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Using Halliday's Functional Grammar to Examine Early Years Worded Mathematics Texts

Keiran Abel & Beryl Exley
Centre for Learning Innovation, Queensland University of Technology

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Abstract

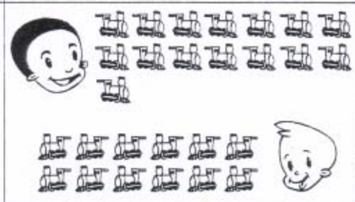
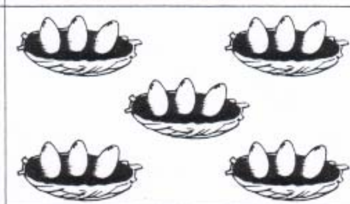
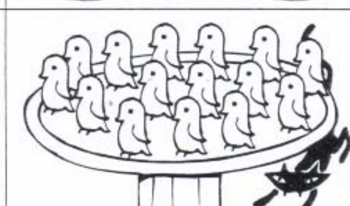
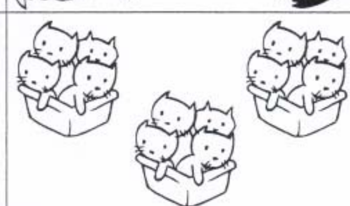
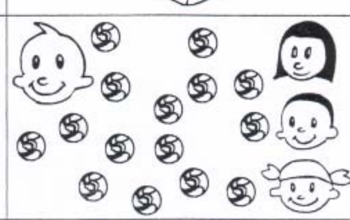
This paper examines the grammatical complexity of six worded mathematics texts. These texts come from a Maths worksheet (Way, 2004) and are typical of those put to early years students to assess their competencies for relating everyday experiences to mathematical operations of addition, subtraction, division and multiplication. Functional Grammar (Halliday, 1990), in particular analyses of mood type, clause structure and cohesion, is used to analyse the means of representing experience and instruction in these worded maths texts. This level of analysis exposes the grammatical complexities of these tasks. The research then maps these grammatical forms onto the outcomes of the Queensland Studies Authority (QSA, 2005) draft English Syllabus 1-10 Elaborations. The purpose of such an undertaking is to raise questions about what grammatical forms young learners might be able to bring from their experiences in subject English to the demands made of them in subject Maths. The findings reveal that worded maths texts contain distinct grammatical forms not considered as outcomes in subject English for these students. Thus this paper makes two contributions to the literature. Firstly it showcases the usefulness of functional grammar as a tool for understanding the grammatical complexity of aspects of subject specific literacies, in this case, worded maths texts. Secondly it makes a strong statement about the need for teachers to be aware of, and respond to, the specific literacy demands of discrete subject areas.

Introduction

As a pre-service teacher undertaking an undergraduate Bachelor of Education program at Queensland University of Technology, I was working with a Year Two class during practicum in Term 4 of 2006. I observed many students struggle with worded maths texts, even students who were considered by their classroom teacher as being 'highly skilled' in maths explorations and in the 'reading and viewing' strand of the Queensland Studies Authority draft English: Years 1 – 10 Syllabus (QSA, 2005). The worded maths texts required them to make meaning from some sort of written recount about an everyday experience and answer a question that was essentially asking them to perform an addition, subtraction, division or multiplication operation. The worded maths texts also had accompanying visuals to assist the students (see Figure One).

NUMBER STORIES (WHICH SIGN?)

1. Read the number story. Choose which operation to use (+, −, ÷, x). Set out the number sentence and answer it. You may wish to use the pictures or counters to help you.

Number story	Picture	Number sentence
(a) Jess has 12 toy trains and James has 15. How many trains do they have altogether?		
(b) There are 5 nests with 3 eggs in each nest. How many eggs are there altogether?		
(c) 15 birds were sitting on the birdbath, until a cat scared away 7. How many were left?		
(d) Liz has 14 hair elastics and Jackie has 11. How many hair elastics do they have altogether?		
(e) There are 3 baskets with 4 kittens in each basket. How many kittens are there altogether?		
(f) Matt shared his 15 marbles between his 3 friends. How many marbles did each friend get?		

CHALLENGE On the back of the sheet, write your own number story for these:

(a) 20 − 15 = ______ (b) 13 + 6 = ______

Figure One: 'Number Stories. Which Sign?' (Way, 2004, p. 87)

As detailed in Figure One above, an extension activity required the students to take a 'number story', that is a numerical formulation, and represent it as a recount of an everyday experience with a follow-on question that guided some sort of mathematical computation. A number of students in my prac class struggled to complete the first six tasks and even more were confounded by the second task. These students all attended an inner-city Education Queensland Primary School located within a middle class suburb. Some of these students would have been considered to be operating at Level One Learning Outcomes of the QSA (2005) draft English Syllabus, while most have transitioned to Level Two Learning Outcomes. Students typically complete Level One Learning Outcomes and commence Level Two Learning Outcomes half way through Year Two. It is appropriate for students to take eighteen months to master all Level Two Learning Outcomes. Thus students may not complete Level Two Learning Outcomes until the end of Year Three. Seven year old Benjamin (pseudonym), who was considered by his teacher to be 'highly competent in maths' and would have been mapped onto Level Two English Syllabus (QSA, 2005) Learning Outcomes, offered the following oral response to the second task. This task required him to construct a recount of an everyday event and follow-on question for computation based on the numerical number story, 20-15.

Benjamin: *You had 20 marbles and you shared 5 to each of your 4 friends and then 3 walked away and that person had 1 and the other friend had 5.*

This paper is my subsequent reflection of this teaching/learning episode. During the summer of 2006 I undertook an undergraduate vacation research scholarship with Beryl Exley, supplied by the Centre for Learning Innovation at Queensland University of Technology. I was interested in the development of literacies within disparate key learning areas. It was during this experience I met functional grammar for the first time. My reflection, as I present it here, does not delve into operational strategies or pedagogies for teaching such. It does not focus on the role and place of visual support for worded maths texts. Instead I raise questions about the grammatical demands of worded maths texts. More specifically I focus my attention on the six worded maths texts presented in Figure One, above, and ask the following research questions:

- What mood types, clause structures, and cohesive devices are evident in the six worded maths texts?
- How do these mood types, clause structures, and cohesive devices compare with subject English learning outcomes for these Year Two students operating at Levels One and Two on the QSA (2005) draft English Syllabus?
- What implications might any discontinuity between the mood types, clause structure, and cohesive devices in subject maths and subject English have for teachers of maths?

From here, this paper is presented in three sections. The following section provides a review of relevant literature on the literacy demands of worded maths texts. It draws attention to the grammatical complexity of worded maths texts and cites a study that employed Halliday's functional grammar as a framework for maths text analysis. The next section provides the data analyses. It examines the six worded maths texts presented above in terms of mood types, clause structures, and cohesive devices and their correlation or otherwise with the knowledges and skills required for tasks in subject English. The concluding section of this paper makes comments about these findings for teachers of maths.

Review of Relevant Literature: Grammatical Complexity of Worded Maths Texts

It was once appropriate to regard literacy as a common skill for all school subject areas, but it has since been categorised as being much more ‘dynamic, contextualised and complex’ (Wyatt-Smith & Cummings, 2003, p. 49). Research shows that specific school subject areas have their own distinctive grammatical features and language structures that students must exchange between and across in order to be successful learners (Unsworth, 1997; Wyatt-Smith & Cummings, 2003). Quite simply, students’ achievements rely in part on their ability to negotiate among these specific and complex ‘curriculum literacies’ rather than relying on a non-existent common literacy that can be employed across an imaginary holistic curriculum (Wyatt-Smith & Cumming, 2003).

The complexity of worded maths texts and the difficulty students are experiencing in interpreting these are frequently a premise of concern. According to Zevenbergen (2001) students are experiencing difficulties in working through the literacy demands of worded texts. The grammatical challenges they present are explored in many studies, each revealing that there are various underlying language and structural patterns hindering students’ interpretation of a range of mathematical discourses (Padula, Lam & Schmidtke, 2001; Zevenbergen, 2001; MacGregor, 2002; Kalogeropoulos, 2005; Monroe & Panchyshyn, 2005; O’Halloran, 2005; Parkin & Hayes, 2006). Worded maths texts that contain lexical ambiguities or are lexically dense, such as words that possess multiple meanings (including those with same spellings or related meanings), the use of symbols and less familiar lexical terms and the complex semantic structures that involve operation cues, are often misinterpreted by students (Zevenbergen, 2001; Monroe & Panchyshyn, 2005). The grammatical density of the sentences, such as those containing more content words and fewer grammatical words, and complex and lengthy noun and verb groups present linguistic challenges that serve to confound young students (Parkin & Hayes, 2006). O’Halloran (2005, p. 75) notes that ‘the major process type found in mathematical language appears to be the relational process’, one often not encountered by young children in subject English. The research on worded maths texts illustrates the possible difficulty students may experience when faced with making meaning from and then transposing worded texts into numerical number stories (Zevenbergen, 2001).

Zevenbergen (2002) suggests that teacher practices often disregarded the explicit scaffolding of students’ literacy skills during mathematics teaching. Not only have students often been deprived of explicit literacy instruction within this key learning area, but the demands of literacy within this key learning area are significantly different to those of other key learning areas. Unsworth (1997) concurs, stating that if students do not learn to differentiate between and work with the unique language attributes and structures of key learning area texts then they will be disabled in their use of literacy across the curriculum in the future. Students need to be supported in making sense of and developing the distinctive grammatical structures that are integral to the maths key learning area in order to successfully participate in school (Unsworth, 1997; Derewianka, 1998; O’Halloran, 2005). For example, reviews such as those conducted by Zevenbergen (2002), Ladhams (2005), Monroe and Panchyshyn (2005) and O’Halloran (2005) believe that for students to be successful at making sense of and producing mathematical responses to worded maths texts then the meaning of maths specific vocabulary needs to be overtly scaffolded. Not only do teachers need to scaffold the use of language, but it is imperative that tools for learning are provided to assist students to increase their awareness of language and how it works (Derewianka, 1998; de Silvia Joyce & Burns, 2001). Such outcomes can be achieved by building a shared metalanguage among both teachers and students for talking about and understanding the distinct grammatical and language demands of maths worded texts (Derewianka, 1998; Unsworth, 2002; Wyatt-Smith & Cumming, 2003).

Halliday's functional grammar is explicitly scaffolded as a metalanguage and thus it has the capacity to focus on the structural elements of subject specific literacies. Not only can this metalanguage hold opportunities for comprehending grammatical structures of maths texts, but also as a shared communication that can be used to describe language. A recent study conducted by Parkin and Hayes (2006), 'Scaffolding the Language of Maths', analysed worded maths texts in secondary school textbooks. The study used Halliday's functional grammar as a tool of analyses and as core content for teachers. The study involved the teacher scaffolding students undertaking a transitivity analysis of text by identifying the text's grammatical structure using student familiar language such as 'who?', 'action?', 'what?' and 'where?'. These word structure clues were written on separate strips of card and then used to facilitate students remembering what segments of text information are considered important 'given' information. The students then re-constructed a worded text for their peers using the card clues to remember what segments of information the text should include. The analysis presented demonstrated functional grammar to be a valuable tool for scaffolding the language demands of mathematical discourses (Parkin & Hayes, 2006).

Whilst the research presented here does not employ functional grammar as content for instruction, it does use Halliday's (1990) functional grammar as a framework for analysis of worded maths texts. The next section of this paper introduces the research component, and explains in more detail the undertaking of the text analysis research task.

The Functional Grammar Framework: Mood Type, Clause Structure and Cohesive Devices

My interest in functional grammar came about after I observed an upper primary teacher at another school utilise it to scaffold his students through the complex linguistic and grammatical demands of producing written descriptions in the visual arts. I was also motivated to find out more about functional grammar due to its prominence in the draft English Syllabus (1-10) Elaborations (QSA, 2005). I now recognise that my own schooling experiences were based on 'whole language' approaches to learning (see, for example, Graves & Stuart, 1985), consequently, like many teachers who were students in Queensland schools throughout the 1980s and 1990s, I was not confident with my grammar knowledge. Thus the research project I am reporting on here allowed me to work with grammar knowledge in a productive way for my future work as a teacher. The research project I undertook examined the grammatical structures of the six worded maths texts detailed above in Figure One. My analyses of their mood types, clause structures, and cohesive devices are presented and discussed. But first, it is necessary to define the terminology I will use as I've come to understand and use it over the last couple of months.

1. Framework for Analysing Mood Type

An analysis of mood type is important for it makes visible the exchange that needs to take place, or put another way, the interactions between text author and text reader. Conducting an analysis of mood involves determining whether clauses are declaratives (statements) or interrogatives (a question that requests information). With declaratives, authors provide information and readers can either accept or contradict this information. With interrogatives, authors request information and readers either answer or offer a disclaimer. Importantly, declaratives and interrogatives are realised through different grammatical structures at the start of the clause. This starting position is termed 'Theme' and is always written with an initial capital (Halliday, 1990, p. 38). Theme gives a clause its character and in the case of the analyses presented here that character is either a declarative or an interrogative. Declaratives start with a subject. Conversely, interrogatives start with a querying subject, such as who, what, when, where or how and are termed WH-interrogatives. 'The WH- element is a distinct element in the interpersonal structure of the clause. Its function is to specify the entity that the questioner wishes to have supplied' (Halliday, 1990, p. 83). An analysis of the mood structures of the six worded maths texts will show the range of grammatical resources these young students will have to master to make meaning of their maths worksheets.

2. Framework for Analysing Clause Structure

Analysing clause structure is important for it provides the 'frame of reference for interpreting our experiences of what goes on' (Halliday, 1990, p. 101). The analysis of clause structure involves identifying the representation of the three components of processes: 'the process itself; participants in the process; and circumstances associated with the process' (Halliday, 1990, p. 101). Briefly, participants identity the 'who or what of the process'. Processes identify 'what is going on', that is, the doing (action/material process), sensing (mental process), and being (relational process) (Halliday, 1990, p. 102-130). While action/material, mental and relational processes are the three principal processes found in the English clause, there also exist three distinctly different processes. One of these, existential process, will be core to the analyses presented here. Existential process, such as 'there are 3 baskets' represent that something exists or happens (Halliday, 1990, p. 130). The word *there* in such clauses has no representational function; it is required because of the need for a subject in English. Existential clauses are used when introducing new information and when there is nothing previously in the text to describe, it is simply stating (Derewianka, 1998). Finally, circumstances provide information about where (place), when (time), how (manner), why (reason/cause), with whom (accompaniment) in relation to the process (Halliday, 1990, p. 137). The analyses presented here only draw on circumstances of manner (how?) and place (where?). An analysis of clause structure will show the range of grammatical resources these young students will have to master to make meaning of their maths worksheets.

3. Framework for Analysing Cohesion

Systems of cohesion are also important to the analyses presented here for they draw attention to the way meaning making relationships are encoded through and within clauses. Thus they contribute to the analysis of the grammatical complexity of texts. In the analyses presented here, three systems of cohesion will be under investigation. The first two systems of cohesion relate to the structural relationship created through reference and absence of reference (ie. ellipsis). Sometimes these references or ellipses are held within clauses and at other times across clauses 'without regard to the nature of whatever intervenes' (Halliday, 1990, p. 288). An example of reference and ellipses can be seen in the following worded maths text:

Jess has 12 toy trains and James has 15. How many trains do they have altogether?

Reference is evidenced as ‘Jess’ and ‘James’ are referred to as ‘they’. The words ‘toy train’ has been presupposed in the part of the text that talks about ‘15’. The text does not explicitly tell us that ‘15’ refers to ‘15 toy trains’; the second clause says nothing about ‘toy trains’. The reader is required ‘to make up the sense’ (Halliday, 1990, p. 288). This absence of text for meaning making is referred to as an ellipsis.

The third system of cohesion I’ll be including in my analyses makes explicit the external relationship between one clause and another by relating some proceeding text to that which follows. The two types of conjunctions I’ll be focusing on are additive conjunctions and temporal conjunctions. Additive relations, such as ‘and’, simply add another clause to the text, thereby making it a compound sentence. It is compound because the clauses are still considered to be independent of each other. Temporal conjunctions, such as ‘until’ serve to sequence information or events according to the writer’s organization, and set up relations between the clauses. While one clause remains independent, that is, it is able to express a main message, the other clause is dependent on the main message for meaning making. Put another way, the dependent clause elaborates on the main message (Derewianka, 1998).

Identifying these devices of cohesion is important for considering the grammatical complexity of these worded maths texts. The following section presents the findings of my research, starting with the analyses of mood type.

Data Analyses: Mood Type

The six worded maths problems all followed a similar macro pattern in that they had two utterances that differed in structure and function from each other. In each of the six texts the first utterance provided information about an everyday event whereas the second utterance requested information. The first utterance, known linguistically as a declarative, started with a participant in the Theme position. Each of the second utterances started with ‘How many…’. This use of questioning, known linguistically as an WH- interrogatives, required a more demanding, lengthier and more complex response than polar interrogatives that require a simple ‘yes’ or ‘no’ answer (Derewianka, 1998, p88).

These brief analyses show that students have to take on the role of meaning making from an information-giving utterance as well as provide an answer for the interrogative. For students to complete this maths work, they need to be proficient in two types of grammatical work: realising their role as readers of declaratives and WH- interrogatives. Students operating at Level One Learning Outcomes for subject English (QSA, 2005) are already developing syntactical knowledge that includes ‘statements in factual texts’ and ‘question beginnings’. However, it is not until students are working through Level Two Learning Outcomes that they start to focus on the ‘function of statements and questions’ (QSA, 2005). This suggests those students who are operating at Level One English Syllabus Learning Outcomes or have not yet mastered all the Level Two Learning Outcomes (which typically does not happen until the end of Year Three) may have gaps in their grammatical knowledge for these maths tasks.

The next sub-section provides the transitivity analyses of the six worded maths texts. Each maths text is presented without analyses, and then charted into clauses and from there into participants, processes and circumstances. Conjunctions and the word ‘there’ (when it is the Theme position where it has no representational value) have not been coloured as they are not considered to be part of transitivity. They have, however, been identified, because their existence will be considered and discussed in the sections that follow.

Data Analyses: Clause Structure

TEXT ONE: Jess has 12 toy trains and James has 15. How many trains do they have altogether?

Jess	has	12 toy trains
Participant 1	Process (relational)	Participant 2

and	James	has	15.
Linking conjunction	Participant 3	Process (relational)	Participant 4

How many trains	do	they	have	altogether?
Participant 5	Process (relational)	Participant 6	Process (relational)	Circumstance (manner)

TEXT TWO: There are 5 nests with 3 eggs in each nest. How many eggs are there altogether?

There	are	5 nests	with 3 eggs in each nest.
No representational function	Process (existential)	Participant 1	Circumstance (manner)

How many eggs	are there	altogether?
Participant 2	Process (relational)	Circumstance (manner)

TEXT THREE: 15 birds were sitting on the birdbath, until a cat scared away 7. How many were left?

15 birds	were sitting	on a birdbath
Participant 1	Process (action/material)	Circumstance (place)

until	a cat	scared away	7.
Temporal conjunction	Participant 2	Process (action/material)	Participant 3

How many	were left?
Participant 4	Process (relational)

TEXT FOUR: Liz has 14 hair elastics and Jackie has 11. How many hair elastics do they have altogether?

Liz	has	14 hair elastics

Participant 1	Process (relational)	Participant 2

and	Jackie	has	11.
Linking conjunction	Participant 3	Process (relational)	Participant 4

How many hair elastics	do	they	Have	altogether?
Participant 5	Process (relational)	Participant 6	Process (relational)	Circumstance (manner)

TEXT FIVE: There are 3 baskets with 4 kittens in each basket. How many kittens are there altogether?

There	are	3 baskets	with 4 kittens in each basket
No representational function	Process (existential)	Participant 1	Circumstance (manner)

How many kittens	are there	altogether?
Participant 2	Process (relational)	Circumstance (manner)

TEXT SIX: Matt shared his 15 marbles between 3 of his friends. How many marbles did each friend get?

Matt	shared	his 15 marbles	between 3 of his friends
Participant 1	Process (action/material)	Participant 2	Circumstance (manner)

How many marbles	did	each friend	get?
Participant 3	Process (action/material)	Participant 4	Process (action/material)

The most prominent finding of these transitivity analyses is both the variable and consistent clause structures within these six worded maths texts. They are considered to be variable as there are so many combinations of clause structure for both the declaratives and interrogatives. Yet, when the texts are grouped according to the operation they are set up to perform, there is remarkable consistency. Put another way, both the texts that require an ‘addition operation’ (Texts One and Four) have the same clause structure for both their declarative and WH-interrogative clauses, as do both the texts that require a ‘multiplication operation’ (Texts Two and Five). As only one text requires a ‘subtraction operation’ and only one requires a ‘division operation’, it is not possible to draw conclusions regarding consistency of clause structure for these examples.

As mentioned, the narrative genre is an often used text type in the early years of the draft English Syllabus (QSA, 2005). Thus through subject English students are being prepared to deal with the linguistic demands of the narrative structure. As Zevenbergen (2002) and O’Halloran (2005) strongly suggest it is equally important that those who teach maths also explicitly prepare students with the essential skills necessary for carefully and appropriately dealing with the language demands of maths worded texts. For example, some of the worded maths texts detailed above use relational processes. The students need to be familiar with these processes so they can both make meaning and respond with the appropriate exchange demand, that of acknowledging information (O'Halloran, 2005, p. 75).

Generally speaking, the processes found in the narrative genre are action/material, mental and saying processes (Derewianka, 2002, p. 43). Although the use of relational processes are identified in Level Two English Syllabus Elaborations for the strand of 'Reading and Viewing', it may mean that students are not as familiar with relational processes compared to the other processes that are most commonly used. Furthermore Williams (1990) proposes that relational processes are the most difficult for students to master, as they tend to be generalised, non-human and abstract. Relational processes are evident in Texts One and Four (both declarative and WH-interrogative), and in Texts Two, Three and Five (in WH- interrogative). The consistency between Texts One and Four is not surprising given they are both focused on the 'addition' operation. Again, the consistency between Texts Two and Five is also not surprising, given they both focus on the 'multiplication operation'. Text Six is noteable for its absence of relational processes. It uses action/material processes in the declarative and interrogative.

The 'there are' examples in the Theme of the declarative clause in Texts Two and Five are complex in themselves. Existential processes are not made explicit in either Levels One or Two of the draft English Syllabus (QSA, 2005). Yet as this research shows, it is a process that is quite common place in early years maths texts. It is thus vital that students understand their function in order to comprehend maths texts.

Zevenbergen (2002) suggests that students can overcome the complexity of worded maths texts by learning the subject specific vocabulary and grammar in order to identify what type of maths operation the text is referring to. The clue to the subtraction operation is 'were left' (Text Three) and the clue to the division operation is 'shared between' (Text Six). However, as these analyses exemplify, such learnings are not so transparent. Texts One, Two, Four and Five all require operations of addition or repeated addition (multiplication). They also use the word 'altogether' as a circumstance of manner. While this circumstance suggests the operation to be performed is either 'addition' or 'repeated addition', the WH- interrogative does not provide any further clues for differentiating between these operations (addition or multiplication). The word 'altogether' used in multiplication Texts Two and Five may confuse students and encourage them to add the two numbers in the declarative.

Data Analyses: Cohesion

The texts detailed above utilise three cohesive devices: reference, ellipses and conjunctions. Each will be introduced and discussed in turn, starting with the device of reference which is used in Texts One and Four. In both texts the reference carries across clauses in the declarative as well as across to the interrogative. In Text One, it can be noted that specific participants 1 and 3 (Jess and James) is referenced to the more generalised participant of 'they' (participant 6). Such devices may be very confusing for early years students who are not explicitly taught to deal with these more complex references. According to the draft English Syllabus Elaborations (QSA, 2005) Level Two Learning Outcomes do not include references to pronouns such as 'they'. By the end of Level Two Outcomes (typically end of Year Three) students are only expected to reference the participants previously mentioned in the text by using the impersonal pronoun ‘it’ (e.g. *The cow* is in the paddock. *It* is eating the grass). The complex use of participant referencing, as used in Texts One and Four, may confound students as they may not necessarily have acquired such knowledge through subject English.

The second cohesive device, which features in Texts One, Three and Four, is that of ellipses. For example, in the second clause of Text Four the participant is represented by the number ‘11’. The central element (*elastics)* and other supporting detail (*hair)* is not included. Students of this age have usually spent more time working with the narrative genre where they are use to more information in participant groups.

Text Three shows an example of conjunction. It is considered to be a complex sentence, connecting an independent clause ‘15 birds were sitting on a birdbath’ to a dependent clause ‘until a cat scared away 7’. The conjunction ‘until’ has been used to join a dependent clause to the independent clause which precedes it. There is a dependency of time and sequence between the two clauses. The dependent clause (clause two) ‘until a cat scared away 7’ elaborates on the independent clause (clause one) and is concerned with making significant meaning about the sequence involved in the context. In this example the main function is to describe that there were 15 birds *before* the cat scared 7 away. While students in Year Two have experienced the use of more complex conjunctions in the narrative text type as noted in the Level Two Learning Outcomes of the draft English Syllabus (QSA, 2005), the temporal conjunctions of time and sequence are much more complex than simple additive conjunctions such as ‘and’, ‘as well’ and ‘also’. It is interesting to note that the Elaborations (QSA, 2005) outline specific example words that can be used to express the relationships between ideas for different types of conjunctions. Although the Elaborations state that the conjunction ‘until’ is a conjunction of time and sequence, some may have reason to believe that in the context of this text, ‘until’ may be classified as a conjunction of cause and effect. This consequential relationship is evidential as the cat *caused* 7 birds to fly away. Cause and effect conjunctions are not part of the draft English Syllabus (QSA, 2005) outcomes. This complexity impacts on students’ meaning making as the Years 1-10 English Elaborations for Level Two outline that students are only receiving instruction in patterns of simple and compound sentences to make meaning when reading and writing (QSA, 2005). Complex sentences come later in both reading and writing as outlined in the Level Three Elaborations (QSA, 2005). This then begs the question where is it that such understandings are carefully scaffolded for these young students? Is it happening in maths instruction?

Conclusion

In conclusion, this paper has focused on some of the linguistic complexities of worded maths texts as presented to a Year Two class. The texts themselves contain complex grammatical structures as identified in the analyses presented. Students require specific knowledge of these grammatical structures and their functions to successfully decode and make sense of this mathematical discourse. It is the role of teachers to explicitly scaffold subject specific literacies, so students are equipped to differentiate between and work with these very complex language structures of maths. If students do not possess these essential skills needed to decode and make meaning of maths texts then they run the risk of failing. According to Unsworth (1997) students do not simply acquire skills of decoding particular linguistic forms of specific curriculum literacies. Students’ achievement relies on their ability to coordinate among these ambiguous linguistic forms and it cannot be assumed that all students have the ability to comprehend these complex demands (Unsworth, 1997; Wyatt-Smith & Cummings, 2003). The challenge for teachers is to support a successful journey for students at school and beyond by equipping them with the essential skills for comprehending the very complex grammars of mathematical discourses (Unsworth, 1997; Wyatt-Smith & Cummings, 2003; Parkin & Hayes, 2006). The New London Group (2000) and Wyatt-Smith and Cummings (2003) suggest that teachers need to empower students for success by introducing and directly modeling these subject specific curriculum literacies.

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