CAL Abstract

Can natural language recognition technologies be used to enhance the learning experience of young children?

Background

Natural language as a bridge to useable technology.

The features of word processors are well documented; spell checking, word prompt, syntax and grammar interventions are all standard. Numerous studies have shown that the use of a word processor can assist in teaching language skills. Sturm, Rankin, Beukelman (1994) suggested that use of word prompt improved spelling skills. Newell (1992) reported 17 case studies where word prompt lead to an improvement in quality and quantity of written work
Spell checking –

Rather more subtle is the effect that the use of word processing software has on the creative process of writing. Here, research is somewhat divided but Kurth (1987) suggested that although the use of a computer did not improve the quality or quantity of childrens writing, the high visibility of text on the screen fostered more conversation about the writing, and the spelling was improved.

Given that there are benefits to be gained from the use of word processing software, children are generally encouraged to use electronic text where possible within the school environment. Access to the software is traditionally via a QWERTY keyboard which to novices is a difficult interface to master. Hermann (1987) suggested that learning to handle the keyboard interferes with the writing process – there are many practitioners today who are unhappy or at least uncomfortable with composing at a keyboard. If this is the case, then the use of more natural interfaces, such as speech and handwriting recognition, may be more desirable.

Speech technology and handwriting technology are both natural technologies. Each have advantages for children in that they become familiar with them at an early age – however they are disobedient technologies in that they cannot be relied upon to give 100% accuracy. It is often suggested that 95% accuracy is the highest attainable. Given this, there is a question over their efficacy as input technologies. Speech recognition has been used with secondary school age children with accuracy rates of 82% – Eamonn O'Hare and Michael McTear (1999), who also reported much faster input with rates of 50 wpm rather than 10wpm at the keyboard. A small study by Masterson (1999) suggested that speech recognition reduced the percentage of both grammatical errors and spelling mistakes when compared with traditional keyboard entry.

Handwriting recognition is a newer technology – in order to participate, the user needs a 'pen' and a graphics tablet. An early experiment in Read, MacFarlane, Casey(2000) gives an encouraging picture in relation to handwritten input with quite young children. In this study, childrens handwriting was traced onto the machine by an adult and a Character Error Rate recorded. Recognition rates in excess of 80% were recorded.

This abstract reports on a further study which is currently taking place using the same cohort with both handwriting and speech recognition technology as input media. In addition to measurements relating to the accuracy of the software, the 'feel' of the interfaces is being examined, in an attempt to establish if children prefer this natural technology to the keyboard. The 'word input rate' as well as the 'correction time' are being measured, together with a 'satisfaction coefficient.' 30 children aged between 6 and 10 are taking part in the study which is intended to examine whether or not children write more freely with the aid of natural language recognition technology.

Further work may include a study into the correction techniques adopted by the children, and whether or not this has a significant effect on their language development.

References

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AB: A 2-year study examined writing skills development of 11- and 12-year olds with
unlimited access to word processors. Samples of the 22 subjects' narrative writing
were
compared with samples from a parallel class that used hand writing methods. Results
indicated that the children using word processors produced better quality writing than
the
children using pen and paper. (AJH)