeated reading.	2.03 2.04
Writing	Some support required	Developing his sound/symbol correspondence skills, with some evidence of phonetic spelling 'skram for scram and arsks for asks'. Writes regularly & producing 1 to 2 paragraphs of stories read aloud by partner at home – applying own spelling techniques including dictionary use.	1.05 2.06
Oral Communication		Clear responses to questions – has gained confidence & appears to have extended his vocabulary.	2.07 3.08

Participant 5: Date: 10/12/2014

SKILL	SUPPORT (note level of support given during assessment)	NOTES	ACSF LEVEL (note both indicators)
Learning		Committed participant in Sound Systems learning disability project. Aims to take a computer class in 2015 and now acknowledges IT skills are needed to re-enter employment. Is now willing to do some homework and is writing anecdotes about his working life.	2.01 2.02
Reading	Some prompting provided	Reading mostly fluent but many small words were omitted and reversed or replaced with another similar word. Able to comprehend tasks provided. Had difficulty decoding some multi-syllable words but quickly learnt these.	2.03 2.04
Writing	Some prompting provided	Clear, well sequenced and entertaining written passages. Some instances of phonetic spelling (e.g. yeld/laught) and poor sound symbol correspondence (leakish/leakage, serged/searched). Mostly correct punctuation. Capitals used throughout. Some evidence of proofreading.	2.05 2.06
Oral Communication		Clear and detailed responses to questions.	3.07 3.08

Full post-assessment data for WRMT2 and TAPS3 – including ACSF post-assessment numeric data

Participant 1:

Test	Skill/Subtest	Standard Score (mean:100, normal range: 85-115)	Percentile Rank	Age Equivalent (years:months)	Performance
Woodcock Reading Mastery Tests2	Word Identification	55	< 1	7:8	Severe impairment
	Word Attack	57	< 1	7:2	Severe impairment
	Passage Comprehension	60	< 1	8:5	Severe impairment
Test of Auditory Processing Skills3	Phonological Segmentation	-	-	7:9	Severe impairment
	Phonological Blending	-	-	8:3	Severe impairment
	Number Memory Forward	-	-	3:10	Severe impairment
	Number Memory Backward	-	-	8:2	Severe impairment
	Word Memory	-	-	4:0	Severe impairment
	Sentence Memory	-	-	5:4	Severe impairment
Australian Core Skills Framework	Learning	-	-	-	2.01 2.02
	Reading	-	-	-	2.03 2.04
	Writing	-	-	-	1.05 1.06
	Oral Communication	-	-	-	3.07 3.08

Participant 2:

Test	Skill/Subtest	Standard Score (mean:100, normal range: 85-115)	Percentile Rank	Age Equivalent (years:months)	Performance
Woodcock Reading Mastery Tests2	Word Identification	104	61	>19:0	Average
	Word Attack	121	92	>19:0	High average
	Passage Comprehension	106	66	>19:0	Average
Test of Auditory Processing Skills3	Phonological Segmentation	-	-	12:9	Moderate impairment
	Phonological Blending	-	-	>18:11	Average

				8:2	Severe impairment
	Number Memory Forward	-	-	8:2	Severe impairment
	Number Memory Backward	-	-	11:6	Moderate impairment
	Word Memory	-	-	7:7	Severe impairment
	Sentence Memory	-	-	15:0	Mild impairment
Australian Core Skills Framework	Learning	-	-	-	3.01 3.02
	Reading	-	-	-	3.03 3.04
	Writing	-	-	-	3.05 3.06
	Oral Communication	-	-	-	3.07 3.08

Participant 4:

Test	Skill/Subtest	Standard Score (mean:100, normal range: 85-115)	Percentile Rank	Age Equivalent (years:months)	Performance
Woodcock Reading Mastery Tests2	Word Identification	63	1	9:11	Severe impairment
	Word Attack	82	11	10:0	Mild impairment
	Passage Comprehension	66	1	9:6	Severe impairment
Test of Auditory Processing Skills3	Phonological Segmentation	-	-	10:6	Mild impairment
	Phonological Blending	-	-	>18:11	Average
	Number Memory Forward	-	-	8:2	Severe impairment
	Number Memory Backward	-	-	7:6	Severe impairment
	Word Memory	-	-	9:7	Severe impairment
	Sentence Memory	-	-	11	Severe impairment
Australian Core Skills Framework	Learning	-	-	-	2.01 2.02
	Reading	-	-	-	2.03 2.04
	Writing	-	-	-	1.05 2.06
	Oral Communication	-	-	-	2.07 3.08

Participant 5:

Test	Skill/Subtest	Standard Score (mean:100, normal range: 85-115)	Percentile Rank	Age Equivalent (years:months)	Performance
Woodcock Reading Mastery Tests2	Word Identification	75	5	11:10	Moderate impairment
	Word Attack	82	11	10:0	Mild impairment
	Passage Comprehension	94	34	16:8	Average
Test of Auditory Processing Skills3	Phonological Segmentation	-	-	7:6	Severe impairment
	Phonological Blending	-	-	>18:11	Average
	Number Memory Forward	-	-	13	Moderate impairment
	Number Memory Backward	-	-	6:7	Severe impairment

	Word Memory	-	-	7:7	Severe impairment
	Sentence Memory	-	-	10:1	Severe impairment
Australian Core Skills Framework	Learning	-	-	-	2.01 2.02
	Reading	-	-	-	2.03 2.04
	Writing	-	-	-	2.05 2.06
	Oral Communication	-	-	-	3.07 3.08

Appendix B

Skills Assessed by each of the Tests and Subtests

Peabody Picture Vocabulary Test – Version 4

The Peabody Picture Vocabulary Test (PPVT4) is a standardised test of receptive vocabulary. This means that it assesses the words that learners *know*. Receptive vocabulary is strongly correlated with academic outcomes. In this test participants did not have to retrieve or say the words, but only point to one picture from an array of four pictures. After listening to the test word, participants then selected the picture that matched that word, if it was known. The PPVT4 scores are reported such that scores of 85 - 115 define the "normal range", with 100 being average.

Woodcock Reading Mastery Tests – Version 2

Three subtests of the Woodcock Reading Mastery Tests – Version 2 were administered to participants:

WORD IDENTIFICATION: This subtest examines a learner's ability to read and pronounce a list of words. It is a measure of sight-word vocabulary.

WORD ATTACK: This subtest examines a learner's ability to decode nonsense words (words that are unfamiliar at first sight) without the aid of contextual clues.

PASSAGE COMPREHENSION: This subtest examines a learner's ability to identify words missing from a text. This requires simultaneous understanding of both grammatical structure and passage meaning in the written text.

Test of Auditory Processing – Version 3

Skills assessed by the subtests of the Test of Auditory Processing – Version 3:

PHONOLOGICAL PROCESSING

PHONOLOGICAL SEGMENTATION: This subtest is designed to determine how well a student can manipulate compound words, syllables and phonemes within words eg say "cowboy". Now say it without "boy".

PHONOLOGICAL BLENDING: This subtest is designed to determine how well the student can synthesise a word given the individual phonemes eg I'm going to say some sounds. When I'm finished you say the word that the sounds make - s/a/t.

Number Memory Forward: This subtest is designed to show how well the student can retain simple sequences of auditory information. It is an indication of a student's immediate short term auditory memory capacity. Number sequences of increasing length are read to the student who is asked to repeat them.

Number Memory Reversed: This subtest is designed to show how well the student can retain and manipulate simple sequences of auditory information. It is an indication of a student's auditory working memory capacity. As in the previous subtest number sequences of increasing length are read to the student who is asked to repeat them in *reversed* order.

Word Memory: This subtest is designed to show how well the student can retain simple sequences of auditory information. It is an indication of a student's short term auditory memory capacity. Word sequences of increasing length are read to the student who repeats them.

Sentence Memory: This subtest is designed to show how well the student can retain details in sentences of increasing length and grammatical complexity. Sentence memory allows the student to utilise the words within the sentence as cues to recall.

Australian Core Skills Framework

Information about the ACSF performance measurement can be found at this link:

http://www.industry.gov.au/skills/ForTrainingProviders/AustralianCoreSkillsFramework/Documents/ACSF_Document.pdf

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Appendix C

Descriptions of therapy activities

Phonological awareness instruction: This refers to instruction which develops an individual's ability to identify the sound components of speech as distinct from the meaning contained within that speech. An example of one such activity – a phoneme deletion activity – which was used to do this with each of the participants in *Sound Systems* is as follows:

Tutor: Say 'farm'

Participant: 'farm'

Tutor: Now say 'farm', but don't say '/f/'.

To successfully do this one must be able to feel and hear that the /f/ is a distinct and individual sound within the word 'farm' and that it can manipulated independently of the rest of the word. The participants either were not able to do this at the beginning of the program, or found it difficult to do. Experiential instructional activities and practice enabled the development of this skill – and then its use as a foundation upon which to build further skills to manipulate sounds within words.

Synthetic phonics instruction: This refers to instruction in which the learner is specifically taught to synthesise, or link, the individual sounds (phonemes) of English with letters and/or letter combinations. This synthesised knowledge, as it becomes established, is then the basis to further

synthesise (or blend) phonemes together to identify a word – along with the reverse process which is to segment the phonemes away from each other in order to learn to spell a word.

Drills to practice these links were delivered in engaging ways using letter cards and written letters and words.

Decoding of non-words: Decoding non-words which are constructed to follow the rules of English spelling, provided opportunity for the participants to practise using new skills in synthesising sounds. For example, if presented with a word like 'mot', one cannot possibly know it by remembering what it looks like, because one would never have seen it before – but such a 'word' permits opportunity to practise identifying and synthesising the sounds associated with each letter. And these are skills which need to be automatised in order to approach real words that the learner may encounter in print.

Reading fluency intervention: Timed repeated reading of passages of text was included in participants' programs. This gave experience at feeling the flow of fluent reading as well as identifying troublesome words with characteristics which required further exploration and direct teaching.

Daily writing: Any skill, if it is to improve, must be practised. The more intensively and intentionally it is practised, with guidance and feedback, the more rapid the progress. Participants' progress was greatly enhanced through encouragement and support to write on a daily basis. Topics which engage reflection and special interest can be particularly motivating. The quality of the respectful working relationship and knowing that one's writing will be read and its content kindly responded to in interaction, provided further motivation to write.

Systematic intervention for spelling: Spelling intervention was undertaken using a systematic hierarchy of English spelling difficulty, examples drawn from daily writing, and enquiries arising directly from participants' self-directed interest were used.

Punctuation and morphology: Spellings, word derivations and word knowledge based in the language morphology (grammar) were drawn from daily writing samples and taught directly. Similarly, punctuation and the meaning it specifies was directly taught.

Stimulation of metacognition (thinking about thinking): Metacognition refers to awareness and understanding of and insight into one's own thought processes. Enhancing knowledge about thinking can engage further motivation as well as provide tools to self-regulate that engagement. Participants were supported to notice when an error was made, when they self-corrected, when they solved a problem they would previously have found difficult, and to notice their level of calm, or otherwise, as they engaged with these tasks. This was initially given as externally applied feedback which gradually shifted to self-awareness for comment and discussion.

Vocabulary knowledge: The importance of growing new vocabulary and becoming curious about words was emphasised with all participants from the start of the program and in every task and every interaction. This was done through discussion, play and direct teaching.

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