13 Emergent disciplinarity: a comparative study of Theme in undergraduate essays in geography and history of science

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1 Introduction

Research into academic writing may take as its focus the professional academic or the student, both of whom have to produce texts which conform in their respective ways to the expectations of the discipline. While investigations of the disciplinary features of professional academic writing add to our understanding of the sociology of knowledge and the rhetorical and epistemological underpinnings of academic discourse, research into student writing may be used to understand and facilitate the process by which novices gradually learn to write in ways that are acceptable within their discipline. So far, however, there has been little comparison of student writing across different disciplines. This is an area which has significance for many of today’s undergraduates, who often move between courses that represent different disciplinary expectations. This study focuses on the essays produced by students in two different disciplines – geography and history of science – to examine how far their writing may be affected by the nature of their previous disciplinary study. In particular, we consider the students’ use of Theme, as a feature that is susceptible to discipline-specific variation.

Our comparison of emergent disciplinarity brings together two separate studies of undergraduate writing, one by Hewings (1999) involving full-time first and third year geography students and the other by North (2003) involving part-time students of history of science with contrasting academic backgrounds in science or arts. Both studies used linguistic analyses based on the notion of Theme (Halliday 1994) as a textual organizer and indicator of rhetorical shaping in text structure. The exact methods of analysis were not identical and reanalysis of the data has been undertaken to make
comparisons possible. The studies also involved the collection of interview and questionnaire data, providing insights which are used to inform the discussion.

We begin by reviewing research on disciplinary discourse before describing our own studies and the methods of analysis used. After discussing comparative data and the effects of disciplinarity, we conclude with implications for developing disciplinary understandings drawing on the notions of an apprenticeship cline (MacDonald 1994) or a network of semiotic domains (Gee 2001).

2 Research into disciplinary discourse

There is considerable research evidence of the discipline-specific nature of professional academic writing. A corpus-analytic study by Biber (1988) across a range of genres found that, within academic prose, it was possible to identify distinct disciplinary areas based on differences in the use of particular linguistic features. Other research (e.g. Bazerman 1988; Myers 1990; Swales 1990) has demonstrated that such differences in academic writing reflect the social and epistemological characteristics of the discipline. Work by Halliday and Martin (1993), for example, isolated features of science writing such as the preponderance of long nominal groups acting as a shorthand reference to previous work. MacDonald (1994) focused on the types of item in subject position in journal articles in psychology, history and literature and identified disciplinary preferences for particular or abstract subjects. Other researchers have also compared writing across disciplines, finding differences in a variety of linguistic features (e.g. MacDonald 1994; Swales et al 1998; Hyland 2000; Groom 2005). The main text-type analysed has been the research article, perhaps because of its important role in disciplinary construction, although similar disciplinary differences have also been reported in masters and doctoral theses (Charles 2003; Samraj 2004). Work on undergraduate texts is also indicating that disciplinarity is a feature even in novice genres (Drury and Webb 1991; Lillis 1997; Lea and Street 1998; Walvoord and McCarthy 1990).

Research in educational psychology, on the other hand, suggests that students’ beliefs about the nature of knowledge and their approaches to study vary along disciplinary lines (see, for example, Entwistle and Tait 1995; Paulsen and Wells 1998). Work by Kolb has indicated how initial predispositions may lead to disciplinary socialization:
For students, education in an academic field is a continuing process of selection and socialization to the pivotal norms of the field . . . Over time, these selection and socialization pressures combine to produce an increasingly impermeable and homogenous disciplinary culture and correspondingly specialized student orientations to learning.

(Kolb 1981: 233)

As students become socialized within a disciplinary culture, their academic writing may be expected to begin exhibiting characteristic features of that discipline. However, the process by which students come to make sense of and participate in academic discourse is not necessarily straightforward.

In the United States, the tradition of teaching college composition has in recent times shifted focus from generic academic writing to more disciplinary-based writing. Writing-across-the-curriculum (WAC) has led researchers to examine both the writing activities and the social and institutional contexts which students experience. Walvoord and McCarthy (1990), for example, undertook a comprehensive study of undergraduate writing in four disciplines, collecting student writing, peer responses to drafts, student interviews and making classroom observations. MacDonald (1994) suggests that students move along a continuum in engaging with academic discourse (see Figure 13.1). She posed the question whether or not students should be given help in negotiating their way along this continuum and concluded in favour of initiation through immersion, picking up the necessary genre knowledge through entering the disciplinary conversation.

<table>
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<tr>
<th>non-</th>
<th>generalized</th>
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<tr>
<td>academic</td>
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_Figure 13.1_ A continuum from novice to expert practice

In Australia and the UK, an ‘academic literacies’ approach has grown in significance in recent years, offering an alternative to the immersion strategy discussed by MacDonald. The focus is on enabling all students, whatever their background, to succeed at university level. There has been particular emphasis on essay writing, based on observations that students often do not understand the conventions of essayist literacy, do not share the premises of their teachers, and therefore fail to understand the messages they are being given about
what is expected in essay writing (Drury and Webb 1991; Lillis 1997; Lea and Street 1998). The difficulties that students may have in making sense of academic discourse practices are illustrated by Wineburg’s discussion of a high school history class, which highlighted a contrast between an expert view of history as ‘a belief system in which texts [are] defined by their authors’, and the students’ tendency to view history as ‘not a process of puzzling about authors’ intentions or situating texts in a social world but of gathering information, with texts serving as the bearers of information’ (Wineburg 1991: 510). While such understandings may emerge over time through immersion, academic literacy practitioners would aim to demystify the process – helping students to see the underlying purposes and values of disciplinary writing and their linguistic realizations.

Work in Australian universities has developed from attempts to provide this sort of scaffolding at school level, underpinned by arguments about the importance of teaching children ‘the sort of control and ownership that comes with literacy’ (Kalantzis and Cope 1993: 57). The emphasis has been on explicating curriculum genres and their lexicogrammatical features. In geography, Wignell et al. (1989) have examined the need for pupils to construct taxonomies which distil the abstract knowledge of the discipline. In history, Coffin has traced the development of specific lexicogrammatical features in writing at different levels (Veeh and Coffin 1996; Coffin 1997, 2000, this volume), outlining a movement from the sequential organization of ‘chronicling genres’ to the more abstract rhetorical organization of ‘arguing genres’. This development, she suggests, is part of the ‘apprenticeship process of learning how to mean like a historian’ (Coffin 1997: 227). Like MacDonald’s continuum (Figure 13.1), this ‘cline of apprenticeship’ (Martin 2002: 272) suggests movement along a trajectory from novice to expert.

Other studies suggest, however, that a linear model may oversimplify the nature of disciplinary learning. For example, Samraj’s (1995) study revealed the interdisciplinary variation experienced by postgraduate students in three courses in environmental science, illustrating the complexity even within one discipline for students writing different text types with different epistemological bases for different audiences. A further complication at undergraduate level is that specialist courses may be studied for general educational purposes, rather than to qualify as expert insiders (Russell and Yañez 2002). An alternative model of the way that students learn disciplinary discourses may be that of a network rather than a cline (Gee 2001), where familiarization with one semiotic domain may be more or less difficult
depending on which other semiotic domains the student has already mastered.

In order to investigate the way in which students learn to produce acceptable disciplinary writing, we need to understand the nature of the writing they undertake, including the ways in which it differs from writing in other disciplines. Although research has been carried out at tertiary level, looking at both undergraduate and postgraduate writing (see, for example, Jones et al 1999; Ravelli and Ellis 2004), relatively little comparative work has been done on student writing in different disciplines. In particular, there has been little study of disciplinary learning when students approach from different routes. Our study compares undergraduate writing in the disciplines of history of science and geography, investigating the way that the students’ use of Theme may reflect disciplinary differences in knowledge construction. In discussing the results, we consider the way previous study background affects disciplinary learning and how such learning may relate to writing success.

3 The research projects

North’s research looked at a course in history of science (HoS) at the Open University, UK, a distance teaching institution which by its nature attracts a diverse range of students. The course is at level two – equivalent to the second year of a traditional full-time undergraduate degree in England. HoS can form part of either a BA or a BSc programme and as a result attracts students from both arts and science backgrounds. In their previous study, students would have undertaken assessed writing in a variety of different courses. It is therefore possible that they had begun to acquire discipline-specific orientations towards academic writing which would be observable in differences between the writing of students from arts and science backgrounds. To investigate this, 61 student essays were analysed (3079 t-units), 33 from ‘arts’ students and 28 from ‘science’ students. The essays were taken from four different assignments, but for each assignment all students wrote on the same topic.

The study by Hewings examined writing by first and third year students studying for a single honours degree in geography, either BA or BSc. The students had all come more or less straight to university after taking final school examinations at the age of eighteen. Geography was chosen for this research as the subject area incorporates traditions of enquiry that span the sciences and the social sciences/humanities. Physical geography draws upon methods
and theories from biology, physics and chemistry, while human
geography has closer affinities to economics, sociology and history.
Sixteen essays (1,243 t-units) were analysed on topics in human
geography and in physical geography from those who scored highly
and from those who received relatively poor marks. Students in the
first year were all doing the same courses, while third year courses were
selected from a range of options.

4 The analytical methodology

Both studies used, among other methodologies, an analysis of Theme
choices in student writing. Theme, within the systemic functional
linguistic tradition (Fries 1983; Halliday 1994), is realized in English
by the initial constituent of the clause, organizing meanings at local
clause level and at discourse level. Theme is ‘the point of departure for
the message … the element the speaker selects for ‘grounding’ what he
is going to say’ (Halliday 1994: 34). Martin (1992: 11) describes first
position in the clause in terms of highlighting the ‘speaker’s angle on
the experience being constructed’. Theme may also be viewed more
dynamically in terms of shaping the interpretation of succeeding text
by limiting the options available (Mauranen 1993; Ravelli 1995,
2004).

While agreeing on the significance of the beginning of a clause in
organizing the message and creating a dynamic angle on the unfolding
text, researchers have had greater difficulty in reaching consensus over
what elements should be included within the Theme, that is, where the
Theme ends and the rest of the clause, the Rheme, starts. In our
original separate analyses, we delimited Theme differently, Hewings
choosing a more conservative interpretation and North taking a more
inclusive approach. In order to allow comparisons, we have reanalysed
the data to harmonize as much as possible; and the method of
identifying Theme set out in this paper is the result of that
harmonization.

Theme is identified at the level of the t-unit, defined as ‘an
independent clause together with all hypotactically related clauses
which are dependent on it’ (Fries 1994: 229). In order to resolve
differences between the two studies in the treatment of coordination,
coordinated clauses with ellipted subjects are treated as single t-units.
Sentence fragments are not classified. Following the traditional
Hallidayan definition (Halliday 1994), Theme is identified as every-
thing up to and including the first ideational element. This ideational
element, realized by subject, predicate, complement, or circumstan-
tial adjunct, is known as the topical Theme. Elements preceding topical Theme are classified as either textual Theme or interpersonal Theme along the lines set out by Halliday (1994).

We do, however, deviate from a strictly Hallidayan classification of Theme by recognizing a wider range of non-congruent interpersonal Themes. Within the interpersonal metafunction, ‘modality represents the speaker’s angle, either on the validity of the assertion or on the rights and wrongs of the proposal; in its congruent form, it is an adjunct to a proposition rather than a proposition in its own right’ (Halliday 1994: 340). In the following cases, however, the writer’s comment is expressed non-congruently, using an extraposed clause (example 1) or projecting clause (example 2). (In examples, G = geography student, 1 = first year essay, 3 = third year essay, HoS = history of science student, A = student with an arts background, S = student with a science background):

1. *It is obvious* from the descriptions of the various processes that soil creep is a very slow form of movement *(G/1)*
2. *I believe that* the translation of scientific texts from Greek and Arabic into Latin provided the foundation for all that followed. *(HoS/S)*

Writers may metaphorically indicate their attitude towards a proposition in a great many ways. Hunston, for example, classes projecting clauses such as *Terneld suggests that* and modal constructions such as *It is possible that* as ‘carriers of interpersonal metaphor’ (1989: 139). Whittaker lists the following types of interpersonal Themes, all of which indicate the writer’s opinion on the veracity of a following proposition (1995: 111):

- Preposition Phrase: e.g. *In my opinion*
- Extraposition: e.g. *It is clear that*
- Projecting clause: e.g. *We would argue that*
- Nominalization of mental/verbal process: e.g. *There is a strong possibility that*
- Impersonal projecting clause: e.g. *It is also contended by Robinson et al that*

In the analysis presented here, we regard all such expressions of modality as interpersonal metaphor, and therefore class them, when clause-initial, as interpersonal rather than topical Themes.

In declarative clauses, the topical Theme is usually the grammatical
subject. This is the ‘unmarked’ case. When the topical element is something other than the subject of a declarative clause, the Theme is said to be ‘marked’. In t-units with an initial dependent clause, the whole of the dependent clause is analysed as marked topical Theme. Marked Themes are mostly circumstantial adjuncts and clauses, complements and predicated Themes (clefts), for example:

3. From here, water would follow the stream (G/1)
4. If water becomes sufficiently concentrated it might begin to cut a channel (G/1)
5. Of equal importance was American silver mining (HoS/A)
6. it was He who set the matter in motion (HoS/S)

In the following discussion of results, we focus on comparing the students’ use of marked Themes and of multiple Theme (that is, where a topical Theme is preceded by textual and/or interpersonal Themes).

5 Results

Comparison of marked Themes shows a clear disciplinary effect, with the history of science essays including 47 per cent more than the geography essay (See Figure 13.2).

![Figure 13.2](image-url) Incidence of marked Themes in geography and history of science essays
The majority of marked Themes were circumstantial adjuncts and dependent clauses, which occurred in 15.5 per cent of t-units in the geography essays and 20.7 per cent in the history of science essays. The relatively high proportion in history of science is in line with other findings that have suggested a preference for circumstantial adjuncts in history (Taylor 1983; Lovejoy 1998; McCabe 1999). By its very nature, history tends to deal with particulars rather than generalities (Becher 1989; MacDonald 1994), and thematizing circumstantial adjuncts serves to foreground the location of particular events in time and space. Circumstantial adjuncts of manner were also frequent in the history of science essays, associated in particular with comparisons between theories:

7. but like Gassendi, Descartes points to God as the original creator of matter and also the preserver of its constant motion; (HoS/A)

In geography, circumstantial adjuncts foregrounding time and location were also common and occurred particularly within parts of the text which gave specific examples:

8. *In the Cumberland Basin, Australia*, changing climatic conditions have had considerable effects on river channel morphology (Pickup 1976). (G/3)

However, since geography tends to draw on detailed analysis of examples to generalize about processes, this led to many Themes giving reasons or causes for observed phenomena:

9. *For this reason*, women are said to experience a ‘glass ceiling’ when it comes to entering positions of power (Davidson and Cooper 1992). (G/3)

While circumstantial adjuncts and clauses formed the bulk of marked Themes, there was also occasional use of highly marked Themes – complements, predicated Themes and finites – as in examples 10 to 12:

10. *Fundamental to Descartes' philosophy* is the place of God as the architect of the laws of matter and motion. (HoS/A)
11. *It was this development* that differentiated the West from any other part of the world. (HoS/A)
12. Neither is cultural isolation credible. (HoS/S)
Highly marked Themes involve more overt writer intervention to persuade the reader towards a particular interpretation (Francis 1989), and suggest a conception of writing as a rhetorical performance, rather than as a transparent representation of reality. Such Themes accounted for 3.7 per cent of all topical Themes in the history of science essays, compared with only 1.1 per cent in the geography essays, and thus represent another point of difference between the two disciplines.

While the essays show evidence of disciplinary variation in the use of marked Themes, there is little evidence of differences relating to students’ previous learning experience. In geography, third year students used only slightly more marked Themes than first year students, while in history of science, students with an arts background used only slightly more than those with a science background. When we turn to multiple Themes, however, a very different picture emerges. Here the disciplinary effect is slight, and variation is much more noticeable within each student group.

Multiple Themes occur when the topical Theme is preceded by textual or interpersonal elements; Figure 13.3 indicates the incidence of these types of Themes as a proportion of all t-units. The geography essays showed a substantial increase in the use of textual and interpersonal Themes from the first to the third year, while the history of science essays showed a similar effect according to student background.

![Figure 13.3](image_url)  
**Figure 13.3** Incidence of multiple Themes in geography and history of science essays
The changing proportion of multiple Themes in the geography essays might be explained by a number of factors: it could arise from the changing nature of the writing tasks at different levels of study, from the students' longer experience of academic study, or from their gradual mastery of the disciplinary conventions of writing within geography. Yet the history of science essays show similar variation in the use of multiple Themes as a function of the students' academic background, rather than their current academic level. In this case, the variation cannot relate to task differences, since the writing tasks were identical for all HoS students, nor to familiarity with academic study, since the students from a science background had previously taken more undergraduate courses than those from an arts background. The most likely explanation seems to be that experience of a particular type of academic writing may have encouraged increased use of multiple Themes in the student essays.

In both geography and history of science essays, the use of multiple Themes was associated with higher marks. Example 13, taken from the highest-scoring third year physical geography essay, illustrates the way textual and interpersonal Themes can be used to build a persuasive piece of writing:

13. Unequivocally hillslope erosion models have advanced since the first one in 1940, but these models are still not perfect. Currently it is fair to say that results from the models although representative of soil loss in an area are far from accurate. Perhaps the most promising advances in modelling are not the predictions made, but the theoretical advances in the model base.

The evaluative and persuasive nature of this paragraph permeates more than just the Themes, but is particularly indicated through the use of interpersonal Themes: unequivocally, it is fair to say, perhaps. It is the presence of these interpersonal Themes which helps distinguish essays that do more than just recount facts. The writer is prepared to intrude more openly into the text, albeit often in a disguised, objectivized format. That this engagement by the essay writer with the subject is valued is clear from the 'Guidelines' produced by the School of Geography. Its characterization of writing that will be awarded a first or upper second includes 'relevant criticism of topic – ideas – models, etc', 'textual argument', 'depth of interpretation' and 'imaginative discussion/analysis'.

Similar guidelines for the history of science course stress the need to construct a persuasive argument based on the critical use of evidence,
pointing out that ‘part of being a historian involves evaluating various interpretations of a given period, or episode, in the knowledge that there will be no one explanation that is definitive’. Once again it was found that the most successful essay writers were more likely to intervene overtly in the text through the use of textual Themes, and to use interpersonal Themes which framed their statements as a matter of interpretation rather than fact, as in example 14, from a high-scoring essay by an arts background student:

14. Grant states that it was the medieval natural philosophers within the long university tradition […] who passed on the best legacy of developing science to the following generations of scientists. (Ref 3).

   However, historians have not all agreed about how and why science advanced during the period in question.
   Pierre Durlem, an historian of science, saw the 1270s as the period when modern science began because condemnation of Aristotle’s work at that time catalysed scholars into thinking of alternative ideas like the possibility of a vacuum or the plurality of the worlds (Ref 4).

   Also, Frances Yates postulated that the magic factors in the neo-Platonism revived in Italy by the humanist Marsilio Ficino through his translations direct from the Greek texts, prompted the later scientific revolution in the 18th century.

   However, more importantly, it is said that Plato’s philosophy inspired Renaissance natural philosophers to think about the world in a more mathematical way (Ref 5).

Despite the differences in the style of extracts 13 and 14, both exhibit greater use of multiple Themes than typically occurred in lower-scoring essays. The use of textual Themes indicates a piece of writing which has been formulated to show how ideas connect with each other – a means by which the writer creates ‘relevance to context’ (Halliday 1994: 36). Interpersonal Themes, on the other hand, are most strongly associated with presenting an ‘angle’ on the matter of the clause, and their use highlights the engagement of the writer in the persuasive dialogue that underlies academic writing.

6 Discussion

Several writers have pointed out that the need for rhetorical shaping in academic writing may differ according to discipline (Bazerman 1988;
MacDonald 1994; Hyland 2000), and our results suggest some variation in this respect between undergraduate essays in geography and in history of science. Such variation can be related to epistemological differences between the two disciplines, with geography, particularly physical geography, having more in common with the hard sciences than does history. The framework of shared assumptions that underpins a ‘hard’ discipline allows writers to rely on a degree of consensus among their audience, while ‘soft’ disciplines deal with individual interpretations which are open to debate, and therefore demand more effort on the part of writers to persuade their audience (Hyland 2000). Such differences may perhaps help to explain why the history of science essays included more marked Themes, suggesting that the writers have had to do more work to shape their argument within a discipline where reality is seen as a matter of interpretation, rather than a matter of fact.

Evidence in support of this hypothesis comes from the students themselves. In interviews, the history of science students commented on the more ‘factual’ nature of science as compared to history, and those from a science background indicated some frustration with the lack of ‘real answers’, and what they regarded as ‘waffle’. Similarly in geography, students with science A levels tended to characterize human geography in terms such as ‘free-flowing’ and ‘not clear-cut’, and to prefer what they saw as the more structured, less open-ended nature of writing in physical geography. Lecturers also commented that physical geography, particularly in the first year, was characterized by a greater reliance on factual content, though it appeared that by the third year, qualities of thinking critically and developing an argument were highly valued by all lecturers.

Given these differing orientations to knowledge, it is perhaps surprising to note that the average frequency of interpersonal and textual Themes did not vary greatly between essays in geography and in history of science. As Figure 13.3 shows, the proportion of multiple Themes was similar in both disciplinary areas. The picture is complicated, however, by the fact that the geography essays were written in first and third year courses, while the history of science essays were at second year level. Moreover, as examples 13 and 14 demonstrate, essays may include a similar proportion of multiple Themes while nevertheless using them in rather different ways.

In this paper, however, our interest lies less in the differences between the two disciplines than in those between students within the same discipline. In this respect, what is striking about the results is that textual and interpersonal Themes occurred more frequently in the
writing of third year rather than first year geography students, and in the writing of HoS students with an arts rather than a science background. In both cases, the use of multiple Themes was associated with higher marks, suggesting that students who used them more frequently were more successful in meeting disciplinary expectations for academic writing. Interpersonal Themes represent ideas as open to interpretation, and the students’ use of such Themes may signal higher levels of engagement with disciplinary debate. Textual Themes, on the other hand, guide the reader’s interpretation of the text, and may reflect the students’ growing ability to take a more authoritative stance in their writing. In both cases, of course, the students may also be exploiting these features in order to display to the marking tutor their ability to handle the discourse of the discipline.

A student’s developing ability to produce written discourse that conforms to disciplinary expectations could be seen as arising from a process of disciplinary apprenticeship which involves development along a continuum from novice to expert (MacDonald 1994; Veel and Coffin 1996). This view is indeed consistent with what was observed in the geography course, but is less clear in relation to the history of science course, which students took not as part of a single-subject programme of study, but as an individual choice within a modular programme. As a result, they embarked on the course with differing previous experiences of academic study and academic writing. Our findings thus suggest that students’ ability to produce disciplinary writing may be hindered or enhanced by the writing they have done in other disciplinary areas, which may have affected not only the particular skills they develop, but also the views and values they hold about the nature of writing. Disciplinary studies would appear to be networked (Gee 2001) in such a way that for any given course, some prior courses may provide a better grounding than others. In the case of the history of science course, it appeared that previous arts study prepared the students more effectively for their writing than previous science study.

Research into professional academic writing has demonstrated that the criteria for evaluating writing vary across disciplines, and it is likely that such variation is also reflected in undergraduate writing. Lea and Street (1998), for example, note the case of a student whose writing was seen as lacking ‘structure and argument’ in anthropology, though judged acceptable in history, while Stockton (1995) comments on the ‘remarkably low’ grades that literature majors received in history. Yet relatively little is known about disciplinary differences in undergraduate writing, and the way that these may affect students’
success in negotiating the demands of courses as they cross disciplinary boundaries.

7 Conclusion

Our aim in this paper has been to question a view of learning to write within a discipline as a simple unidirectional process. From the tutor’s point of view, students may appear to progress along a continuum towards expert writing in a discipline. But from students’ points of view, this may be merely one thread within a tangle of different writing experiences. Our research suggests, firstly, that student writing demonstrates at least some disciplinary variation, such that what is valued in one context cannot be assumed to be valued equally in another context, and secondly, that students’ success in writing within one disciplinary area may be affected by what they may have learned about writing through previous academic study. The evidence we provide here is limited, involving a study of one particular feature—the use of Theme—across two disciplinary contexts. Yet the results are, we suggest, sufficient to highlight the need for further cross-disciplinary research into student writing, in order to disentangle both the features that characterize good student writing in different disciplines (which are not necessarily the same as in professional academic writing), and the way that different influences, from a range of previous experiences, combine to shape a student’s writing in any particular context. Without such understandings, it would be difficult to design effective strategies for supporting student writing in the disciplines.

References


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