


TEACHING GENRES IN THE DISCIPLINES: CAN STUDENTS LEARN THE LABORATORY REPORT GENRE ON-SCREEN

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Successful written communication in the disciplines is highly valued in tertiary assessment processes and is a preparation for professional life. Yet, the challenge remains to find an effective way of teaching this skill within varying discipline and institutional contexts. As institutions try to meet the needs of a changing student population, online forms of "learning" have been welcomed. However, can this mode provide students with new insights into how to write the genres of their disciplines and facilitate their understanding of the purpose and context of different text structures? Online courseware that aims to teach writing skills needs to be informed by both applied linguistics and learning theories. Within applied linguistics, genre based approaches to teaching the language of the disciplines are now widely accepted. This approach can provide learners with generalised, systematic guidelines about how to create meaningful and purposeful texts, although each student will create their




own individual text. Genre theory has also been used to describe and develop approaches to teaching writing which emphasize a communicative, purposeful and socially based theory of learning. This paper will illustrate the application of genre theory in the design of an on-screen program which aims to teach students how to write a laboratory report in three different disciplines, namely, biology, biochemistry and chemical engineering. This program provides guidelines, models, interactive exercises and feedback and takes into account the genre variations between these disciplines. Outcomes of a pilot evaluation of part of the program will be discussed.

Keywords: *genre theory, laboratory report writing, on-line learning, higher education, systemic functional linguistics (SFL)*

Introduction


The new technologies promise dramatic possibilities to change the modes of teaching and learning within universities. Courses or parts of courses are now offered online and some universities are moving towards completely 'virtual' forms of teaching in some contexts. For most teachers, moving their courses to an online form of delivery, will force a re-thinking and re-conceptualisation of their approaches to teaching which in turn will raise questions about their roles within the institution and their relationships with students. Students in turn are encountering a new medium for learning whose flexibility challenges their identity as traditional learners, forcing them to learn 'on their own' and become their own teachers. For academic literacy specialists, the new technologies raise key questions about how students learn using these technologies and how to teach academic communication skills in this new medium. The focus of this paper is how and what to teach about writing the laboratory report genre on-screen. The on-screen courseware developed for this genre (How to write a laboratory report at university, WALRUS) is based on previous



paper-based teaching materials and approaches which have been used successfully to improve students' writing skills in this area (Taylor and Drury, 1996). These paper-based materials and approaches, like many writing courses, have been underpinned by genre theory as developed within discourse analysis studies (after Swales, Dudley Evans, Bhatia and others) and within systemic functional linguistics (SFL) (after Martin, Rothery, Veal and others). Moving to teaching genres in an on-screen environment has implications for the underlying theory. This paper will explore how genre theory can also provide a useful theoretical framework for teaching the laboratory report on-screen. Firstly, the background to the writing a laboratory report program will be briefly summarised. Then the main principles of genre theory in both the above traditions will be reviewed as a basis for critically examining how and to what extent the on-screen program for writing a laboratory report has incorporated these key principles. In this way, attention will be focussed on how a new on-screen context for learning a genre can constrain and/or extend the language theories on which it is based. Finally, evidence of learning outcomes will be discussed in the light of a pilot evaluation of part of the program, namely the part for writing a laboratory report in the biological sciences.

Background

The on-screen writing a laboratory report program began as a part of a collaborative project between the Learning Centre and the Department of Biological Sciences, Sydney University, to integrate writing skills into the first year biology curriculum (Taylor and Drury, 1996). This project, begun in 1994, has undergone many changes and adaptations as the biology curriculum for first year itself has changed and as resources have been reduced. However, a strong commitment to the teaching of writing skills within the discipline remains as does a developmental approach to teaching these skills. The initial paper-based materials for supporting the teaching of laboratory report writing skills (Drury, 1997) were embedded in laboratory-based activities which provided a relevant and realistic context for explaining the purpose of the genre, its content, structure and language. In creating the materials, genre-based approaches to describing the laboratory report within the discourse analysis tradition (Dudley-Evans, 1985, Bhatia and Tay, 1987) and the



SFL tradition (Veel, 1992) were used as well as research into scientific language and other science genres in both traditions. As part of the pedagogic context, learning activities focussed on students identifying their own criteria for a successful report, using these criteria to assess examples of report writing and comparing these with teacher expectations. Further, students were encouraged to reflect on and develop their approaches to writing by writing parts of a practice report and receiving feedback from peers and the teacher, before writing a report for assessment. Most of this rich learning cycle remains in the curriculum (see Taylor and Drury, forthcoming) and the major change is that students are no longer required to write a full report but only the results and discussion sections.

At the same time as these developments in the Biological Sciences were taking place, the Learning Centre had begun to engage in other collaborative projects aimed at improving students report writing skills within the context of their curriculum, namely with the Departments of Electrical Engineering and Chemical Engineering and later with the Department of Biochemistry (Murison, 1996). Therefore, when the WALRUS program was conceived in 1997, it was planned to be a resource on writing reports at university which could be extended in terms of the needs and purposes of each discipline, taking into account not only genre variation among disciplines but also variation as students move from first to third year of an undergraduate program. This is an ambitious, long term goal for the WALRUS project and as yet only the first stage is in operation, namely the part of the program for writing a laboratory report in the biological sciences which was created using the Authorware programming language (Drury and O'Carroll, 1999) The move to an online form of technology which would work across platforms and browsers has delayed the implementation of the other parts of the program designed for writing reports in chemical engineering and biochemistry. However it is hoped that these will be operational in 2002. These developments are taking place at the same time as collaboration continues with subject area specialists on how to integrate the on-screen programs into their curricula.




Key Principles of Genre Theory and their Application to Teaching Genre On-screen

Context

Genre theory situates any text instance within the context in which it has been created so that an examination of the language choices in the text reflects its context and purpose. Earlier approaches to genre analysis within the discourse analysis tradition focussed on the text itself and its linguistic characteristics and tended to neglect the wider social context. However, later approaches emphasize the importance of a thicker description (Bhatia, 1993) which includes information on the discourse community who use the genre, their common goals and discursive practices (Swales, 1990). An SFL approach to genre analysis has consistently emphasised the importance of the social context or cultural context of a genre, although as a linguistic theory it has tended to provide richer insights into the linguistic characteristics of genres. The SFL model distinguishes between two kinds of context that influence genres and in turn are influenced by genres, a more general context, the context of culture and a more specific context, the context of situation. The context of culture is described in terms of the meaning potentials and hence genres available to social subjects interacting within discourse communities which are open to change over time. Genres serve the purposes of those engaged in the discourse communities and can be adapted and changed to serve new purposes which in turn can bring about change in the social context itself. The context of situation is described in terms of the register variables of field (participants and their activities), tenor (relationships among the participants) and mode (channel and medium/a of communication). Genres are made up of particular combinations of field, tenor and mode variables according to the social purposes they are fulfilling.


Context and the Writing a Laboratory Report Program

Programs that teach genre on-screen need to address the issue of what kind of context they will provide for the genre and how they will do this. Selection of a relevant context (what context and how much) needs to be tied to the overall aim of the genre teaching program, the target student audience, the course they are



studying and the task they are aiming to carry out. As yet, the writing a laboratory report program does not provide an adequate description of the social context of the genre on-screen although the program does situate each genre in its discipline context by using authentic examples - both expert and novice - from each discipline as the basis for explanation and exercises. In addition, these text selections have been informed and commented on by subject area specialists. The program design also tries to make a link between what students actually did in the laboratory and how they reflect on their results and write them up in the genre form of a laboratory report. A sub-section of the program (Content) addresses in detail the issue of what content or field knowledge to put in which section of the laboratory report, while another sub-section (Application) moves students towards applying what they have learnt in the program to writing their own report based on their own experiment. The on-going project will eventually provide a range of report genres from different disciplinary cultures which students can explore and compare and contrast. The resource itself, in line with genre theory, can also clarify variations in disciplinary context and purpose revealed by specialist informants and link these to different report genre conventions. For example, laboratory reports in some applied science disciplines such as chemical engineering need to address the teacher as both expert and client, rather than solely as expert, and this dual role of the teacher changes the tenor relationship between student and teacher and this has implications for the form of the genre. Thus, in the long term, this extended report writing program would go some way to providing an academic context for the report genre.


Another aspect of the academic context which needs to be addressed in an on-screen genre writing program is an understanding of the processes and practices of writing the genre. How and why are students engaging in this writing task and what are staff expectations. Students and teachers as specialist informants can provide this information. For example the Monash Transition to Tertiary Writing Project (Moore and Clerehan, 2000) is a multimedia resource which makes use of audio data from interviews with students and lecturers. Students talk about their approaches to writing assignments in particular discipline contexts and lecturers provide information about their expectations of writing in the same discipline. This is an appropriate resource for the target audience, namely students entering the university context for the first time.



The pedagogic context in which an on-screen genre writing program is used plays a critical role in providing a relevant context for students to actually engage in the on-screen learning program. If the program is closely integrated into the discipline, then the context for writing can be provided by associated teaching and learning activities both on and off screen that take into account learners' needs and the writing task they are preparing to carry out. However, the form and extent of integration depends to a large extent on subject area specialists. There are successful models of on-screen writing resources being integrated into subject area curricula in various ways (see Ellis, 2000 and Merten et al, 1999) The present on-screen resource takes into account student needs by providing an on-screen diagnostic questionnaire which helps students' to identify the parts of the biology laboratory report they have most difficulty with and hence which parts of the program they need to access. The on-screen design for chemical engineering and biochemistry reports takes this diagnostic approach a step further by providing a diagnostic exercise on entry to each part of the report so that students can test themselves before moving further into a particular part. The pedagogic context of the biology report writing resource will be further extended in 2002 to provide a data base composed of student text examples which will be used for exercises to address common problems students experience in content, structure and language when writing the report genre. Students as individuals or in groups will choose or be guided by the subject area specialist to access different parts of this data base according to their developing needs as they prepare for the task of writing their own laboratory report. In this way, a richer, student centred context will be provided for the program both on and off screen.

Purpose

The definitions of genre in both approaches emphasize the goal-oriented or purposeful nature of genre as a social process. According to Martin (1997, p.13) 'genre represents the system of staged goal oriented social processes through which social subjects in a given culture live their lives'. Bhatia (1993 p.13) defines genre after Swales as 'a recognizable communicative event characterized by a set of communicative purpose(s) identified and mutually understood by members of the professional or academic community in which it regularly occurs'. Martin (1992)



further argues that purpose influences the selections made in the register variables of field, tenor and mode and in this way genres develop their individual structure and language characteristics. Genres, unlike registers, are complete texts that move through stages from beginning, middle to end to achieve their social goal

Purpose and the Writing a Laboratory Report Program

The overall purpose of the laboratory report genre is to display awareness and understanding of known, established content in order to be successful in the teaching/learning context (Bhatia, 1993, p.96). For both students and teachers in the early undergraduate years in the sciences, getting the content right often takes precedence over writing appropriately. This concern has been taken up in the design of the writing a laboratory report program at both macro and micro levels. At the macro level teachers expect students to know what content goes in which part of the report (ie.abstract, introduction etc.) and why. Therefore one section of the program called Overall Structure identifies the typical parts of the biology laboratory report and students are asked to drag and drop statements of their purpose or function to match the appropriate part (see Figure 1).

Overall Structure Exercise 1 Page 2/6

Match the summaries of the function of each stage with the appropriate stage in the structure.

STRUCTURE OF THE REPORT	FUNCTION OF EACH PART
TITLE	
ABSTRACT	
INTRODUCTION	
METHODS	
RESULTS	
DISCUSSION	
CONCLUSION (optional)	
REFERENCES	
APPENDIX(-CES) (optional)	

Menu

to tell the reader what you did, the materials you used, the procedure you followed
 to interpret and explain the significance of what you found
 to give more detailed information
 to tell the reader what you found
 to provide a summary of the whole report
 to give enough background information to the reader so they will know the context and purpose of your experiment.
 to tell the reader the topic of your report
 to tell the reader the origin of all the references you have cited the text.
 to summarise your findings and interpretations

Figure 1: Exercise to help students identify the purpose of each section of the laboratory report

A further exercise then asks students to place authentic text extracts from different parts of the report in the appropriate parts of the laboratory report according to the purpose they exemplify. At the micro level, where each section of the report is explained and exemplified in detail, students can choose from 4 sub-sections, the first of which is Content. In this sub-section questions are used to highlight what kinds of content are appropriate for this part of the report (see Figure 2). In other words, the micro-level purposes or functions of each stage in the report are explained and illustrated followed by exercises and feedback for students to test their own understanding.

Introduction Page 1/3

Content **A : THE CONTENT**

In general the information or the content in your introduction should answer the following 5 questions :

1. What is the subject of your report? What is your experiment about?
2. Why is the subject important? (optional in first year)
3. What is the theory on this subject? What have other researchers found out about this subject?
4. How does your experiment compare with previous experiments done in that area (is it going to confirm a hypothesis already stated, to apply a methodology to other subjects? etc.)
5. What is the aim or objective of your experiment or what hypothesis(es) is/are being tested? What are you trying to find out?

The answers to these questions can help to provide guidelines as to what information should be included in the introduction.

Content
Structure
Language
Application
Menu


← →

Figure 2: Questions to elicit what content is typically appropriate for the introduction stage of a laboratory report in the biological sciences

It is true that these types of explanations and exercises could also be presented in a paper-based form. However, the screen offers students a more immediate way of making connections within the genre to aid their own understanding. For example, students can use the hyperlinks in the left hand sub-menu in Figure 2 to find out how these content questions are structured or to see what language choices are possible. In this way, the on-screen program has the potential to make the connections between purpose, content, structure and language clearer so that a better understanding of their interrelationships can be achieved.

Schematic Structure

The descriptions and explanations of the schematic structure, stages or moves through which genres develop to fulfil their communicative purposes have been invaluable in the teaching of genres to new or apprentice members of discourse communities. The typical stages of an established genre unfold in certain, generally predictable sequences to achieve the genre's purpose. Each stage is characterised by discourse and lexicogrammatical choices. Research continues into what stages are considered typical of a genre, variations in the sequencing of stages of particular

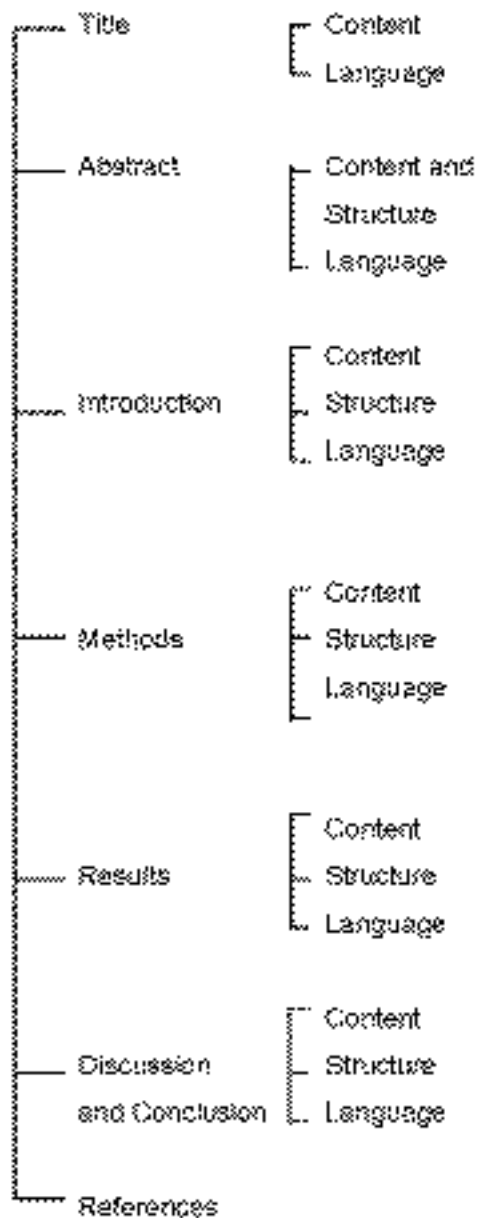


genres and whether stages are optional or obligatory and whether they are recursive. Approaches to teaching genres have been criticised for modelling schematic structure in a formulaic or prescriptive way and presenting the analysis of a genre's stages as unproblematic. In addition, a static, linear image of models of genre has tended to elide their dynamic potential. However, despite these criticisms, the detailed linguistic descriptions of the staging structures of genres have helped to make explicit the way language is used to achieve success in the written genres of a number of discipline areas.

Schematic Structure and the Writing a Laboratory Report Program

The navigation system of the laboratory report writing program is designed to allow students to learn about the schematic structure of the report and the language choices that realise this structure. Although students have a choice as to which menu items they access, the menu design itself tells them about the macro and micro level structure of a report. The macro menu was created using headings which reflect the different parts of the report, typically, abstract, title, introduction, methods etc. Each macro menu item in turn has its own sub-menu, generally consisting of 3 parts which are related to learning about the schematic structure of the genre, namely, content, structure and language (see Figure 3). In general, this two level hierarchy and the repetition of the sub-menu items within each part create a simple but effective navigation framework. Where there are genre variations in the schematic structure as in the short report for biochemistry which has two different macro stages, namely, Study Design and Legend, these are identified in a further sub level in the hierarchical structure within the Methods part of the report (see Figure 3). This short report genre, in fact, has no Methods section since it is largely replaced by the 2 new sub parts. However, the more traditional and familiar report design has been retained so as to guide students from the more familiar structure they have met in first year courses to this new structure required for their report in the second year course in Biochemistry. In this way, different purposes of the two kinds of reports and hence their structures are made clear.

Structure of Report in Biological Sciences



Structure of Short Report in Biochemistry

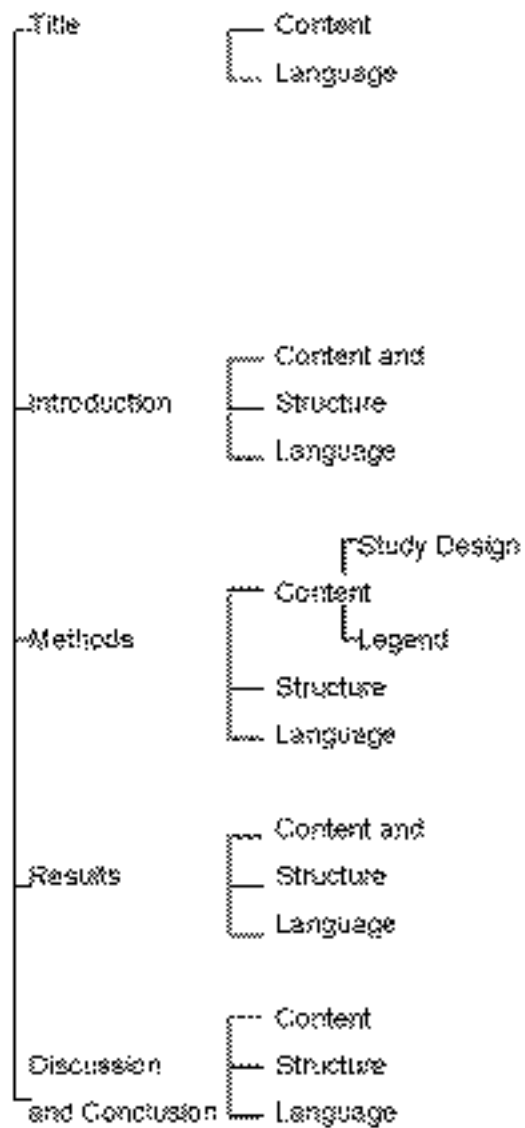


Figure 3 : Navigation design for the Laboratory Report Writing Program in Biological Sciences and Biochemistry

Within the Structure sub-menus, as the name suggests, the typical staging structure of a particular part of the laboratory report is introduced (see Figure 4). Rolling the cursor over the stages can immediately exemplify each stage, re-inforcing the links between content, structure and language. However for more detailed information on language choices in this section of the report, the student needs to access the

Language sub-menu where key language features for this section, such as choice of sentence themes, information exchange, the language of certainty and usuality and tense choices are illustrated and explained.

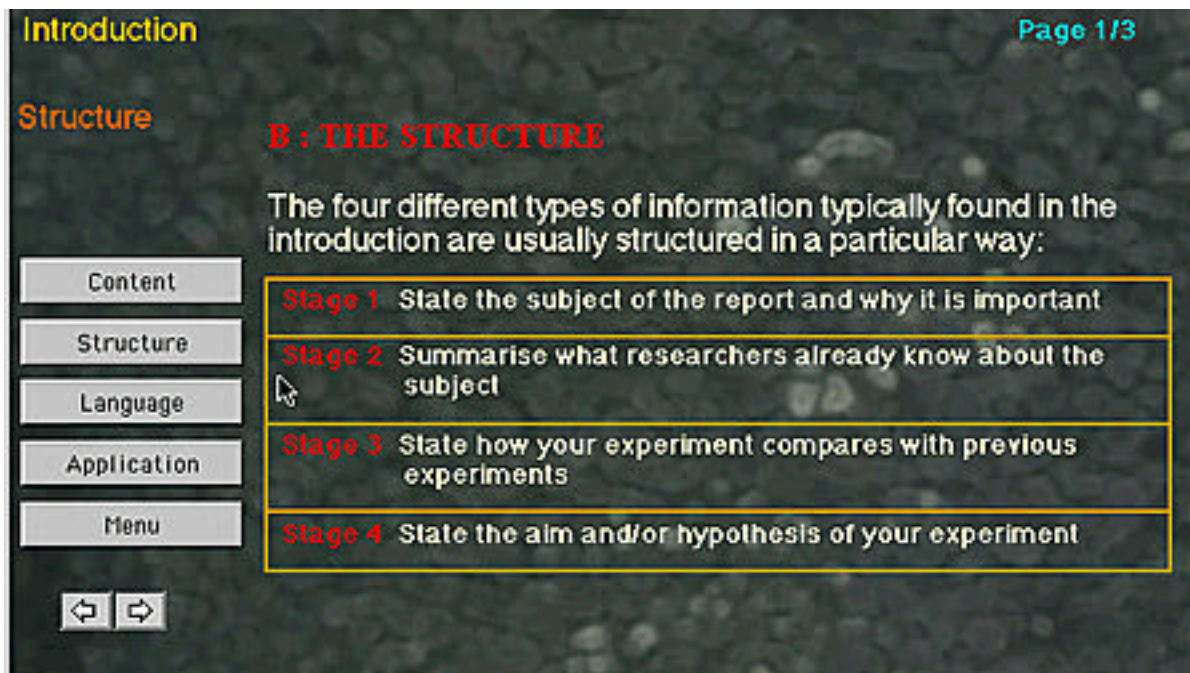



Figure 4: The on-screen display of the staging structure of the introduction to the laboratory report in the biological sciences

Relationships within and among Genres

In SFL, research into genres in educational contexts, began with short texts produced in the primary school years. As research moved on to examine longer texts of the later years of schooling and also workplace texts, Martin (1994) proposed using SFL clause theory to account for the development of these longer texts or macro genres based on the combination of the shorter genres or elemental genres. This is an attractive theory, especially in an educational context, where elemental genres, once mastered, can become the building blocks for macro genres. However, the theory has proved difficult to apply to some longer texts, such as the university essay in the social sciences and humanities, although aspects are still relevant such as the concept of a macro theme which at the most general level introduces the essay and predicts its development in the hyper themes or introductory sentences of each paragraph. Genre descriptions which have grown out of discourse studies, although they tackled larger texts, such as the research



article, began by focussing on parts of these texts such as the introduction (Swales, 1981) and slowly building up towards a picture of the whole genre (Hopkins and Dudley-Evans, 1988 Swales, 1990). Therefore, to some extent, both theories in treating longer genres as being made up of smaller genres recognise each element as having its own purpose and structure which contributes to the overall purpose and structure of the longer or macro genre.

As genre studies have grown, it has become clear that the schematic structure, discourse and language criteria for identifying a particular text instance as belonging to a particular type of genre are not always applicable as genre instances may vary from their conventional or prototypical forms. Therefore, it is helpful to see genres both in terms of their typical, conventional forms and in terms of a continuum between and among genres within a discourse community. This way of modelling genres is useful in educational planning and curriculum situations where teachers want to move students from the more basic genres of learning and applying the introductory knowledge of a discipline to the more complex genres and subject matter of later studies (Rose, 1997, Veel, 1997). Generic variability is also associated with expert users of a genre who want to achieve a particular, more personal, purpose within a given discourse community (Bhatia, 1993 p.12). Genre mixing also seems to be a phenomenon noted in new cross-disciplinary studies whose purposes may blend those of individual disciplines (Veel, 1998).

Relationships within and among Genres and the Writing a Laboratory Report Program

The concept of macro genres composed of elemental genres can be applied to the description of the laboratory report program where each part of the report has its own purpose, reflected in its content, structure and language. Once again the menu and sub-menu items re-inforce this view of the genre (see Figure 3). However, although this view of the report can help students to successfully understand the purpose, content, structure and language appropriate for each stage of the report, the danger is that it may over represent the report as made up of separate unrelated segments. The report is a whole text and needs to be seen as such - something which is difficult to do in an on-screen environment. Screen scrolling of the whole

report does not help to conceptualise it as a whole, as text disappears off screen, making connections difficult among and between parts. Printing out the complete macro genre to provide a paper-based copy is at the moment the only way to give a learner an overview of the whole text. The menu item Overall Structure does attempt to provide some linkage between the different parts of the report. In particular, it highlights the role of the aim, as macro theme in the report and on rolling the cursor over the participants in the macro theme, the linked participants in the results and discussion sections are highlighted (see Figure 5).

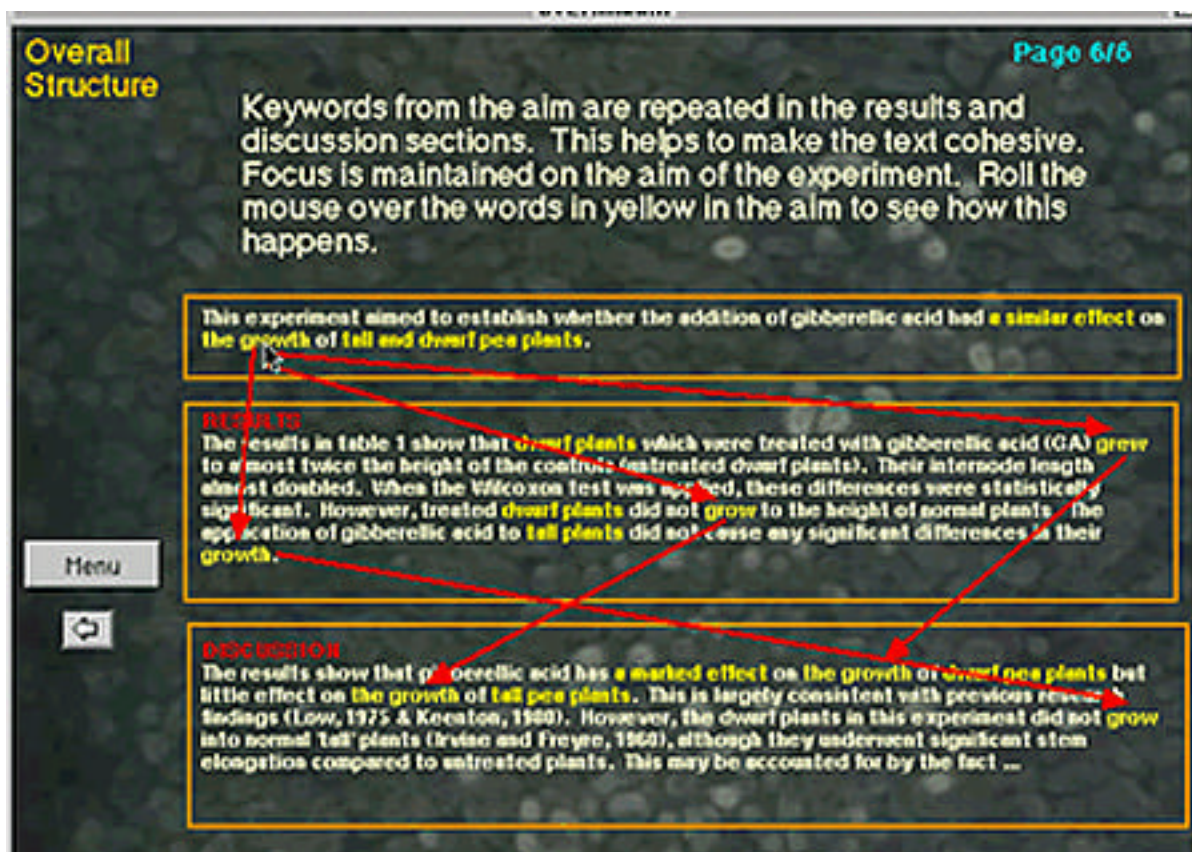



Figure 5: The on-screen display showing how participants in the aim in the introduction are linked to those in the results and discussion stages of the laboratory report in the biological sciences

However, the space constraint of the on-screen environment can also be exploited to show the dynamic, unfolding aspect of a genre. For example, when students reach the on-screen limit of a part of a genre, they can be asked to reflect and make predictions on how the text will develop. Then they can use hyperlinks to see a range of possible choices of text development, make a choice and receive feedback



on what they have chosen. However, this design feature has not been used in the present resource.


As the report writing program expands to include more laboratory report writing genres from different disciplines, the variations in genres will become apparent. There is already generic variation to be seen between the 3 discipline areas analysed. The laboratory report in chemical engineering contains aspects which have similarities with a business report whereas the short report in biochemistry models itself on brief communications in such journals as Nature.

Genre Theory and Learning Theories

Genre theory and analysis in both the discourse analysis and SFL traditions have addressed the educational context of teaching and learning genres and have developed materials and approaches to teaching genres in formal educational settings. Materials have focussed on exemplifying the product, the genre itself, choosing from a range of different kinds of examples - both expert and novice, successful and unsuccessful, draft and final version - where genre characteristics of context, field, tenor and mode, schematic structure, discourse and lexicogrammatical features are made explicit.

A genre-centred pedagogical approach in the discourse analysis tradition is task driven 'likely to focus student attention on rhetorical action and on the organizational and linguistic means of its accomplishment' (Swales, 1990, p82). Communicatively based classroom activities engage students in examining examples of the target genre to learn about aspects of context, purpose, schematic structure, discourse and language choices before they write guided practice texts and finally their own text. Feedback and guidance is provided by the teacher, although peers are also involved in the feedback process (see Weissberg and Buker for examples of genre-centred materials and teaching approaches).

In a similar way, genre-based literacy pedagogy in SFL (Martin, 1999) engages students in an interactive teaching and learning cycle where they acquire knowledge and understanding of the target genre and how to apply this in producing their own individual text for 'publication'. The teaching learning cycle is divided into 3 phases,




the modelling or deconstruction phase, joint construction and individual construction. The cycle can be entered at any point according to students' needs and can be accessed at different levels in that teachers can move back and forth between phases as appropriate, focusing on different aspects of the genre. The modelling phase allows for all aspects of the genre to be made explicit from social context to lexicogrammatical features, joint construction makes the process of genre writing clear by engaging students, with the teacher as guide, in creating an example of the genre and finally, individual construction moves students on to writing a draft of their own text for peer and teacher conferencing before the final version is written. After this stage, students and teacher can engage in a more creative or critical analysis of the target genre, questioning its structure and purpose, re-writing it as a different genre etc. (see Martin, 1999 or Cope and Kalantzis, 1993 for more information on the genre-based teaching and learning cycle and Christie et al, 1990 and 1992 for examples of the application of the model in teaching science genres in the school situation).

Genre Theory and Learning Theories and the Writing a Laboratory Report Program

Genre-based pedagogy in both traditions provides a rich teaching and learning context which would be difficult to create in a on-screen environment. It is true that the on-screen environment can offer a wider range of different kinds of examples of a genre than would be possible in a typical classroom situation and the technology can be effectively used to highlight and explain generic features. Students can choose to access whatever texts are relevant for them at a particular stage in their learning, test their own understanding of the genre conventions by using interactive exercises which target typical problem areas and then receive immediate feedback on the choices they have made in the exercises. This describes the resources of the present program for writing a report in biology.

What is missing in this program and in general in an on-screen environment is the engagement and interaction with their peers and the teacher which students can experience in the face-to-face classroom situation. Such interaction is an essential aid for the teacher to monitor on-going student understanding and react by giving further clarification, explanation etc. when necessary. To some extent, this kind of




interaction can be created on-screen by offering students bulletin board, chat room and discussion list facilities, where they can post questions, draft texts etc and receive answers and feedback from the teacher and their peers and additional guidance from the teacher. Teachers can also monitor student progress using these facilities (Ellis, 2000). Such facilities however offer a different context and form of interaction where communication is carried out entirely through a written mode. How or if this affects learning is unclear, although the delay involved in communicating in writing on-screen should allow for more reflection on what is being communicated and this in turn has implications for learning.

Classroom based exercises, as well as allowing for peer collaboration, are also more varied and creative than present on-screen exercises which are basically limited to variations on multiple choice, drag and drop, toggling and formulaic text entry. More challenging exercises based on extended writing would have to be emailed or posted on a bulletin board for individual feedback from the teacher and peers.

The extent to which the full range of interactive resources available in an on-line environment such as, bulletin board, chat room, discussion list and email facilities. will be made available with the future laboratory report writing program will depend to a large extent on subject area staff, how they see their role and that of the academic literacy specialist and how they see the program being integrated into their curriculum. Off-screen activities can also make the on-screen program a richer learning resource but this again is dependent on how subject area specialists will use the program.

Can Students Learn the Laboratory Report Genre On-screen

Much of the evidence for the success of genre-based pedagogical approaches in the tertiary level classroom tends to be of an informal and qualitative nature. In general, studies report on how genre theory is used to research writing in the disciplines and/or how it underpins the design and implementation of writing programs. Some studies in the discourse analysis tradition have shown evidence of improved writing outcomes using genre-based pedagogy (Reppen, 1995; Mustafa, 1995 and Henry and Roseberry, 1998). Although, there is evidence for the success of genre-based




pedagogy in the SFL tradition in the primary school (Walsh et al., 1990), no such detailed evaluation has been carried out in the tertiary level context. Evidence for improved student learning in the on-screen environment is inconclusive with most studies reporting no significant differences in learning outcomes compared with traditional teaching/learning approaches (Alexander and McKenzie, 1998). Many studies which make claims for improved student learning using on-screen programs have also been criticised in terms of their research design (Dillon and Gabbard, 1998). In this context, it is not surprising that there is as yet, not enough valid evidence to support claims of improved student learning for on-screen programs using genre-based approaches to teach writing at tertiary level. It is clear that research into this area is urgent, given that many tertiary level academic literacy programs are moving into an on-screen environment. However, the fact remains that finding an appropriate research design is problematic and the present pilot survey of the on-screen report writing program for biology is a step towards the development of an appropriate research tool to assess learning outcomes from this kind of program.

This pilot survey (n=40) was carried out shortly after the program had been made available to students and just after students had submitted their first assessed laboratory report assignment in first-year biology. The survey questionnaire sought both quantitative and qualitative data, primarily on the design of the program in such areas as screen layout, navigation design, instructions for doing the program and on the design of explanations, exercises and feedback. Although the main aim of the survey was to gain information on the overall program design so that changes could be made, the survey also tried to establish students' pathways through the program and students' perceptions of their learning.

The majority of students (consistently more than 80%) rated the program highly in terms of the 'user friendliness' of the screen layout and navigation design, the effectiveness of the program instructions and the usefulness of interactivity in aiding the explanations.


Similar ratings were given for the exercises in terms of the clarity of instructions, ease of doing the exercises and their usefulness. Almost 90% of students rated the feedback as excellent or very good, although a third of the sample wanted more



feedback. These ratings were supported by responses from two expert users (biology lecturers). About half of the students moved systematically through the program, from screen to screen in a 'page turning' approach, while the other half moved quickly from screen to screen, scanning the information before choosing a particular explanation and exercise to work through in more detail. The most visited parts of the program were the results and discussion sections and then the overall structure and references. This is not surprising since first year students were using the program while writing their laboratory report assignment which requires them to write only the results and discussion sections.

The marks received for the reports written by the sample group were compared to those of a control group who did not do the on-screen program but had access to paper based guidelines and models on how to write the laboratory report, although these materials did not contain practice exercises. Students' reports were also assessed in terms of their academic literacy using the MASUS instrument (Bonnano and Jones, 1997) and literacy ratings were compared with biology marks. There were no significant differences in performance between the two groups either in terms of their literacy assessment or their biology mark. As mentioned above, this outcome is consistent with most research which has attempted to compare student learning outcomes using computer-based learning materials to those using traditional materials.

Although most students (66%) reported that the program had made them more aware of their problem areas and more knowledgeable about writing laboratory reports, only a third reported that it had increased their confidence in writing reports. This suggests that they may not have been able to transfer and apply what they had learnt to the context of their own writing. Students' main complaint, apart from teething problems with the technology, was that more examples and models were needed, something which the new data base extension will provide. Given the small sample size and the research design of this survey and also the kinds of data it sought, it is impossible to draw any conclusions about student learning associated with using this on-screen program. However, since most students recorded strong positive experiences and attitudes towards the program, it is likely that learning has taken place and for some students, depending on their learning style, prior



knowledge and ability, this may well have contributed to their better understanding of laboratory report writing and a better performance outcome.

Conclusion

Essentially, on-screen and classroom environments offer two distinctive learning contexts and allow for different learning experiences and different approaches to learning. In today's resource starved universities, the rich learning environment of the classroom is being eroded as students have to increasingly compete for teacher attention to their individual needs. In this context, an on-screen learning situation can offer advantages in meeting the varied and individual writing needs of a large and diverse group of students. For example, a core on-screen resource can model and deconstruct genres and provide exercises for students to check their understanding. If and when students encounter difficulties with the exercises or feedback provided, they can post their questions to a discussion list to be answered by teachers and peers. Many students will have similar questions and problems and can see the answers provided for their peers on the list. This approach would then allow teachers time, either in a face-to-face context or on-screen, to give more detailed, individual feedback to students in the individual construction phase, when they are actually trying to draft their own report. In this way, it may be possible to maintain the richness of a face-to-face learning experience, albeit occurring less often than in a traditional curriculum, at the same time as providing an on-screen learning environment and offer students both experiences. This is what many surveys of students using on-screen learning resources have requested - the best of both worlds.

However, many questions remain as to what and how students learn on-screen and whether this new learning context improves and deepens learning and finally whether learning is transferrable to new contexts. An important part of the on-going development of the report writing program is to collect more evaluation data, not only on aspects of program design and content, but also on what and how students are learning using this resource and how they are using this knowledge in their own writing. Although we can argue that most of the principles of genre analysis and pedagogy are maintained in an on-screen environment, until we know more about

how students learn in this environment, we cannot claim that genre analysis and pedagogy have been successfully transplanted to this new learning context.

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