Expanding expression - expanding cognition: An investigation

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Introduction

It has long been recognised that the quality and quantity of a child's capacity to orally express on entry to school at 5 years of age is a strong predictor of the child's general learning pathway and transition into print. In low socio-economic schools in particular, a deep-seated concern for many teachers is that some or a majority of the children entering school at age 5 are under-resourced in overall communicative competency, and especially under-resourced in English. Both limit their capacity to fully engage in learning processes and contexts, presenting considerable challenges in terms of literacy acquisition.

Numerous initiatives have been undertaken in New Zealand (e.g. Phillips et al., 2002; Robinson & Timperley, 2004; Timperley et al., 2003), and internationally (e.g. Ackers & Hardman, 2001; Alexander, 2003; Applebee, 1994; Damhuis et al., 2004), in an endeavour to address the English and language gaps of 5- and 6-year-old children in low socio-economic schools – with varying success. Some initiatives have focused on intervention programmes designed specifically to address the gaps or weaknesses of the child; others have focused on the pedagogical approaches teachers might adopt, in recognition of the highly influential effect of teachers on learner outcomes.

In almost all cases, however, initiatives have been orientated towards literacy, rather than towards the child's expressive capacity and vocabulary resources underpinning literacy competency in English. To date, the persistent 'long tail' of learning disadvantage in core learning areas of children who enter school minimally resourced in expressive language and conceptual understandings has yet to be satisfactorily addressed.

From research over the last two decades, much is known about the environmental and interactional conditions that optimally support language acquisition and use (e.g. Adams et al., 1996; Christie & Martin, 2007; Ellis, N. C., 2005; Ellis, R., 1990; Hoff, 2006; van Lier, 1998, 2004). The fields of cognitive psychology, first and second language acquisition, applied linguistics, child development, and neuroscience, for example, have all contributed to currently

available insights into the language acquisition of young children. While the emerging picture is complex (as are language and learning), this paper posits that by conflating the available evidence into a set of underlying principles and understandings about language acquisition, and by critically examining whether the classroom environment optimally supports these, we may be able to identify what is likely to make the greatest difference to the language and cognitive acquisition of 5- and 6-year-old children who are under-resourced expressively.

What follows is a brief consideration of supporting research evidence, an outline of the study, and a discussion of some insights gained from the study to date. The study sets out to investigate:

- current environmental conditions and pedagogy operating in four Year 1-2 classrooms in four low socio economic schools
- how closely these align with a set of identified underlying principles and understandings about language acquisition
- whether, by teachers changing some fundamental practices, the language and cognitive acquisition trajectories of the children in these classrooms also fundamentally changes.

The study is work-in-progress; however, significant issues and implications have already become evident.

Some research background

While genetic factors cannot be ignored, variability in children's language acquisition and expression is to a great extent the result of the quality and quantity of environmental language input and output (Bronfenbrenner, 2005; Hoff, 2003, 2005, 2006; Huttenlocher et al., 2002; van Lier, 2004; Vygotsky, 1978). Outside of home and family, the effectiveness of environmental learning conditions in mainstream classrooms has the greatest potential to provide the interactional and discourse optimal conditions that under-resourced children need to exponentially expand their English language expressive and cognitive capacities.

Teachers realise that where the child cannot or does not engage with fullness of expression at school and in the classroom, this is a matter of some concern. A child with effective oral language to express his/her thinking and meaning, and with an

extensive vocabulary base orally, is advantaged in terms of early years' education. Higher levels of verbal competency correlate with increased levels of participation in learning and increased levels of cognition (Adams et al., 1996; Green, 1995; McNeil, 1959). The extent of a child's vocabulary knowledge and his/her expressive experiences and oral capacity are strong predictors of successful transition into print, both as a reader (e.g. Clay, 1998; Lonigan et al., 2000; Richgels, 2004; Scarborough, 2001; Snow et al., 1998; Strickland, 2002) and as an emerging writer.

In a small study of language development of 5- and 6-year-olds in American schools, Huttenlocher et al. (1998) found that vocabulary size and syntactic development were highly related. Low-income children used less than two-thirds the number of different vocabulary items of middle-income children, and less than 10 percent of their speech was complex utterances, compared with over 25 percent for middle-income children. The apparent relationship between a child's vocabulary resources and complexity of expression was a significant finding in this study.

On promoting vocabulary and comprehension in the primary grades, Moses (2005:1) reported that 'children from the lowest vocabulary quartile at the end of second grade are already two or more grade levels behind average children in vocabulary…. [and] at risk of never catching up to their peers'. On average, children from low socio-economic communities entered school with a receptive and expressive vocabulary of less than half the number of words of children from socio-economically advantaged communities, who generally entered school with a working vocabulary of 6000 or more words, and with well-established and age-appropriate language resources to understand and express meaning orally (Hart & Risley, 1995, 2003; Moses, 2005; White et al., 1990).

Theoretically, this research study is seated within a framework of socio-cultural theory,[1] based on the work of Vygotsky and other sociocultural theorists, including Bronfenbrennner (2005). He proposed that the 'form, power, content and direction ….that affect development (and learning) vary systematically as a joint function of the…developing person and the environment (both immediate and remote)…' (2005:178). In the words of Haugen (1972:325), 'Language exists only in

[1] e.g. Vygotsky, Leontiev, Luria, Wertsch, Rogoff, Bronfenbrennner.

the minds of its users, and it only functions in relating these users to one another…'. Vygotsky (1934/1962:125) differentiated between two planes of speech – 'the inner, meaningful, semantic aspect… (the intraspsychological plane) and the external, phonetic aspect (the interpsychological plane)'. It is primarily through the process of externalisation – 'saying' – that insights can be gained and expression can be made about the inner processes of thought and language. Conversely, it is the externalisation of inner processes in the form of speech that has the potential to expand (transform) a person's inner meaning-making capacities, cognitively and linguistically.

Grappling with the complex notion of language acquisition and use as primarily an ecological and social process is not simple. This study sets out to investigate one component of this complexity: the identified vocabulary and expressive gap of children on entry to school as 5-year-olds in the classroom environment where children spend significant amounts of time daily.

Research evidence across numbers of disciplines and fields points towards a set of commonly agreed upon underlying principles or elements that are contributory to optimising language and cognitive acquisition and expansion. These can broadly be divided into two aspects, linguistic and interactional. The interactional aspect is highly influential on whether optimised conditions for linguistic acquisition and cognitive expansion can or do occur. However, in themselves, optimised interactional conditions may not result in optimised language acquisition and expansion (Alexander, 2003; Ellis, N. C. 2005; Hardman, 2009; Mercer & Littleton, 2007). Optimised interactional and optimised language acquisition conditions are in partnership. The first impacts primarily on the quantity of language expression by students and teacher. Yet saying is not enough (van Lier, 2004). Explicit attention to the linguistic quality of utterances (Ellis, N. C. 2005; Ellis, R, 2002; van Lier, 2004), of both the teacher and the students, appears to make the critical difference as to whether linguistic expression in the classroom will result in optimised language acquisition and expansion by students.

Hoff's (2006) review of evidence[2] from first language acquisition research identified key factors affecting young children's acquisition of language. These

[2] See also Bloom, 1993; Bornstein, Haynes & Painter, 1998; Ellis, 2006; Hoff, 2006; Huttenlocher et al., 1998

included: (a) the mutual engagement of child and prime caregiver, where replies to children's verbalisations are responsive, frequent and contingent upon the child's utterances; (b) talk that elicits conversation from the child, this being a predictor of grammatical development; (c) the total quantity of speech addressed to a child being related to general measures of cognitive and linguistic development – more speech enhances the language development by the child; (d) frequency and in-built redundancy, recasts and expansion, in combination, being positive predictors of grammatical development, accounting for between 18-40 percent of variance among children; (e) children who hear longer utterances in input being more advanced in syntactic development; (f) quantity of speech – the more speech heard and produced by a child, the greater their vocabulary resources. What is often termed elaborative style discourse is a feature of child-caregiver interactions with children who have fullness of expression linguistically and cognitively.

Second language acquisition research similarly supports the view that elaborated speech and elaborated modification, implicit and explicit, matter for effective language acquisition (e.g. Ellis, R. 2002, 2006; Ellis & Barkhuzen, 2005; Gass, 1997, 2003; Halliday. 1985; Robinson & Ellis, N.C. 2008). Linguistic expansion shapes more complex oral and written text, a feature of linguistically enhanced expression (Halliday, 1985). School-based texts are typically literate-like, linguistically complex in clause structure, that is, elaborative style expressions. The child who has fullness of expression linguistically, as a result of elaborative style discourse opportunities, is advantaged in managing classroom exchanges and discourse (Schleppegrell, 2001).[3] 'Variation in [vocabulary and grammatical] acquisition must [primarily] have its origins ….in the nature of talk to [and with] the child' (Marchman & Thal, 2005:149).

The study

The core underlying linguistic and cognitive principles and conditions identified from cross-disciplinary research evidence have been summarised into three considerations: attention to the teacher's utterances and expressions; attention to the students' linguistic utterances and expressions; and the operating interactional patterns that are

[3] See also Eggins, 1994; Halliday & Hasan, 1989; Martin, 1992; Michaels & Collins, 1984; Torrance & Olson, 1984.

optimally supportive to the first two (Figure 1). Each set of identified principles, and each item within each set, is in co-relationship, each one affecting and interwoven with the others.

***Linguistic attention:* teacher**

- linguistically and cognitively enhanced input
- frequent output opportunities
- fullness of expression
- recycling and redundancy
- focus on form and focus on meaning
- degree of salience
  - less salient - greater explicitness needed
- meaningful feedback
- noticing and engagement
- meaningful contexts - utterances
- vocabulary - implicit and explicit attention

Figure 1:
Underlying linguistic, cognitive and environmental principles and conditions

***Linguistic attention:* students**

- extended think and prepare to say time
- initiating and sustaining expression
  - fullness – interactional - dialogic
- responsive to other's expressions
- increased control of topic and the way
- seeking to know and express more
- expanded expression
  - guided - spontaneous
- expressing dialogically and monologically
- relevant and meaningful expression

Supportive environmental conditions
teacher and students:

- taking turns
- teacher relinquishing control of topic and the way
- explicit elaborative style expression
- conversation and dialogic exchanges
- minimising low-level cognitive questions and dominance of IRE response patterns
- minimising hands-up student responses
- increased dialogic exchanges, spontaneous expression, participation
- increased think and wait time
- scaffolded classroom activity structures
- increased communicative - interactional opportunities
- varied class formats for shared expression
- joint construction

Two methodological approaches, linguistic analysis and classroom interactional analysis, have been selected to illuminate how classroom conditions (Figure 1) affect the quality and quantity of students' language acquisition and use in the context of classroom (Alton-Lee et al., 2000; Christie & Unsworth, 2000; Halliday, 1977; Halliday & Matthiessen, 1999; Nuthall, 2004; Unsworth, 2000). Making connections between the interactional patterns and the quality and quantity of linguistic expression of case study students and their teacher endeavours to identify whether the classroom offers optimal conditions for language acquisition.

The study's structure

Four Year 1 and 2 classrooms in four different low socio-economic primary schools in Auckland, New Zealand, are involved in the study. The participants are 5- and 6-year-old students (12 of whom are case study students), and their teachers. The teachers have at least three years teaching experience and are permanent appointees in their schools. No further teacher attributes are specified.

The selected classes are ethnically diverse, the largest ethnic groups in these communities being Pasifika and Maori. Many of the children in the classes have languages other than English as the dominant home/family languages of communication, although many may be New Zealand born. All have attended school for at least three months (one term), and they range in age from 5.5 years to 7.0 years old. Ethnicity, and the languages other than English used in the home, are features which are not a focus of the study.

There are four basic phases in the study. The first and last phases are wrapped around an intervention of five workshops with the study teachers, and there is also an implementation phase of one school term. Pre- and post-intervention data gathering (phases 1 and 4) includes: (a) assessment of all students, in order to select three case study students from each of the four classes – thus, 12 case study students in all; (b) vocabulary assessment and oral text production information about each of the case study students (video recorded); and (c) 30-minute video recordings of three 'typical' lessons in each of the four classrooms on three different days in one week.

Additionally, the four teachers are interviewed about matters related to language acquisition and use in the classroom.

The intervention of five workshops is designed to offer the teachers understandings about the identified principles and conditions, and how to implement these in day-to-day classroom practice. Following each workshop, teachers trial the workshop focus and report back on what has occurred, they being regarded as co-researchers rather than research 'subjects' (Mills, 2000).

Each videoed lesson of 30 minutes' duration involves four video cameras – one camera trained on each of the three case study students, and one on the teacher as she engages with the class. Thus, in each classroom, four sets of 30-minute observational data are obtained each videoed lesson in a set of three lessons, pre- and post-intervention. This rich data offers the potential to gain deep insights into the reality of classroom and environmental factors affecting students' language acquisition.

It is hypothesised that even with quite limited training, when teachers implement the identified principles and conditions with focus and attention, noticeable changes in the quality and quantity of students' oral expression will become evident.

Data analysis

The pre- and post-intervention case study student data triangulates three sets of analysis information for each child: (i) vocabulary level as measured by the British Picture Vocabulary Scale II (Dunn et al., 1997); (ii) oral expression competency, analysed at below and above clause level [the lexico-grammar level of text] (Halliday, 1977; Halliday & Matthiessen, 1999; Matthiessen, 2001); and (iii) classroom expression and interaction during three class lessons, analysed using a linguistic and interactional coding scheme.[4]

Human behaviour analysis software (Observer XT 8.0, Noldus, 2007) is being used to analyse videoed lessons. Each case study student can be coded and compared against self and other at any one instant and across time, pre- and post-intervention.

[4] Loosely based on Communicative Orientation of Language Teaching (COLT) – Spada & Frohlich, 1995.

The teacher's interactional and discourse ways of operating, and how this influences child expression at any moment and in terms of long-term acquisition, become evident.

Pre-intervention data gathering has been completed. The intervention workshops have been conducted, study teachers are currently implementing in their classrooms, and video analysis of pre-intervention data has begun. Some significant insights directly related to the research questions are already evident. The discussion below is confined to the students only.

The students - insights and implications

Class assessment of students' communicative competency

The selection of the randomly selected case study students involved the class teacher making judgements about each student using a checklist [CombiList] (Damhuis et al., 2004) of 16 criteria related to the child's communication in class. Each child was simply rated Y (yes), S (sometimes), and N (no) based on the teacher's cumulative knowledge of the child after at least one term at school. Individual child assessments took no more than ten minutes, from which a whole class profile could be also be derived. Assessment using the CombiList early on in a child's schooling offers a valuable reflective and selective tool for teachers. Whether children can and do communicate effectively in the class, whether opportunities to do so are optimally available, and how these might become so, are some important teacher considerations, as suggested by Damhuis et al. (2004).

The teachers in the study found the CombiList simple to understand and use, minimally time-demanding, and insightful. It gave them specificity, as well an overall 'best fit' general trend, about each child, and about the class as a whole. In all four classrooms, most students were 'best fit' S or N, with very few Y, serving as an alert to the extent of the students' communicative competency, and how they as teachers might go about developing this in the context of classroom.

Case study students' communicative competency

One student from each Y, S, and N category in each class was randomly selected as a case study student – thus, four students each of Y, S, and N, 12 case study students in all. Pre-intervention assessments of each child included an assessment of vocabulary and three oral production texts generated from two student-selected photos and a retell of a sequential text – firstly the child's retell based on the text visuals only, and a second retell after listening to an oral text while viewing the visuals.

Vocabulary

As measured by the British Picture Vocabulary Scale II, nine students aged between 5.03 and 6.03 years had vocabulary age equivalents of between 3.03 and 4.11 years. Of the three remaining students, two were close to but below their expected age level in vocabulary, while one student stood out as well above. The considerable gap in vocabulary competency of the majority of students, compared with age expected levels, is of enormous concern, vocabulary being at the heart of a child's capacity to communicate.

Currently, there is limited knowledge of Year 1 and 2 students' vocabulary competency, based largely on observational/anecdotal information gathering and/or varying school entry assessments in Year 1, and from the six-year observational survey (Clay, 2005), which records the child's self-generated oral and writing vocabulary, word recognition of high frequency vocabulary items, and phonological knowledge.

The vocabulary pre-intervention assessment results of this study suggest we would do well to use a consistent, highly reliable and valid vocabulary assessment tool, such as the British Picture Vocabulary Scale II, to measure the English vocabulary of students in low socio-economic schools as early as possible after entry to school at age 5, possibly around age 5.3 years. This would offer timely insights into the child's vocabulary resources. More precise knowledge would alert the class teacher to the vocabulary acquisition needs of the child soon after school entry at 5 years of age. Explicit attention to the depth and breadth of students' vocabulary acquisition is undoubtedly an urgent pedagogical matter to address in low socio-economic schools and classrooms.

Students' oral text production

While not fully analysed linguistically at this point, transcriptions of oral texts produced by each case study student show significant trends. All 12 students produced dominantly syntactically simple text utterances, exhibited significant vocabulary limitations, and generally lacked fluency to produce logically connected ideas. Much of the time, finger pointing and prompting was needed to 'draw out' minimally sustained and fluent texts. The stand-out exception was the above-age vocabulary level child. Based on transcripts alone, 11 of the students appear to have an oral text competency level in English well below expected age-equivalent levels. They lack fluency in elaborative style expression in English, hugely affected by their limited vocabulary resources and syntactical competency.

If we are to gain informed insights into the expressive capacities of Year 1-2 students in low-socio-economic schools, we need to go well beyond the limited oral text assessment information that is gathered on entry and at 6 years of age. More extensive oral text gathering and informed deep-level analysis would provide timely and needed information about each child's expressive resources. This should then act as a key pedagogical point of departure on which classroom teaching and learning is based.

Such assessments need not be time-consuming. The oral text production battery of assessments in this study took on average no more than 20 minutes, and transcriptions no more than 30 minutes. Thus, with minimal investment of time and effort, teachers can gain valuable insights into each child's oral text expression, as long as they have minimal core of grammatical knowledge.

Classroom text production

Pre-intervention videoed footage of case study students' oral expression and interactions during three class lessons in the four classrooms in this study, at this early stage of analysis, foregrounds significant patterns and issues about the quality and quantity of each child's oral expression and interactions. These include:

(a) students' quantity of oral expression typifies patterns identified in the research literature, namely, minimal oral expression opportunity available to the child;

(b) the teacher is overwhelmingly dominant in what gets expressed, by whom, and when;

(c) when child utterances occur, they are in large part syntactically and lexically simple and short, whether curriculum-based or social-communicative based;

(d) teacher responses to child utterances tend to be minimally linguistically and cognitively expanding, dominated by typical initiate, response, evaluation (ire) patterns, and by low-level cognitive questioning and evaluations, not providing the child with effectively scaffolded, rich potential input;

(e) generally, where the class lesson activity structure is group rotation, children involved in activities where the teacher is not present are operating at very minimal levels of cognitive and linguistic engagement;

(f) when students are involved with teacher, individually, in small groups or in a class group, expanded cognitive and linguistic expression by teacher and students is for the most part not occurring.

When students such as the case study children come to school under-resourced in oral expression and vocabulary, it is critically important that classroom environmental conditions are as optimal as possible in terms of quantity *and* quality of oral expression by students and teacher, if there is to be exponential growth in language acquisition.

Next phases of the study

One term of implementation in each of the four classrooms in the study is in full swing. There is a common goal by the four teachers involved: to explicitly attend to optimising discourse and interactional conditions in the classroom, across all curriculum areas, based on what they learnt in the intervention workshops. At the end of each week, they report on and evaluate implementation.

The language effects on the students' quality and quantity of oral expression are already evident. Some comments by the teacher's capture this:

> 'I am definitely seeing the students' linguistic, cognitive and vocabulary expansion.'

> ‘I have noticed more spontaneous expression, and children wanting to know words, write about what we’ve talked about, and read.’
>
> ‘The children didn't just remember facts, but also the sentences that we had shaped and recycled, like: “Cash is money like notes and coins. You can use cash to buy something, but if you don't have cash you can use a card to buy something”.’

Conclusion and acknowledgements

‘How teaching is related to learning (acquisition) requires an understanding of how individual student behavior and experience are shaped by the way the teacher designs, manages and assesses classroom activities’ (Nuthall, 2004:281). Investigations focussing on this kind of understanding are inevitably complex, theoretically and methodologically, as is this study. The Cognition Education Research Trust (CERT) has played a critical role in enabling this study to be conducted. Encouragement and support given has been ongoing over the last three years. A critical component of this has been generous funding support. For example, the involvement of four research assistants to video record the lessons pre- and post-intervention, and the cost of conducting the intervention workshops, have been totally funded by CERT. Their support is reflective of the importance they place on educational improvement and the role emerging researchers such as myself can play as contributors to this. Since 2007, I have been a recipient of their trust and support, for which I am extremely grateful.

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