Reader, Writer and Student Models to Support the Writing Process

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Abstract: This paper introduces a triad of user models to support student writers. A reader model gathers information about the target readership. Its construction by the student aims to help them focus on the expectations of their readers. A writer model is inferred from answers to brief questions about the student, and holds information about writing strategies. This enables advice to be tailored to the student's preferred approaches to writing. A student model is inferred from on-line help pages viewed by the writer, and from information given by them. This enables additional information to be consulted. The models are designed to improve the performance of on-line writing environments by serving appropriate, individualised advice, as needed.

1 Introduction

There is much interest in helping students write appropriately for their particular academic discipline and audience, as evidenced by the literature dealing with research on writing and its implications for the classroom (e.g. Grabe & Kaplan, 1996; Kroll, 1990), and texts for students (e.g. Jordan, 1996; Swales and Feak, 1994). There are also an increasing number of Online Writing Labs (OWLs), many containing detailed advice for students, according to the needs of their courses (e.g. Cogdill, & Kilborn, 1997; Jordan-Henley, 1998; Williams & Liem, 1996).

It would be useful to offer information to supplement static material in OWLs, based on users' writing strategies and characteristics of the target readership. We describe ScRAWL, a user modelling system with this aim, comprising a student, reader and writer model. ScRAWL may be used with any web-based Help; the reader and writer models may also be used independently.

2 The ScRAWL Models

Since writing is open-ended, traditional student models are insufficient in this context. Student contributions to a student model have recently been used to improve its accuracy (Beck et al, 1997; Bull & Pain, 1995; Dimitrova & Dicheva, 1998; Kay, 1995). The ScRAWL models develop this approach, with differing levels of student-contribution according to the role of the model. The 3 ScRAWL models take account of Student Concerns; Reader Attitudes; and Writer Leanings.

The Student Model (*SM*) has two components: SM^{system} and $SM^{student}$, containing information about areas of concern for the learner. SM^{system} is a system maintained, inferred model. $SM^{student}$ comprises a learner's own contributions: it supplements SM^{system} with the student's *stated* beliefs. The Reader Model (*RM*) is also created by the student, in answer to system questions about their target readership. This supports reflection on the requirements for the audience of the written product, by considering readers' likely attitudes to the work. This model serves also as a checklist for use on completion of a document. The Writer Model (*WM*) is co-constructed by the student and system. It is in part inferred from student responses to questions, and in part from student amendments to these inferences. *WM* represents a student's orientation to writing, enabling support according to their preferred way of writing–the writer leanings.

2i The Student Model

SM^{system} is related to Help Pages viewed. Each time a student views a Help Page, 1 is added to the cumulative score for that page. SM^{system} assumes Help viewed on several occasions describes an area of difficulty. Help viewed once only, indicates the learner may need further sup-

port, or they understand the information because they used Help. (Therefore, on the first viewing, no implication is derived.) As soon as a page is accessed a second time, the representation moves into the active part of the student model. The representation of difficulty level increases with viewing frequency, from 'potentially difficult', through 'difficult', to 'very difficult'. From this information ScRAWL offers easier access to pages, by selection from an ordered, individualised menu. Further, ScRAWL can suggest additional web pages that a learner may find helpful.

$SM^{student}$ is complementary to SM^{system}: it enables students to contribute to the contents of *SM*. The potential contents of $SM^{student}$ are determined by the Help topics available, as defined by the student's tutor. The actual $SM^{student}$ is then constructed by the learner selecting amongst alternatives offered. Whereas SM^{system} is fully inferred, $SM^{student}$ is *given* by the learner, and is not dependent on viewing frequency. When a student no longer has problems with an issue in either part of *SM*, they may remove it. Since *SM* provides information to enable easily accessible Help for an individual, it does not contain representations where the learner is competent. The lack of a representation indicates the topic is irrelevant, or the learner has no problems. Alternatively, the learner may hold a misconception about which they are unaware, and so have not sought Help. The system cannot detect such cases; these should be picked up by the tutor.

2ii The Reader Model

RM prompts for information about readership, e.g. whether the readers are knowledgeable about the subject; whether they will be sympathetic or critical to the argument, etc. Advice is offered based on the answers, in the form of questions for the author to consider, e.g.:

Your readers are not experts:
- Is it clear *what* is important?
- Is it clear *why* it is important?
- Have you defined your terms?
- Have you provided adequate examples?

An advantage of creating *RM* is that it encourages authors to reflect on aspects of writing that can be easily forgotten, despite their obvious importance. *RM* can be brought into use at the appropriate stage for an individual writer–for example, at the start for planners, and perhaps later for discovery writers. A second advantage is that the *RM* can later be used by the writer as a checklist, to ensure that important issues have been included in the document, and that the level or detail of content is appropriate for the particular readers. *RM* remains accessible for author viewing throughout writing. It may be modified by the writer at any time, as might be useful, for example, if a student is revising a previously written document for wider circulation.

2iii The Writer Model

Authors have varied approaches to writing, described by Chandler (1995) as *architect*, *bricklayer*, *oil painter* and *water colourist*. These distinctions were further investigated by Wyllie (1993) in the context of composing on the word processor, with an additional category: *sketcher*. These strategies are briefly defined thus (from Chandler, 1995; Wyllie, 1993):

Architects	usually plan thoroughly before starting to write. They tend not to correct slips as they write, but edit the whole text on completion.
Bricklayers	usually rework sentences and paragraphs, forming a solid foundation before moving on.
Oil painters	do not usually plan, but write down ideas as they occur to them, revising later.
Water colourists	usually write a single draft which needs little revision.
Sketchers	tend to form a rough plan at the beginning, which is later revised.

WM helps writers build a model of their writing style by asking 8 questions, requiring answers on a 5 point scale (always; usually; sometimes; rarely; never). These questions were considered most likely to reveal writing strategies accurately, based on the results of Chandler and Wyllie.

1 Does writing help you to organise your thoughts?
2 Do you correct slips as you write?
3 Do you complete a draft at the first attempt?
4 Do you start with the easiest part?
5 Do you find the screen restrictive?
6 Do you consciously choose writing strategies?
7 How much do you *revise* your text at the *end* of writing?
8 How much do you *plan* at the *beginning*?

ScRAWL then offers a series of suggestions to the writer, based on their writing strategies, e.g.:

Because you usually 'discover' your text as you write, try also to think about your readers while writing. Make sure your developing text satisfies the needs of *these* readers.

Individualising advice based on writing strategies is important, since writers may prefer one approach, or one set of approaches over others (Snyder, 1993). They may also find it difficult to change strategies (Wyllie, 1993). Further, authors may often be writing in a familiar genre, with well-developed, effective strategies (Torrance, 1996).

3 Summary

ScRAWL's triad of user models is designed to complement static information provided by OWLs. *SM* has two components: SM^{system} and $SM^{student}$. *SM* offers tailored Help about aspects of writing, according to a student's difficulties. SM^{system} is inferred, and is thus the most familiar kind of user model. $SM^{student}$ is constructed entirely by the student. *WM* enables individualised suggestions according to a student's writing strategies. It is built cooperatively by the student and system. *RM* models the target readers, advising the student writer according to the likely expectations of their readership. It is created by the student, in response to system prompts. *RM* is unusual as it is not a model of the current user–it models how the recipients of the user's undertakings might view the outcome of their efforts. Creating this model and reading the subsequent advice is designed to help authors focus, and thus contributes to the individualised Help received by a user based on the contents of *SM* and *WM*.

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