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Interactions with Talking Books: Phonological Awareness Affects Boys' Use of Talking  
Books

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## Abstract

Framed by current concerns about boys' attainment in literacy, this paper investigates the potential of talking books software to support the literacy development of male beginning readers. The study primarily considered whether typically developing boys who showed lower levels of attainment in phonological awareness would show a greater degree of improvement in phonological awareness or a change in reading strategy following a talking books intervention than boys who were demonstrating higher levels of phonological awareness. It also examined whether the boys' phonological awareness attainment would affect how they used the software to support their attempts at reading, both in terms of their interactions with the computer and the types of speech feedback that they selected. The analysis also considered whether there was any association between the nature of the boys' teaching and learning interactions with the computer and any changes in their reading strategies from pre to post-test. The findings suggest that the use of the talking books software was particularly beneficial for those boys who initially showed lower phonological proficiency and that the boys in this study utilised the talking books software adaptively depending on their phonological proficiency. Moreover, there was evidence that contact with the talking books affected the reading strategies of the boys who had higher phonological awareness. There was also evidence of an association between the way in which the boys interacted with the software and changes in their reading strategy between pre and post-test.

## Introduction

There is currently much discussion and debate, both nationally and internationally, in relation to boys, their schooling and their literacy attainment or lack of it. These discussions are framed in part by concerns about boys' literacy levels as indexed by their performance on standardised tests of reading, writing and spelling. Comparative analyses indicate that, across a wide age range, boys' performance on such metrics is consistently lower than that of girls, a pattern which recurs in many countries (see for example Department for Education and Employment, 1999a; Department of Education, Training and Youth Affairs, 1999a, b; Economist, 1996:23; Helbers, 2000 cited in Rowan, Knobel, Bigum & Lankshear, 2002; Department of Education, USA 1998). Whilst recognising both the problems inherent in attempting to measure 'literacy' and the importance of meeting the needs of girls as well as boys, when these data are taken together with the recurrent emphasis on basic and higher level literacy skills needed for full participation in contemporary society they suggest that ways need to be found to support boys' literacy development.

Boys are often characterised as enthusiastic users of new technology (for a review see Littleton & Hoyles, 2000), and it is perhaps not surprising that some commentators have speculated that it may be possible to positively affect boys' attainment in literacy by supporting them through computer-aided learning tools (e.g. Medwell, 1998). However, this is a bold claim given that we know relatively little about how boys engage with the kinds of resources that might support their progress in literacy. As Rowan, Knobel, Bigum and Lankshear (2002) note:

Efforts to get boys reading and writing' by plonking them down in front of computers propagate a popular misconnection between boys, new technologies and remediation. They also maintain ultimately disadvantaging cultural models that expect all boys to have a natural affinity with computers.....or assume that using computers with boys who struggle with school literacy will automatically solve their literacy problems. (p.159)

It is therefore important that we do not take as 'given' the notion that boys' perceived positive disposition towards computer-technology will necessarily mean that such technologies can be readily harnessed to support their literacy development - particularly as in some cases it has been suggested that boys' extensive use of computer technology may be borne of insecurity rather than confidence (Elkjaer, 1992). That said, given the increasing pervasiveness of computer technology in the classroom it is important to investigate whether, for specific groups of boys, there are potential benefits to be had by using particular forms of computer-based support for literacy.

For children in the very early stages of literacy, much has been written about the potential of so-called 'talking books' – interactive CD ROMs, which offer a multimedia presentation of the traditional storybook format, including the addition of speech feedback so that children can elect to hear the story read to them. These CD ROMs, and interactive educational toys based on similar principles, are widely available to parents wishing to support their children's literacy development at home (Fox, 2002; Lewin, 1998). However, the use of talking books in the course of regular classroom activity is often marginal to the literacy curriculum and reflects concern about their genuine educational potential (Fox, 2002; Wood, Littleton & Chera, 2005). That is, there has

been relatively little research that has examined exactly what benefits, if any, children gain as a result of using such software. While there is agreement and evidence that children enjoy using these resources (Fox, 2002; Littleton, Wood & Chera, 2005; Medwell, 1998; Underwood & Underwood, 1998), there is mixed evidence regarding their effectiveness at promoting reading-related skills. For example, Underwood (2002) has described the benefits of using commercial talking books as 'serendipitous' (p.124), and this conclusion is borne out by the marginal improvements in attainment reported in studies such as Medwell, (1998) and Miller, Blackstock, and Miller, (1994).

However, Chera (2000) developed a talking book based on the 'Bangers and Mash' reading scheme (published by Longman) which was designed in consultation with psychologists, teachers and children, and which aimed to promote phonological awareness in children in the initial stages of learning to read. Crucial in the design of this software was the integration of different levels of speech feedback to support different ways of engaging with the talking books. That is, children could elect to hear the whole page spoken, hear individual words read aloud, or hear words broken down into sub-word components, which were spoken in isolation and then blended back together. The sub-word level feedback was accompanied by a short animation, which also showed the word being broken down and recombined in synchrony with the speech feedback. Subsequent evaluations of the Bangers and Mash talking books have shown that even relatively brief contact with the software has the potential to promote phonological awareness in four to six-year-old children (Chera & Wood, 2003) and affect children's reading strategies (Wood, 2005).

There is a small literature that has examined gendered differences in children's use of talking books (e.g. Underwood & Underwood, 1998; Wood, Littleton & Chera, 2005). These accounts focus on and problematise boys' use of these resources when they are paired with other children, highlighting the potentially problematic aspects of boys' collaborative use of such media. However, little is known about boys' use of talking books when they use them on their own. This is important in terms of separating out what is potentially problematic on an interpersonal level from what is potentially problematic in terms of the software itself. More practically, the pressure that once existed in terms of children's access to computers in the classroom is now less and children are just as likely to work individually on computer-based tasks than in pairs or as part of a small group.

Consequently, this paper investigated five to six-year-old boys' individualised use of the Chera (2000) talking books software and considered two main research questions. Given the concern around boys' underachievement in literacy, the first considered whether typically developing boys who showed lower levels of attainment in phonological awareness would show a greater degree of improvement in phonological awareness following a talking books intervention than boys who were demonstrating higher levels of phonological awareness. This question arises in part from Wood (2005a), who found evidence that the younger readers in her intervention study appeared to benefit the most from use of the software. The decision to focus on phonological awareness as a basis for dividing the boys into attainment groups was informed by the extensive reading literature that shows phonological awareness to be an important precursor skill to

successful reading acquisition (see for example Adams, 1990; Blachman, 1997; Snowling, 2000; Goswami & Bryant, 1990).

A second research question considered whether the boys' attainment in terms of their phonological awareness would affect how they used the software to support their literacy development. We were interested in investigating whether the lower attaining boys in particular would engage with the software appropriately given their developmental level, or whether these boys would view use of the resource as an opportunity for undirected play around the computer, as observed in the dyad-based work reported by Wood, *et al.* (2005). To consider the appropriateness of the boys' interactions, a coding scheme which categorised the way in which the boys were using the computer to support their reading activity was applied to videotaped footage of one of the intervention sessions. The boys' use of the different types of speech feedback available in the software was also compared.

We were also interested in whether there would be an association between attainment and whether or not the boys' reading strategies (as evidenced by their reading errors) had been affected. Reading errors, or 'miscues', reveal the different approaches that children take to decoding text and so a change in the nature of the miscues that are apparent in the boys' reading from pre to post-test would suggest that the software has affected the way that the boys are attempting to tackle the task of reading.

Finally, we considered whether any changes in the boys' strategy use were associated with the nature of their interactions with the computer. This was because some styles of teaching and learning interaction related to beginning reading have been

suggested to benefit children's attainment by encouraging them to develop different approaches to reading text (Guppy & Hughes, 1999).

## Method

### *Participants*

Eighteen five and six-year-old boys participated in the study and had a mean age of 5 years and 5 months (*SD* 7.0 months). All the children were recruited from a single primary school in the UK (in the UK children begin to attend school and receive formal tuition in reading in the year that they are five-years-old). The sample had a mean standardised score on the British Picture Vocabulary Scales II (Dunn, Dunn, Whetton & Burley, 1997) of 107.4 (*SD* 11.9), which indicated that the children were in the normal range with respect to receptive vocabulary for their age. The boys were participating in the experimental group of a larger study concerned with evaluating the effectiveness of talking books with beginning readers (see Wood, 2005a).

### *Procedure*

*Pre and post-tests.* The children were assessed on rhyme detection, alliteration detection, rapid picture naming and fluency (phonological production) using subtests taken from the Phonological Assessment Battery (PhAB) (Frederickson, Frith & Reason, 1997). In the rhyme and alliteration detection tasks, the children were presented with three words and the children had to identify which two of the three words spoken rhymed with each other or shared the same initial sound. In the rhyme task, the children scored one point for each correct answer, with a maximum score of 21 possible. In the alliteration task, the children scored one point for each correct answer, with a maximum score of ten possible.

In the rapid picture naming task, the children were presented with a grid of fifty pictures composed of line drawings of five common objects. Each object appeared in the grid ten times and the order of presentation was randomised. The children were familiarised with the pictures and their names and then asked to say the name of each object aloud as fast as they could. The time taken to name all the pictures was recorded in seconds. The children completed two of these grids and the total time taken to name the objects was calculated over the two trials.

In one part of the fluency subtest the children were asked to generate as many words as they could think of that rhymed with 'more' and 'whip' (rhyme production). They were allowed up to 30 seconds for each of these stimulus words. They were also asked to name as many words as they could think of that began with the sound /b/ and /m/ (alliteration production). The children's performance on the rhyme and alliteration subtests was scored separately.

In order to split the children into two groups based on their phonological awareness attainment, the children's scores on the above measures at pre-test were converted to z-scores and these were added together to obtain a composite phonological awareness attainment measure for their attainment at this point in the study. The boys who had a negative composite score, indicating that they were below the mean attainment level for the group, were identified as the *lower phonological awareness attainment group* (n=9). The children with positive composite scores were identified as the *higher phonological awareness attainment group* (n=9).

*Error Analysis.* The *Neale Analysis of Reading Ability: Revised* (NARA II; Neale, 1997) was included at pre and post-test to analyse the children's patterns of

reading errors, as these are taken to be indicative of the reading strategies that the children were using to decode text. During this assessment the children were shown a book that comprised short stories that increased sharply in difficulty. Each story was accompanied by a picture that illustrated some aspect of the tale. The children were then asked to read the stories as far as possible. Consistent with the standardised instructions provided, the children were only required to attempt the stories that were felt to be appropriate to the child's ability and the assessor intervened and corrected the children as they progressed through the story, where necessary. The children's errors were noted and later categorized. The NARA II gives guidance on the analysis of miscues and uses the following categories: mispronunciation, substitution, refusal, addition, omission and reversal. The children's performance on the first three stories alone was assessed. Two sets of stories, matched for difficulty, are provided in the NARA II. Consequently, the alternate form of the task was presented as post test to avoid repetition. The number of miscues of each type was expressed as a percentage of the total number of errors that they made when reading the stories during that pre or post-test assessment.

*The intervention.* The children were introduced to the first book from the Chera (2000) *Bangers and Mash* talking books. The features of the software were briefly demonstrated to the children (see Chera & Wood, 2003, for a full description), after which they were left to use the software independently, although an adult was present throughout their sessions of work. The children completed six computer sessions in total, two with each 'book'. Two or three days were allowed to elapse between each computer session, and each session was no more than 15 minutes in duration. The fourth session with the computer (out of a total of six) was video taped and the number of times that the

children used each of the speech feedback facilities provided by the software was counted. All the children were post tested on the PhAB tasks one week after they had completed their intervention sessions.

Informed consent was obtained from the school and from the parents of the children participating. All the children were given the opportunity to withdraw from the study at any point, and could opt not to complete any of the assessments if they did not wish to. One child from the higher phonological awareness attainment group did not complete the post-testing.

#### *The Coding Scheme: Capturing Literacy Interactions*

The children's interactions around the talking book presented in the fourth intervention session were categorised in terms of the extent to which the children were reading independently and the ways in which they were observed to elicit support from the software. The development of this scheme is described in detail elsewhere (Wood, 2005b), but draws on elements of both Medwell's (1998) and Guppy and Hughes' (1999) observations of young children's literacy learning interactions. Below each of the four finalised categories arrived at are described.

*Bookbinding.* In these types of interactions we see that the computer is entirely responsible for reading the story, and they 'stand in for the author' (Guppy & Hughes, 1999, p27). The children may comment on the story, or point to and repeat a word occasionally, but they are largely silent but attentive.

*Chiming in.* The computer still has primary responsibility for reading the text, similar to bookbinding, but these sessions are characterised by more consistent contributions from the children who 'chime in' when they know a word and may also

comment on the story narrative. Many children who chime in will repeat words just after they have been read by the computer, or will attempt to read simultaneously with the computer, even though their reading is not yet sufficiently developed to enable them to read the text unaided. In these cases their speech will overlap with that of the computer, but it will be clear that the child is relying on it to start to say the word before they are able to join in.

*Supported Reading.* During supported reading the children are attempting to assume responsibility for reading the text most of the time. However, they will encounter words that they are unfamiliar with, and turn to the computer to assist them when they get stuck. Their own strategies for independently decoding words may also be visible, and there may be frequent word substitutions to maintain the flow of their reading. Guppy and Hughes (1999) describe children in their *cue reading* stage as adopting ‘a detective-like approach to unknown words’ (p.50), and this is also a characteristic of many of the children in this study classified as engaging in supported reading. The crucial element of this type of interaction, however, is that the children make use of the computer to help them to read words that they are unsure of and / or to check that they have read a word correctly.

*Fluent Reading.* Children who are fluent readers work independently and read fluently. Appropriate strategies are applied when they are confronted with an unknown word, and mistakes are seldom made. Crucially, the computer is not used by these children for support at all.

## Results

Table 1 summarises the boys' pre and post-test scores on the various phonological awareness measures and their use of the speech feedback facilities in the software. To assess the question of whether one of the groups benefited more from using the software than the other group did in terms of their phonological awareness, the pre and post-test scores were converted to z scores and then the post-test z score was subtracted from the pre-test z score for each phonological awareness measure. This new value therefore indicated whether the child's performance on that task had improved or declined relative to the rest of the sample. These difference scores were then summed to produce a composite measure, which indicated the degree of improvement in overall phonological awareness from pre to post-test, with a negative score indicating an overall decline and a positive score indicating an overall improvement. Mann-Whitney analyses were conducted and it was found that the boys who had the lower phonological awareness scores at pre test improved significantly more on the composite phonological awareness measure than the higher attaining boys did,  $U (n_1=9, n_2=8)=11.0, p=.016$ , two-tailed.

Table 1 about here.

With respect to the speech feedback use, there were also clear differences between the two groups, with the *lower phonological awareness attainment* group relying on the speech feedback aspect of the software more than the *higher phonological awareness attainment* group did. Specifically, the boys with the lower phonological awareness scores requested whole page and whole word speech feedback significantly more often than the boys with higher phonological awareness,  $U (n_1=9, n_2=9)=11.0$ ,

$p=.004$ , and  $U (n_1=9, n_2=9)=10.0, p=.007$  respectively, both two-tailed. Neither group appeared to use the sub-word feedback very often.

The literacy learning styles of the boys were coded and differences in these styles across the two phonological awareness groups were examined (see Table 2). It can be seen that the boys who showed the least phonological proficiency at the outset of the study appeared to engage with the talking books in a way that was appropriate to their developmental level, with most of these children *bookbinding* or *chiming in* with the computer. Similarly the boys with better phonological awareness were observed to use the computer to engage in more advanced styles of literacy learning, where they took responsibility for decoding the text, with approximately half of the group not needing to use the speech feedback at all. To enable a statistical analysis of this pattern of association the ‘bookbinding’ and ‘chiming in’ categories were collapsed to a single group of ‘less independent’ readers. The ‘supported reading’ and ‘fluent reading’ groups were similarly collapsed to form a single group of ‘more independent’ readers. A significant association between phonological awareness attainment group and style of literacy learning was found (Fishers exact  $p=.001$ ).

Table 2 about here.

To consider whether phonological awareness attainment was associated with a change in reading strategy, the children were categorised into those who showed an increased tendency towards a particular kind of reading error at post-test, and those who did not (see Table 3). It should be noted that as no children were found to make ‘reversal’ errors, data on this type of miscue are not presented. A significant association found was between phonological awareness group and mispronouncing words (*Fishers exact*  $p=.05$ ,

two-tailed). That is, the children with higher phonological awareness at the outset of the study were more likely to likely make mispronunciation errors at post-test than the other children.

Table 3 about here.

Finally, we examined whether there was evidence of an association between the style of literacy learning adopted when using the talking book and changes in the children's reading errors / strategies. These data are summarised in Table 4 and, similar to the previous analysis, a significant association was found between the children's style of literacy interaction with the computer and the tendency to mispronounce words when reading (*Fishers exact*  $p=.035$ , two-tailed), with the more independent readers showing an increased tendency to mispronounce words.

Table 4 about here.

### Discussion

The work reported here indicates that the boys who had the lower phonological awareness scores at pre-test improved significantly more on the composite phonological awareness measure than the higher attaining boys did. This suggests that the use of the talking books software was particularly beneficial for those boys who initially showed lower phonological proficiency. Furthermore, the boys who showed lower phonological proficiency at the outset of the study appeared to engage with the talking books in a way that was appropriate to their developmental level, with most of these children bookbinding or chiming in with the computer. Both these forms of literacy learning interactions serve important literacy functions in early reading development. Guppy and Hughes (1999) argue that bookbinding encourages children to develop meaning making

skills, developing children's understanding of what a story is, how to interact with a text and how to make predictions about what will happen next. It also supports the initial development of phonological and alphabetic awareness, as it can support letter recognition, the detection of recurring patterns of text and sound, and help to build a child's sight vocabulary. Chiming in, or commenting and echoing what was being read by the computer, may furthermore result in a more confident approach to word reading, by encouraging children to try out and develop alternative reading strategies in a safe environment. It was also evident that the boys with better phonological awareness were observed to use the computer to engage in more advanced styles of literacy learning, where they took responsibility for decoding the text but used speech feedback to support them when needed. This explains why the less proficient children were observed to use the speech feedback more often – they needed to in order to attempt the task of reading.

There is an interesting separation of effects in the analyses presented here. As noted, the lower attainment group was seen to benefit from using the talking books in terms of phonological awareness attainment. However, it was also found that the boys in the higher attainment group showed a significant change in their reading errors, as they increased in their tendency to mispronounce words. Mispronunciation errors are significant as they are indicative of a phonic-based attempt at decoding. So, although the boys with lower phonological awareness improved their phonological knowledge it was the higher attaining children who more likely to attempt to increase their attempts to apply it to reading. Taken together these results suggest that the talking books do have the potential to support reading development in both ability groups, albeit in different ways dependent on the boys' developmental level. Similarly, an association was found

between literacy learning style and reading strategy, in so far as adopting one of the more independent interaction styles was also associated with the increased tendency to make mispronunciation errors.

Contrary to previous work with dyads (Wood *et al*, 2005), the boys in this study did not engage in undirected play around the computer, rather they utilised the talking books software adaptively, drawing appropriately on different features of the software to resource their reading activity according to their phonological proficiency. This suggests that the use of such software could have a potentially valuable role to play in supporting the literacy development of boys who are beginning readers. However, it also crucially underscores the importance of not making generalised statements about the ways in which computer software might resource boys' literacy development. The work presented here indicates that the features of such software may be 'taken up' differently according to the boys' attainment in literacy and mode of working (for example, as an individual or in a dyad). The context in which the activity is located (for example, school or home) will also have a crucial bearing on the boys' interpretation of the task and the associated ways of engaging with and using the software.

In the current climate of anxiety concerning boy's literacy attainment, it is vital that we move beyond the notion that computers are 'engaging' and 'appeal to boys'. The results of this initial, relatively small-scale work which focuses in-depth on boys' use of just one specific talking book, clearly indicate that phonological awareness affects boys' software use. What is needed now, then, is a sustained programme of research, which builds on and complements work such as that reported here, to construct a more detailed understanding of how specific computer technologies may resource or constrain boys'

literacy learning interactions and how these interactions are further mediated by individual differences and social context.

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Table 1

*Mean values for the boy's phonological awareness performance at pre and post-test and the boys' use of the speech feedback features of the software (SD in parentheses, \*p<.05).*

	Higher Phonological Awareness Attainment (N=9)	Lower Phonological Awareness Attainment (N=9)
<b>Rhyme Detection</b>		
Pre-Test	10.6 (5.0)	4.4 (3.5)
Post-Test	11.9 (4.4)	7.9 (5.8)
<b>Rhyme Production</b>		
Pre-Test	8.1 (2.0)	2.2 (2.0)
Post-Test	8.8 (3.4)	2.2 (2.2)
<b>Alliteration Detection</b>		
Pre-Test	7.7 (1.5)	4.7 (2.5)
Post-Test	9.0 (1.4)	5.7 (2.9)
<b>Alliteration Production</b>		
Pre-Test	9.9 (2.4)	4.1 (1.6)
Post-Test	8.9 (3.0)	5.7 (2.9)
<b>Rapid Picture Naming</b>		
Pre-Test	129.9 (33.4)	168.6 (47.6)
Post-Test	120.5 (46.2)	168.7 (43.9)
"Read the Page"*	.2 (.7)	6.6 (6.8)
"Read the Word"*	33.6 (36.1)	117.4 (69.0)
"Segment the Word"	1.6 (3.2)	3.3 (4.3)

Table 2

*The number of boys who were observed to adopt one of the literacy learning styles in each phonological awareness attainment group.*

	Higher Phonological Awareness Attainment	Lower Phonological Awareness Attainment
Bookbinding	0	4
Chiming In	0	3
Supported Reading	5	2
Fluent Reading	4	0

Table 3

*The number of boys who showed a change in miscue from pre to post-test, broken down by phonological awareness attainment group.  $p < .05$ .*

	Higher Phonological Awareness Attainment	Lower Phonological Awareness Attainment
Mispronunciation*		
Increase	5	1
No Increase	3	8
Substitution		
Increase	3	5
No Increase	5	4
Refusal		
Increase	3	2
No Increase	5	7
Addition		
Increase	1	1
No Increase	7	8
Omission		
Increase	0	1
No Increase	8	8

Table 4

*The association between the boys' literacy learning style and changes in miscue from pre to post-test. Values shown represent the number of boys who were observed to belong to each category. \*  $p < .05$*

	Less Independent	More Independent
<b>Mispronunciation*</b>		
Increase	0	6
No Increase	7	4
<b>Substitution</b>		
Increase	4	4
No Increase	3	6
<b>Refusal</b>		
Increase	1	4
No Increase	6	6
<b>Addition</b>		
Increase	1	1
No Increase	6	9
<b>Omission</b>		
Increase	1	0
No Increase	6	10