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Adapting methods for teaching work-based literacies to a changing workplace context: Using protocol-assisted modeling

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1. Introduction

1.1 Context for the study

The field of technical writing has undergone significant changes over the last fifteen years. No longer is it sufficient to have “good writing skills” and produce clear manuals. Changing business practices have profoundly transformed what traditionally were writing tasks into the full-scale management of a company’s “*information meta-products*”. Writing professionals must now design information by skillfully combining several semiotic resources for each audience, situation and context, including textual, visual, spatial, audio, video, and code. One question teachers can legitimately ask in this context is, how can university programs in professional writing best help prepare students for such complex work-based literacies?

While teaching particular professional genres (e.g., a set of instructions, a user manual) can be one way to start, it is highly unlikely that such knowledge alone will help students learn to function successfully as professionals in such a complex, dynamic and multi-semiotic context. This observation is made even more salient when we consider that since Ivanič (1998) we know that mastering contextual discourses and genres is as much, if not more, a matter of taking on new – and often competing – identities as it is of knowing how to wield the relevant surface features of the genres students will need to produce as professionals. For this reason, students typically have a hard time taking on an authentic voice and professional identity in their productions, an entirely expected problem since they are not yet legitimate members of the workplace community they are aiming to participate in (Lave & Wenger 1992).

The problems engendered by taking on new identities have been central in writing research since Ivanič (1998). In effect, the difficulties involved in taking on the identity of a target community can impede a writer’s legitimate participation in that community (see also Lea & Street 1999, Lillis 2002, Street 1995, 1997). Today, much work still remains to be done on exploring the implications of identity for teaching professional and academic writing. In technical writing, for example, developing a relevant professional identity requires simultaneously fostering relevant attitudes and behaviors as well as skills in technical and professional writing, information design, visual design, user studies methods, project management, scientific research methods, web/mobile application design, tutorials and online help design, and communication strategies.

This topic is also an important area of research for international networks of writing researchers, especially in terms of intercultural communication. In effect, students in professional and academic writing programs in Europe are most often required to navigate the conditions of learning to write not only in their first language, but often in one or several additional languages, as well. What this has to say about switching between the salient and implicit norms from one language to the next is very relevant to issues of identity in writing, as it adds to the complexity of the task. Students learning the indexicalities of professional writing in the context of technical communication and information design must also attend to the ways in which those indexicalities differ across cultures. In addition to writing, they must learn to pay attention to the indexes of community belonging – attitudes, behaviors, implicit mental representations – including navigating how these indexicalities are expressed differently in different cultures. This is certainly the case for professionals who were former students in our program. Today they must juggle managing technical communication projects across both languages and cultures, in French, English, and one or several additional languages

(German, Italian, Spanish, Portuguese, Russian, Arabic, or Chinese). Given the complex pedagogical needs of such students, it may perhaps be somewhat unexpected that the primary claim to be made in this paper is that stimulating awareness and consideration of audience, long a priority in writing research and pedagogy, is still essential. In effect, to be effective, writers need to have "an image of the intended audience interacting with the text" (Schrivier 1989, p. 4).

This paper describes results from an ongoing study mapping the emergence of situated work-based literacy in French and Dutch technical writing students, using a method specifically designed to elicit more well-developed representations of the actual readers and users of their work. It uses a modified version of Schriver's (1992) protocol-assisted modeling (PAM) approach, designed to help writers construct a more accurate mental model of how readers think and react to information. Fifteen students enrolled in a master's program in technical communication participated in a semester-long study in which they were asked to predict potential problems for readers in six poorly designed documents, then revise their evaluation based on a think-aloud protocol transcript showing how the document's actual users reacted to it. A post-test assessed changes in their ability to anticipate reader problems. Writing pedagogies such as these may better contribute to the long-term construction of students' professional identities. In addition, the approach could very well be a relevant addition to writing pedagogies by researchers in discourse studies, applied linguistics or English Language Teaching, in that it specifically helps students learn how to better target the specific audiences they are writing for, including audiences whose native language and culture are not those of the author.

2. Background: What is protocol-assisted modeling?

2.1 Protocol-aided revision

In the early 1980s, Hayes et al. (1981, 1983) developed a technique for helping writers to revise texts based on a method they adopted from industrial performance testing: think-aloud protocols (also described at length by Carroll 1997). In this method, participants were asked to perform a task while thinking aloud as they interacted with a document and/or machine. Because they were asked to verbalize anything that came to mind while they were carrying out the requested task(s), their comments revealed the key difficulties they encountered while using the document, both in terms of problem type and placement.

The resulting technique adapted by Hayes et al. (1981, 1983), called "protocol-aided revision", provided think-aloud protocols to writers to help them revise their texts:

"Evaluators make visual and/or audio recordings of readers as they think aloud while comprehending a text. The transcripts are then analyzed for evidence of readers' problem-solving strategies, comprehension, misuse and error recovery, access and retrieval behaviors, inferences and predictions, level of satisfaction and preferences. This information was then used to guide the revision of: insurance forms, apartment leases, computer manuals, or medical support forms." (Schrivier 1989, p. 28)

2.2 Reader protocol teaching method

Schrivier (1992, 1997) adapted the protocol-aided revision approach to teach writing to university students, with the idea being that the approach would help writers develop a stronger image of readers. In a series of papers (Schrivier 1989, 1990, 1992), she reviews a number of reader-centered techniques that are typically used to help teach writers how to create "an image of the intended audience interacting with the text" (Schrivier 1990, p. 4). Among them, she cites audience-analysis heuristics, peer review, and role-playing, which she found to be less successful than another technique, "protocol-assisted modeling" (PAM, also known as the "reader protocol method", Schriver 1992, and "protocol-aided audience modeling" Schriver 1997, p. 475). In an experimental study (Schrivier 1992), she compared the effectiveness of traditional audience awareness methods

and PAM, and found that students who were exposed to the PAM method were: “better able to diagnose problems from the readers' point of view; more sensitive to problems caused by omissions or information gaps; more aware of problems at the global level of text.” (1992, p. 202)

The PAM method was shown to improve her student writers' ability to anticipate readers' needs. She suggested that the method could be used as a helpful supplement to other methods for teaching the process of 'imagining the reader.' As she also argued, the method shows significant potential for teaching tacit and perceptual knowledge because no explicit instruction is given to students on how they are to evaluate the texts and anticipate reader problems. In other words, by analyzing samples of reader responses to various texts, students gradually create their own 'intuitive', but empirically grounded, understandings and mental representations about real reader information needs. This is important because

Previous research and classroom experience tell us that examples can be powerful ways of teaching perceptual knowledge, that is, the “seeing” or “listening” abilities that allow people to recognize significant categories of objects or events in their environment (Bransford, 1979; Brown & Campione, 1981; Sweller & Cooper, 1985; VanLehn, 1986; Zhu & Simon, 1987). Perceptual knowledge is important for instigating or guiding action in a variety of contexts for learning and doing. [...] In particular, I explored the hypothesis that extensive experience in interpreting readers' feedback (provided through transcripts of think-aloud reading protocols) would help writers to become more aware of how readers construct text. (Schrivier 1992, p. 182)

2.3 A description of protocol-assisted modeling

In this teaching method, in which students are taught over ten lessons to better anticipate reader reactions, Schriver (1992, 1997) proposes a four-part approach:

- (1) present students with a problematic document (i.e., a poorly written and poorly visualized document that will cause comprehension problems). Students are asked to read the text and identify problems for the reader;
- (2) give students a guided writing task in which they describe the features of the text they think will pose problems for the reader;
- (3) have students read a think-aloud protocol transcript of a user attempting to understand and use the document;
- (4) give students a second guided writing task in which they describe any other problematic features they may have missed when first evaluating the document.

Figure 1: An excerpt from a problematic document

EMACS: Commands for creating text

EMACS enables you to manipulate words, sentences or paragraphs of text. In addition, there are commands to fill text, and convert case.

Editing files of text in a human language ought to be done using Text mode rather than Fundamental mode. Invoke M-X Text Mode to enter Text mode. See section 20.1 [Major Modes], p. 85. M-X Text Mode causes Tab to run the function `^R Tab` to Tab Stop, which allows you to set any tab stops with M-X Edit Tab Stops (See section 11.3 [Indentation], p. 46). Features concerned with comments in programs are turned off except when explicitly invoked. Automatic display of parenthesis matching is turned off, which is what most people want. Finally, the syntax table is changed so that periods are not considered part of a word, while apostrophes, backspaces and underlines are.

If you are editing input for the text justifier TEX, you might want to use TEX mode instead of Text mode. See the file INFO: ETEX. INFO

A sample PAM from Schriver (1997, p. 477-478) is provided (Figures 1-4). Figure 1 shows an excerpt taken from a problematic instructions text, while Figure 2 shows the writing prompts students received after reading the original text.

Figure 2. First guided writing task, given after students read the original document

Writing task (1):

1. Read the draft document.
2. Predict the reader's problems with this document.
3. Write your answers below.

After describing the document features they predicted would be problematic for readers, students then read the think-aloud protocol transcript of an actual user trying to navigate that same document (Figure 3).

Figure 3. An excerpt from a think-aloud usability protocol transcript

Ok, now I'm going to try ... Commands for English text. EMACS enables you to manipulate words, sentences, or paragraphs of text. These commands sound like ones I'd use all the time, good. In addition, there're commands to fill text, and convert case. I don't know what it means to fill text, I guess it means putting data from one text into another ... that is, filling the text with what you want in it. Well, I guess I'll soon find out.

Editing files of text in a human language *human language? Boy that sounds strange, what could they be distinguishing here? Maybe computer language or machine language from human language?* ought to be done using text mode rather than fundamental mode. *Well, I don't know what text mode or fundamental mode is, so how will I know which I'm in? Let's see ...* Invoke MX text mode to enter text mode. *I won't do that because I don't have time to see the other section. That's terrible to tell me to...* See section 20.1 major modes page 85 MX text mode cause tab to run the function ^R tab to tab stop. *Now wait a minute, what is all this stuff? Sounds important, but I have no idea what it could mean. I know what tabs on a typewriter are, and I see a tab key here, but what the heck does running the function ^R tab to tab stop mean? Oh god, now they want me to look up another section...* which allows you to set any tab stops with MX edit tab stops see section 11.3 indentation page 46... *Just to get started in this one. No I think I'll skip that. I'll deal with it when I have to use it. I thought this section was on how to edit. What does setting tab stops have to do with editing?* Features concerned with comments in programs are turned off except when explicitly invoked. *Hmmm... a feature? Wonder what a comment feature is? How do they get turned off? Do I have to turn them off? Well I guess I can't turn them off if I don't know what they are.* Automatic display of parenthesis matching is turned off, which is what most people want. *What does that mean? How do I know if I'm like most people and want them turned off? I wish they'd tell me why I need to know all these hacker terms!* Finally the syntax table is changed so that periods are not considered part of a word, while apostrophes, backspaces and underlines are. *Syntax table... no idea. Of course, I do know what the syntax of sentences are, so maybe it means something to do with certain commands EMACS considers acceptable... maybe certain actions in a row produce a correct syntax.*

If you are editing input for the text justifier TEX you might want to use TEX mode instead of text mode. See the file info etex info. *Well, I don't want to edit input for the text justifier mode, I just want to figure out how to manipulate words and paragraphs. Like it says up here (points to top of section). This stuff is too complicated and it's aggravating to read.*

As the final task in the exercise, students are once again asked to respond to a set of written prompts (Figure 4), intended to help them identify any other problems in the original document after having read about how a particular user reacted upon reading the document.

Figure 4. Second guided writing task, given after students read the think-aloud protocol transcript

Writing task (2):

1. Now, read the think-aloud protocol transcript.
2. Use the reader's comments to identify additional problems in the draft.
3. Write your answers below.

Despite their potential, using think-aloud protocols to create teaching materials for developing audience awareness does pose a number of problems, as described by Schriver (1989, p. 27):

- Think-aloud protocol transcripts inevitably have "gaps" when participants forget to speak. In effect, one of the challenges involved in using think-aloud protocols is keeping the participants talking throughout their entire interaction with the document and/or machine. Quite often, people

forget to speak as they become engaged with the task at hand, causing the transcript to give an incomplete account of the problems they encountered. The final transcript might therefore fail to fully account for all the problems a particular user may have had, although it can still give students a very good idea of many of the problems actually encountered.

- The second point follows from the first: participants may make "mental leaps" and reach a conclusion without verbalizing the intermediate steps of how they reached their understanding, once again leading to potentially incomplete information in the protocol transcript.
- If the original document contains visuals or other nonverbal representations, participants may be unable to verbalize what they are thinking.
- Protocols are time-consuming to make.

This final point is of particular concern when deciding whether or not to integrate the method into a professional or academic writing class. In effect, a significant amount of time needs to be set aside for creating the teaching corpus, including finding suitable examples of documents. Ideally, documents chosen should show clear enough problems from a pedagogical point of view while, at the same time, not being overloaded with problematic features. Clear criteria on whether or not to include the documents in the teaching module need to be decided at the outset, so as to avoid going through the inconvenience of spending a considerable amount of time both recording a live participant user-testing the document and transcribing the session, only to conclude in the end that the document is pedagogically unsuitable. In addition, issues of pedagogical progression – in other words, deciding whether it would be interesting to have students analyze one document before another, and why – should also be addressed before running the module in a classroom setting.

Another drawback concerns whether or not, due to study size, it is feasible to evaluate the method's effectiveness in comparison to the other methods commonly used to develop audience awareness (audience-analysis heuristics, peer review, or role-playing). In Schriver's (1992) rigorously constructed experimental study, the studied population included 117 students enrolled in ten professional writing classes. The population size made it feasible to compare methods, using five classes as an experimental group, and five as control. Depending on teaching conditions, replicating Schriver's study could prove unethical if participants are constrained to a single class, and are taught variously using either PAM or traditional audience awareness methods. Such would have been the case in the current study, which describes the implementation and results of using PAM in a single group of 15 students. As a consequence, this study takes Schriver's claims about the effectiveness of PAM as its starting point, in order to focus on how it might contribute to the development of the students' professional identity and workplace literacies.

The purpose of the study was to examine the implementation of the PAM method with a small group of Master's students in technical communication and information design. The results from the study are very much to be taken as preliminary within a larger study underway looking at how professional writing programs can better help students learn the indexicalities of professional writing, specifically in the context of technical documentation and information design in France. In the conclusion, the method is evaluated, looking specifically at whether it effectively prepares students for the complex workplace contexts they will encounter, in which their ability to frequently and rapidly adapt to user and contextual information needs is crucial.

3. Methods

3.1 Research questions

A corpus of texts was designed for a 15-hour, first-year Master's course on information design, where the topics ranged from a focus on message design and Plain Language principles, to design theories and graphic design principles, visual design (color, shape and typography) and information visualization. The PAM exercises were created specifically to reflect these aspects of the course.

All students had previously been introduced to traditional audience analysis techniques (using guidelines, peer review and audience analysis) in a technical communication course taught the previous semester. At the end of the course, they produced and user-tested a user guide. During the user tests, students were also initiated into carrying out and transcribing think-aloud protocol analysis, and so had been familiarized with the technique.

The current study was designed to answer the following two questions:

- (1) Does the PAM teaching method impact how well students identify problems in a document?
- (2) If yes, how so?

3.2 Participants

Fifteen first-year Master's students participated in the study. Of those fifteen, only nine participants were targeted for analysis because they provided a full set (for various reasons, the remaining six participants were unable to complete the entire set of PAM exercises). Of those nine participants, seven were native speakers of French, and two of Dutch. Five were male, and four were female.

3.3 Materials

Schrivier (1997, p. 477-78) was used as a model to create a corpus of eight PAM exercises. The corpus included Schrivier's sample, plus seven further exercises, each of which consisted of the four-part approach shown in Figures 1-4. Of those, two exercises were eliminated retrospectively from the analysis due to faults in their design. The other five PAM exercises used the following original documents: (1) the online explanation originally provided by Amazon when it introduced its currency converter; (2) an administrative university document providing instructions for setting up hiring committees; (3) a set of instructions including both text and images on how to install a wall clock; (4) an online user guide for using plagiarism detection software; and (5) an educational brochure intended to help adolescents safely manage their interactions with the police. Two of the documents were in French (1 & 2), the remaining four were in English (3-5, plus the sample PAM shown in Figures 1-4).

3.3 Procedure

Participants carried out a PAM exercise each week. Alternately, one was carried out in class, and the other was completed independently outside of class. Each PAM exercise was made available on the course Moodle, and participants were asked to upload their completed PAMs onto the course Moodle. All participants responded to the writing prompts solely in English.

4. Results

Comparing the results obtained in the current study to the original claim, we can recall that Schrivier (1992) found that students who had been exposed to the PAM method had a greater ability to:

- identify and propose solutions to the global aspects of text quality (i.e., in terms of rhetoric, organization, logic, cohesion, and tone);
- predict readers' needs.

4.1 Progressive increase in the length of written responses

One of the first observations to be made in the current study is that the participants' analysis of the documents became more detailed over time. This observation is reflected first and foremost in the number of words, as seen in Figure 5. While at the outset, both the first and second written

responses averaged the same length (i.e., about 40 words), as time went on, participants proposed more observations based on their own analysis of the documents, than they did after reading the think-aloud protocol transcript.

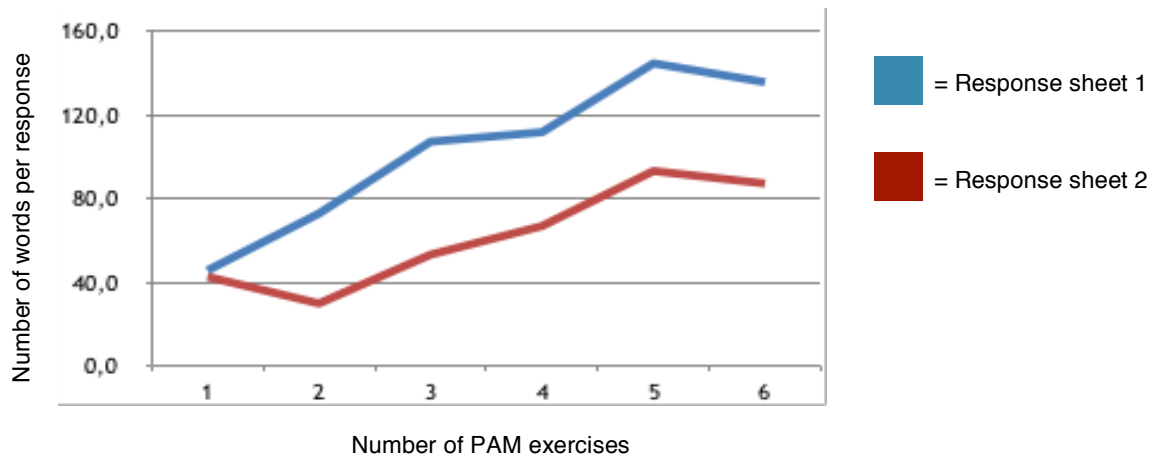


Figure 5. Length of written responses over time

4.2 Early focus on surface features

Interestingly, not only did the written responses increase quantitatively, they also demonstrated a qualitative shift in focus. The earliest written responses showed a greater tendency to focus on surface-level features, such as word choice (e.g., specialist jargon) and inappropriate grammar (i.e., non-compliant with Plain Language principles). In the first PAM exercise, for example, participants used a “checklist” approach in their evaluation, attempting to match the principles they had previously studied with the problems they identified in the document:

“Complicated wording and syntax. References to items not present. Vocabulary.”

“Problems with specific vocabulary (domain specific, no definitions...). Problems with wordiness: useless words.”

“Problem with document: difficult to understand, technical language.”

“Sentence complexity.”

Over the course of repeating the exercises, however, they increasingly moved toward a more reader-centered approach, making more predictions about the problems readers would have based on the documents’ actual features, rather than a checklist. In turn, the evaluations they made in the first guided writing responses became comparatively longer than the second guided responses. They also appeared to integrate the ‘before’ and ‘after’ analyses from the previous exercises, and to use that to formulate their own, more detailed observations, with progressively less and less recourse to the think-aloud protocol transcripts to identify the problems.

4.3 Increasing focus on predicting reader reactions

For example, over time, participants steadily focused more on predicting actual reader reactions based on the problems they themselves had identified in the documents. They indicated how the actual document features might impede reader interaction, as seen in comments such as:

“A user that is skimming the document will have a hard time finding the chapter titles. Too many red arrows and red lines in the images make it difficult to discern what is important. The use of arrows is not linked to the text, making it difficult to establish connections between the text and the images. Sometimes the image is on the left of the page and sometimes on the right which makes it difficult to establish a structure.”

“Readers will face problems with document usefulness. The content is neither appropriate nor structured. Multiple negatives will cause confusion. Text complexity and the way it’s written do not take into account the user’s needs. The content focuses entirely on liability, and the reader will be naturally unmotivated. Amazon encourages this lack of motivation with obscure language. Users will quickly forget the content (lack of accessibility).”

4.4 Increased proposals for revision (unprompted)

In addition, all participants gradually offered more diagnostic analyses of the documents, as well as solutions for revision. On both first and second response sheets, they increasingly commented on what, in their opinion, the document authors should have done differently. Such evaluative comments are particularly noteworthy because they were entirely unprompted by the research design (i.e., participants offered them freely, without being explicitly asked to do so by the guided writing tasks):

“The guide is not effective: it contains the right information but not in the right order, it should be reorganized (like a forum, with QA format).”

“This paragraph should be situated at the end of the brochure because when people are looking at this they can think that the following information is not important and they won’t read it.”

“Too much text will make the reader skim and miss important information. Warnings at the beginning risk being overlooked. Readers will only read relevant info (7. Operation); they may miss important information. Make an index and use short sentences, make steps. Put warnings in places where absolutely needed. Start the document with the instructions and add other information later.”

“The background is too stimulating, and risks tiring the reader before he even starts. The yellow box on the right has information in it. It’s a menu I think and the tags... I don’t know what it is supposed to mean. The fact there is a similar box on the right means that the reader does not know where to start scanning for useful information. Use a calm background. Restructure the entire page. Put the menu in a clearly identified position. Use only 1 box. Maybe put a long horizontal block at the top with menus like on a website. Remove unnecessary and unhelpful information and images.”

5. Discussion and conclusion

5.1 Shortcomings of the study

One of the shortcomings in carrying out this study stems from the difficulties encountered in constituting the corpus. In addition to being time-consuming, questions were raised retrospectively about the pedagogical appropriateness of the exercise progression. Whether the order in which the exercises are presented make a difference in terms of how well participants perceive the imagined needs of a document's readers will need to be validated in a later study.

Relatedly, results from the two final exercises (from the original eight) were discarded during the analysis phase, as it became apparent that they were inappropriately placed in terms of pedagogical progression: the problems in the original documents were far too numerous and blatantly obvious to maintain credibility in the eyes of the students, who after completing several PAM exercises were showing substantial sophistication and thoroughness in their evaluations.

5.2 How the PAM method contributes to building an effective professional identity

The PAM method is an inductive method, meaning that it does not explicitly point out to students what aspects of the information are relevant to pinpointing difficulties readers may have with a document. In this sense, it allows them to develop – on their own – an ‘intuitive’ sense of the strengths and shortcomings of professional documents: their perceptual knowledge (Schrivier 1992).

Through its ability to develop students' mental representations of a document's readers, the PAM method helps them better adapt their attitudes, behaviors and abilities to a company's needs. There is indirect evidence that the method has already been successful in helping the students who participated in the study to develop a more appropriate professional identity. One line of evidence comes from the positive evaluation of the students' performance by their internship tutors over the course of a mandatory 12-to-16 week company internship. In addition, of the nine students who participated in the study, six have received work-study contracts for their second year as a direct result of the quality of their work during their internships. In France, a work-study contract is the much coveted *contrat d'alternance*, which allows students to work as salaried employees in a company throughout the second year of their Master's program (spending three days in class, two days in company training); the company covers tuition fees, as well as travel and housing expenses while on site.

The next step in the study will be to build on these initial findings by carrying out a qualitative exploration of the impact of the PAM method, tracking the six students over the course of the coming year during their work-study contracts. To further explore how the PAM method influences students' ability to rapidly adapt their projects to widely variable user/shareholder information needs, the following methods are planned as part of an ongoing project:

- semi-structured interviews with the six students, their company tutors and colleagues;
- onsite observations of their work practices and interactions in the workplace;
- reflective journals on their changing abilities to design effective information, the difficulties they encounter when doing so, and the strategies they put into play in order to resolve them.

5.3 Study implications

Although relatively little attention was paid in the writing research community to Protocol-Assisted Modeling when it was first proposed, it is clearly time to re-assess its potential as a major contributor to professional and academic writing programs, especially in terms of fostering new identities and complex workplace literacies. The implications of using Protocol-Assisted Modeling are far-reaching:

- (1) The perceptual knowledge that arises when writers learn how to construct valid mental representations of readers / users, once set in motion, appears to become a sort of procedural knowledge that crosses both genre and situational boundaries. When writers learn how to effectively imagine and predict reader reactions in one genre or situation, they appear able to apply that knowledge to other genres and situations. Schrivier (1989, p. 250) raises this possibility when she notes that the students who participated in the control groups (i.e., were exposed to the PAM method) transferred their ability to detect document problems from one genre and audience (computer manuals for instruction) to another (elementary science texts written for lay people). In this respect, being exposed to Protocol-Assisted Modeling may impact the construction of professional writers' identities in ways which have yet to be uncovered.
- (2) The PAM method can also be used to help speakers of additional languages gain access to the hidden indexicalities that make their mastery of writing in a foreign language so problematical. Writing skillfully and with legitimacy is clearly not a question of just learning the relevant genres' surface features, but is also highly dependent on a writer's ability to access what is both implicit and inferred, and wield that in contextually appropriate ways. While gaining access to the indexical knowledge that acts as a 'gatekeeper' for institutional

structures is complicated enough for many writers in their native language (succeeding in academics, in scientific research and international publication, in companies), those difficulties are compounded for those whose basis for writing is intercultural by nature. The PAM method may help reveal the complexities of indexicality for such writers.

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