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Using TRAY, a Text Reconstruction Program, with Top Infants

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ABSTRACT *There have been several reports of the use of the computer program TRAY with junior and secondary age children, which raise many issues, particularly concerned with its likely effects on language development. There have, as yet, been no investigations into the use of the infant version of this program with infant children. This article describes such a study, in which groups of top infants were observed using the program. Several issues arising are discussed, including the stimulus for language and reading provided by the program, and the question of selecting appropriate texts to use with it. The study demonstrates that using the program with top infants is feasible, and suggests issues for further investigation.*

Introduction

The last few years have seen an enormous growth in the number of computers in use in primary classrooms in Britain, largely due to the government's decision to support the purchase of one microcomputer by each primary school. But the early perception of the microcomputer in primary education was as a stimulus for the development of mathematical thinking. Much of the early software intended for language development was of poor quality, often giving only repetitive practice of narrow skills (Wray, 1986). The position has improved greatly in recent years but, increasingly, a consideration of the implications of microcomputing is focused not on 'language' programs, but on the influence on language development of the use of micros throughout the primary curriculum.

Adventure games and realistic simulations demand use of reading, thinking, discussion and role-playing skills. Even very young children can now have access to a whole range of text handling programs, which include word processors, teletext emulators and magazine-format simulations. In the infant age range, the use of concept keyboards allows whole words or phrases to be integrated easily into word-processed texts, either as the only means of input, or to provide a word bank which can be used in conjunction with the conventional keyboard. Some primary schools are already making extensive use of electronic mail to enable pupils to communicate with schools in their own area or on the other side of the world (Wagstaff, 1986). Potentially, some of the most useful resources for language development are well designed, content-free programs. In spite of their acknowledged value, such programs, with the exception of word processors, are relatively under-used (King,

1986) perhaps because they are time-consuming to prepare and their potential may not be immediately obvious to the teacher.

One such program, TRAY, which requires pupils to reconstruct a text, starting only with the punctuation as a guide, was published as part of the MEP Primary Project. Infant TRAY, a simplified version, was developed in 1985. A few accounts have been published describing the use of TRAY with older primary and secondary age pupils, (Lewis, 1984; Ball, 1985; Johnston, 1985a; Govier, 1985; Wailing & Loney, 1985). However, there seem to be no evaluative comments published on the use of Infant TRAY, either in educational computing journals, or in the literature on reading and language development. The aim of this brief study was to introduce infant TRAY to a few small groups of six and seven year olds, and to attempt some comment on the opportunities it offered for reading and language development, and the selection of suitable texts for children of this age.

Infant TRAY is a simplified version of Developing TRAY, written initially for use with secondary age slow-reading pupils. The name derives from the idea of a print gradually coming into focus in a photographer's developing tray. Starting with a screen showing only punctuation and a series of dashes to represent letters, the pupils gradually reconstruct the extract, initially by 'buying' letters then predicting words or phrases as the text becomes clearer. The infant version, though lacking some features, is essentially the same in use. Both have a complementary program, CREATE, which enables teachers to type a text into the program for pupils to reconstruct. Infant TRAY has an additional facility which enables some letters to be revealed before the children approach it. When in use, the program has some additional options available. Letters can be 'bought', and, if the group gets hopelessly stuck, the whole text can be displayed. In addition, partly completed texts can be saved and completed on another occasion.

Although TRAY has considerable potential for the development of reading and language, it is difficult to categorise in terms of the main types of computer software available to support the language curriculum (Wray, 1986). Those who have used it with older pupils report the collaborative nature of the activity and its usefulness as stimulus for discussion, particularly as a means of making the pupil's reasoning process accessible to others (Govier, 1985). Johnston, in a major study of the use of TRAY by secondary pupils, writes: "TRAY requires high level problem solving skills: an analysis of given data and other information; decision-making about strategies to adopt; the creation and interpretation of meaning; hypothesis forming and testing; evaluating data and strategies; imagining; referring to other sources of information; experimenting (Johnston, 1985a). A distinct effect on children's poetry writing is claimed by Wailing & Loney (1985), with a more imaginative use of vocabulary and a strong switch away from rhyming couplets, after working on TRAY texts written in blank verse. Only one group of children, from a first year remedial set, were described as failing to work effectively with the program, although it should be acknowledged that failure, in general, is unlikely to be described in the literature.

Although slightly different in structure, TRAY uses techniques that closely resemble cloze procedure. The major difference is that in a TRAY text, parts of words and phrases can be predicted, as well as individual words. As in a cloze activity, the emphasis is on the importance of using prediction as a strategy for fluent reading. Jongsma, (1971) claims that research into cloze as a teaching technique suggests it is most effective when conducted as a co-operative exercise

and combined with small group discussion. Early microcomputer based cloze exercises would accept only 'correct' or original word completions. More recently, however, Walker & Potter (1984) have produced a program which can be regarded as a divergent cloze technique. Children can be asked to think of more than one possible answer to fit a single deletion in a cloze exercise. Both the use of context and discussion are encouraged.

Design of the Study

Four different extracts were used during this study. Two of them, texts one and two, are files included on the TRAY disk, and are based on the Gay Way and Ginn reading schemes. Two others were taken from *The Elephant and the Bad Baby* by Elfrida Vipont and *Mog's Christmas* by Judith Kerr, and made into TRAY files using the CREATE utility. All of the children had met the material before, either in a reading scheme, or as a story. The exact text from the Ginn scheme may not have been read by all of them, but was, in any case, based on a fairy story. The two story books had been read to the class, although some time before this study took place. *The Elephant and the Bad Baby* had been dramatised as a class assembly during the Autumn Term. The texts are given in Appendix 1.

In all, five sessions using TRAY were organised. The work involved children from a class of top infants who had all had previous experience with the computer. Their discussions as they used the program were recorded.

Results

Session One

Text one, with the eight least common letters revealed.
Taking part: two boys, Mark and Gavin who were competent readers in terms of the class, but could not be described as 'natural' or avid readers.
Length of session: 32 minutes.

Once they got used to using the cursor keys the boys had no difficulty with the keyboard controls for TRAY, and were not disconcerted when the upper case letters were temporarily included in words on the screen. They made some predictions, such as 'lorry' from the word shape, and noticed similar patterns elsewhere in the text, but generally relied on phonic skills to decide on the words:

> *Gavin:* Lorry and lorry. There's another lorry. Mark, do that one. (pause) Went! Went! There should be a 't' there... at the end.

They were sometimes confused and wanted to make a predicted letter the initial sound in a word: 'Deb' for example, when they were considering the 'b', was read as 'bed'. Sometimes they counted the number of letters in a word to check their ideas.

At the outset, one of the boys, Mark, dominated the use of the keyboard, although ideas came from both of them. Gavin made a claim to be included:

> *Gavin:* I'm not moving it. Mark, move it up to there a minute. Oh, Mark! Miss Haywood...
>
> *Mark:* Yes, look at that!
>
> *Gavin:* I should know how to do it because my cousin got this game at home. I should be doing that. I knows how to do it.

Towards the end of the session the two boys began to co-operate and took turns.

Gavin: Now it's your turn, i'n' it? You've got to take it in turns and then it'll be fair. Now it's your turn now. Then it's my turn.

As the text was revealed, the boys began reading through it, putting in words, rather than letters, and correcting themselves. They used forward acting cues, but never read beyond a missing, or partly revealed word to discover meaning. There was lively discussion of possibilities in the text. Discussion only strayed off the text towards the end, when the teacher sat down with them and was asked about the additional computer the school had bought.

It was clear that both boys had enjoyed the session. They had already asked if they could go on to another screen, and relished telling another child how 'hard' the exercise was.

Session Two

Text two, with the eight least common letters revealed.
Taking part: Matthew C., a mature and confident child who enjoyed books; Denise, who had a very strong personality and who was a competent, but not avid, reader; Chris, a quiet boy and an average reader.
Length of session: 40 minutes.

This group tended to use different skills from the first two boys when tackling their text. The dominant personality in the group was Matthew, who directed the work, especially towards the start of the session:

Denise: I haven't had a go yet, or Chris.

Matthew: I know, but you're pressing RETURN when I've finished.

This group had more difficulty at first with the operation of the program, although they became used to it after a while. They began by predicting words for the text, basing their guesses on the look of the partly revealed words. Denise was particularly keen to predict whole words, rather than check letter by letter:

Don't do that. If you know a whole word, she said, type the whole word first.

They did not seem to use phonic skills in the same way as the previous group. No reference was made to the sounds of letters in words, although visual cues, such as word length, were used. Unlike the two boys in the first session, these children made full use of context to predict words, employing forward and backward acting cues:

Wolf? Ah! Wicked wolf!

On another occasion:

Denise: Little Red Riding Hood looked...

All: Little Red Riding Hood looked...

Matthew: Looked at what, though?

Denise: I wish it was in!

On one occasion letters from a partly revealed word were used to construct a prediction that was grammatically acceptable, but a nonsense word:

Denise: Little Red Riding Hood looked... Little Red Riding Hood looked... grassly?

The group obviously enjoyed using TRAY, remaining in during their break, by choice, to work on it and asking for another text at the end of the session. Towards the end they became very excited as the extract was almost completed:

Oh Granny, what big teeth you have. All the better to... see... you with my dear. We've done it!

Chris' contribution of "Or eat you with" was not taken up and 'eat' had to be revealed by trial and error.

Session Three

Text three, with the ten least common letters revealed.
Taking part: Mark and Gavin.
Length of session: 30 minutes.

The boys found this text much more difficult than the previous extract from the early Gay Way reading book. They revealed individual words at first, basing their predictions on visual cues and word length. Phonic cues were also used, but were far less effective with this text than on the first occasion the boys used TRAY. They seemed far more willing to co-operate and share the typing this time.

Mark and Gavin were not able to extend their range of strategies for tackling the text. They again used forward acting cues:

In the... m... i... In the medal... In the middle...

Sometimes, when they predicted the correct word, their inability to spell it led to the word not being accepted into the text. This then made them think their choice of word was incorrect:

Gavin: In the middle of the... river, it could be. (Typed in the letter 'I')

Mark: Ha ha! Not river

Gavin: O

Mark: Road!

They tried to type in 'road' but failed, and then went back to typing 'river'. Their inability to use context was, perhaps, due to the difficulty of the extract, and the confidence with which they started quickly waned. Even when the source of the text was explained they needed help to complete it.

If children like this were working alone on a TRAY text, it would have to be simple enough, or sufficiently familiar, for them to have reasonable confidence in their predictions. Then they could be encouraged to check the spellings of words they thought appropriate, rather than accepting the computer's apparent rejection of correct guesses.

Session Four

Text three, with the ten least common letters revealed.
Taking part: Matthew C. and Matthew J. a below average reader but a boy with an extensive vocabulary and good spoken language.
Length of session: 45 minutes+.

The two children who had worked with Matthew C. on the first text were both absent so he was joined by another boy, Matthew J. They were more successful with the text than Mark and Gavin had been, but even so they found it quite difficult. Once the most obvious words had been revealed, they asked for help, in a roundabout way:

Matthew C. Say that we've done quite a lot but we can't read it... that we're trying to get some more clues to do the rest.

Matthew C., having worked on a text before, realised the importance of discovering the source of the extract:

Matthew C. We've got to find out what the story is and then it gets easier.

Matthew J. Three pigs? 'Cause it has got a 'p' there.

Matthew C. We'll try it... I don't think it is, no.

They used forward and backward acting cues, as well as looking for visual similarities in words:

In the middle of the... road. So that could be road.

On another occasion:

Then the elephant said to the bad baby... something... you haven't... something... said... please!

The most interesting discussion focused on what caused the baby to fall off the elephant:

Matthew J. Stopped?

Matthew C. Why don't we try and find all the different words of stopped.

Matthew J. Halt.

S.H. Any more?

Matthew C. Stay there... Don't move.

As the text neared completion:

Matthew C. Then the elephant sat down... something... in the middle of the road and the bad baby fell off.

S.H. Why do you think the baby fell off?

Matthew C. 'Cause he stopped so suddenly that she toppled over.

S.H. How did the elephant stop?

Matthew C. Stopped so... suddenly!

Like Mark and Gavin, they had a problem spelling one word, but had the confidence to check it, rather than accept immediately that their idea was incorrect:

Matthew C. No it can't be middle... Is there two 'd's in middle?

Session Five

Text four with the ten least common letters revealed.
Taking part: Matthew C. and Sarah, an above average reader.
Length of session: 45 minutes+.

It was hoped that the text used for this session would have proved intriguing for the two able readers who attempted it. In the event, they did not realise or

remember the source of the extract, and it proved too difficult for them. Only about half of the text was revealed, and much of this was done by typing in letters at random. The relationship between the two children as they worked was aggressive, perhaps exacerbated by their obvious frustration with the difficulty of the exercise. Matthew made the most effort, and tried to direct the work:

> We can't flick through the letters all the time!

They made some attempt to predict:

> *Both:* Suddenly Mog woke up. She saw a tree. It was a tree walking. Mog said...
>
> *Sarah:* Help!
>
> *Matthew:* Yes, but it can't be help; it's five letters.

But generally their attempts were half-hearted. The text was clearly unsuitable, even for these two able readers.

Issues Arising

Although this was a very brief investigation of the use of TRAY by top infants, some important issues did arise from observation of the groups, and from the evidence provided by the tape recordings of the children's discussion.

1 Stimulus for Reading and Language

The program undoubtedly provided a stimulus both for reading and for group discussion. The children used several different strategies to reveal words, including predicting letters, groups of letters forming sounds, and words; using forward and backward acting cues; looking at word length, patterns of words and syntax. This activity is complex and relates closely to the problem-solving nature of reading as described by researchers such as Smith (1978). Prediction is central to the process of disclosing text, as it is to reading itself, even for young children. As Clark observed in her study of young fluent readers: "It is important to define the task of reading as predicting one's way through print and to focus even in the beginning of teaching reading on anticipation and discrimination rather than identification" (Clark, 1976).

Discussion of possible alternatives in the text was often lively, such as with text three, when the group was trying to establish the words which were eventually revealed as 'sat down suddenly'.

2 Concentration

The sessions were quite long, especially considering the age of the children concerned, generally lasting between 30 and 45 minutes. As long as the text was within their capabilities the task held their attention, and discussion rarely strayed from the activity. This attention to the text has been reported amongst secondary pupils (Johnston, 1985b), as well as 'A' level students (Lewis, 1984) and it is pleasing to see that very young children can sustain interest and concentration on a similar task.

3 Providing Practice in Phonic Skills

Depending on the selection of the text, the teacher can focus on specific reading skills. The boys who worked on text one, for example, used phonic skills without being prompted. This was obviously a successful strategy for dealing with a text from a reading scheme with a phonic basis. A teacher wishing to encourage practice of such skills can select appropriate texts which will do this. Particular sounds can be emphasised by using the third option available to partially reveal the text before children start work on it. This enables certain letter groups only to be shown in the words on the screen, so that children build up text around certain sounds. Although teachers may wish to encourage the adoption of strategies other than decoding to sound, the use of this method by lower junior children has been noted elsewhere (Ball, 1985).

4 Selection of Texts

It was assumed before the study that the selection of suitable texts for TRAY would be relatively easy. This was found not to be so, but obviously the suitability of the material used is crucial to the success of the children using the program. TRAY for infants displays double height letters on screen, and is limited to a maximum of six lines, each of 40 characters. The version of TRAY for older children allows much longer texts to be used, by incorporating a more dense screen display. Quite apart from the benefits for young children of having a clear display, it would be impractical to present a longer extract. Even with eight to ten letters already revealed at the start of the session, these children still took between 30 and 45 minutes to complete the text.

However, it is not easy to find extracts that are stimulating, coherent and meaningful within the constraints of the available text length. Perhaps if TRAY was in use regularly with a class this would be easier, as familiar extracts from a recent story or serial could be used. Over a period of time, too, a teacher could build up a collection of suitable texts, rather than looking for them artificially, to use with children with whom she did not have daily contact.

The extract from *The Elephant and the Bad Baby* was successful with one group, perhaps because they remembered it sufficiently well. Matthew C. indicated to his companion the advantage of knowing the source of the text:

> We've got to find out what the story is and then it gets easier.

The account of Mog the cat watching a Christmas tree move and talk was the least successful. Instead of proving intriguing and challenging, the children did not recall the story and it was then difficult, even for two quite able children, to reconstruct the text.

5 Accuracy of Spelling

The question of spelling needs some consideration as the program does not accept incorrectly spelt words. During two sessions, mistakes in spelling meant that correct predictions were not accepted into the text. The notion of the computer's 'infallibility' is very strong for some young children, and they may need encouragement to have confidence in their own ideas, and perhaps check spellings with an adult, before accepting that their predictions are not correct.

6 Classroom Organisation

This study was conducted in artificial conditions, as far as classroom management was concerned. Of the five sessions, four took place outside the classroom. On no occasion did the group have the undivided attention of a teacher, although the conditions in which they worked were obviously favourable. The question of adult involvement in children's discussion is itself controversial. Cummings (1985) illustrates the predominance of teacher-talk in conventional lessons, but adds:

> The microcomputer is able to provide a productive medium for inquiry learning if it enables children to turn the tables and become more accustomed to asking questions than answering them ... This is especially so in joint word-processing activities or with content-free programs like TRAY ... By verbalising we alert our perceptual expectations and talking ideas through in debate is more likely to achieve this than passive listening. (Cummings, 1985)

Does the involvement of an adult make this more likely? It is clear from the recordings that the children were frequently involved in lively discussion when working alone, and used various reading strategies to reveal the text, without prompting. However, there were also occasions when an adult could profitably have followed up a child's comments, such as after the following exchanges:

> *Matthew:* Little Red Riding Hood looked ... something ... and said ... something Granny ... something big.
>
> *Denise:* Could be anx ... anxiously.

Perhaps, in the normal work of the infant class, a nursery nurse or parent who was sensitive to the objectives of the program could work with a group. The children who took part in this study are well used to being assisted by parent volunteers with language activities, some of them computer-based, such as word-processing. In this way slightly larger groups could probably be involved, although it is appreciated that this sort of parental involvement may not be acceptable to some teachers.

Conclusion

While it is clear that from a small-scale investigation such as this one the scope for generalisation is small, it does seem that several useful points have emerged. The study demonstrates most importantly that using TRAY with a top infant group is feasible, and can have some beneficial results. For many teachers simply the fact that groups of this age were able to concentrate on a reading and language task for periods of between 30 and 45 minutes will be seen as sufficient justification for them trying similar activities in their own classrooms. Beyond this the study does raise some important issues which will need further, more detailed investigation. These chiefly concern the selection of texts to use with the program. One of the most highly-praised features of TRAY is that it is content-free, and allows teachers to use any texts that they consider appropriate for their particular children. However, as the study demonstrates, this begs many questions. More work needs to be done to provide teachers with clear guidance on the criteria to use when selecting texts. It is hoped this study will provide a stimulus for this work.

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Appendix 1

Text One

Deb the rat and Meg the hen sat in
the red lorry.
Ben the dog and Jip the cat sat in
the red lorry.
The red lorry went up the hill.

Text Two

Little Red Riding Hood looked again
and said,
"Oh granny,
What big teeth you've got!"
"All the better to eat you with my
dear!" said the wicked wolf.

Text Three

Then the elephant said to the bad
baby "But you haven't once said
please". Then the elephant sat down
suddenly in the middle of the road
and the bad baby fell off.

Text Four

Suddenly Mog woke up. She saw a tree.
It was a tree walking. Mog said
"Trees don't walk. Trees should stay
in one place". She ran up to the roof
in case the tree came to get her.