

Engineering and Language Discourse Collaboration: Practice Realities

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Abstract: This article describes a situated engineering project at a South African HE institution which is underpinned by collaboration between Applied Language Studies (DALs) and Mechanical Engineering. The collaboration requires language practitioners and engineering experts to negotiate and collaborate on academic literacies practices, discourse understandings, reports as genres as well as literacy concerns so that engineering students can acquire the necessary academic literacies to be successful in HE and in the workplace. Although the collaboration intends to facilitate the embedding of teaching and learning of literacies into disciplinary discourses enacted in the writing of different kinds of genres in mainstream curricula (Jacobs, 2007b, p. 870), collaboration practices are complex and lengthy and require systematic and sustained collaboration with discourse teachers (Jacobs, 2007a) in engineering "communities of practice" (Lave & Wenger, 1991). The article focuses on literacies understandings and discourse development as well as practices and organisational circumstances that generate and /or delimit specific discourse collaboration practices.

Introduction

This article focuses on the social construction of the content classroom from the perspective of language and discipline-expert collaboration using a classroom discourse practice framework (Foucault, 1972; Bourdieu, 1992). In particular, the article reflects on literacies understandings and the situated collaboration practices that impact on literacies acquisition and discourse development in a South African HE engineering collaboration context. In South Africa, the issue of language proficiency levels as well as discourse development and how to teach it have become a concern to lecturers outside language and linguistic departments since 1994 when there was a sudden and significant change in student diversity and the discourses students brought with them to HE (Starfield, 1990; Thesen, 1997; Boughey, 1998; Moore, 1998; Paxton, 1998; Amos, 1999; Van Heerden, 2000, p. 10).

However, low-proficiency language levels have remained a trend in HE research and a global concern as stakeholders in American education have also identified a need for large-scale commitment to improving student writing achievement (Troia, Shankland & Heintz, 2010, p. 1) as language proficiency tends to have a causal relationship with academic success in HE. For Blue (1993, p. 5), the most important factor for academic success is "simply proficiency in the language of instruction" and,

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usually, no student acquires literacies naturally (Myles, 2002) or automatically without active intervention (Green, 2010). Research and South African HE experiences over the last 20 years have also found that literacies acquisition depends on literacies practices that students have acquired in the past and those that are specifically extended to them in the present. Therefore, academics and discipline experts can no longer dismiss, take as implied, or view literacies and discourse acquisition as issues that are separate from content for language practitioners to fix-up, especially as student cultural and language differences increasingly become challenges for literacies acquisition in HE.

Therefore, effective and successful literacies learning and teaching practices need to be implemented and integrated into content classroom literacies practices as content subjects are not ends in themselves that exist separate from language. The shift from a conception of literacies located in individuals to ways in which literacies are utilised so that literacies becomes a resource realised in social relationships rather than the property of individuals, is important. Consequently, collaboration processes and practices that include apprenticeship, scaffolding, literacy mediation, peer and expert mentoring and the inclusion of real social contexts (Vann & Fairbain, 2003) also ensure that discourse understandings shift from not just what is *done* with literacies, but also *understandings* of what is done, including the *values* given to actions, and the ideologies and practices that encapsulate the use and valuing of literacies (Barton & Hamilton, 2000, p. 13).

As HE institutions are increasingly pressured to produce learners who meet the literacy demands of the working world and the global economy, the need to address literacies issues and discourse development has become a strategic imperative. Therefore, discipline experts can no longer treat discourse as bodies of knowledge and pay little attention to how students know, process or apply that knowledge or ignore that students' academic literacy levels impact on their success in HE and in the workplace. Academics and discipline experts need to take responsibility for their discourse structures by not downplaying language but rather acknowledging that discourse is an essential part of content and not an optional extra (Van Heerden, 2000). As the teaching and learning of literacies like writing and reading are increasingly facilitated into disciplinary discourses (Jacobs, 2007, p. 870) through discipline expert and language practitioner collaboration practices, student literacies levels as well as academic success rates will be improved (Dove & Honigveld, 2010, p. 5).

Research Context

At the research site, many of the black L2 students have attended historically-disadvantaged state schools and often do not cope with HE academic-literacy demands (Quinn, 2007, p. 1). Performance in mainstream subjects remains "stubbornly low" (Keeton, 2010), and content teachers continue to express concern over the inability of students to write effectively after three years as undergraduates in HE. Although real-world transfer is "notoriously difficult" (Green, 2010, p. 393), language practitioners are also concerned about the apparent limited literacies transfer from language to content class as well as the need to address English Second Language (ESL) language difficulties across the curriculum and not only in the language class. However, transfer failures occur frequently because educators expect it to occur automatically without any active intervention on their part (Green, 2010, p. 394).

As a result, at the end of 2009, a language/engineering collaboration project was initiated at the research site to develop first-year Mechanical engineering student literacies levels. Although low-proficiency levels are a concern as 45% of the students registered for engineering were L2 in 2010, a further constraint to literacy or discourse acquisition was the limited impact of the semester duration Communication Skills 1 course. The Engineering curriculum traditionally requires the first-year students to take a one semester generic language course which is L1 based as language support.

However, as disciplinary identity and discourse development happen gradually over the students' entire undergraduate career, the brief language exposure is insufficient to meet the literacies and discourse development needs of students. Rather, discourse development requires the teaching and learning of academic discourses and literacies to be integrated into engineering content classes throughout the three-year undergraduate study period.

Although collaboration may often occur more informally through casual sharing of ideas in faculty staffrooms, this study investigates the need for more structured cooperative collaboration settings. According to Cook and Friend (1995), collaboration is a style of interaction between at least two coequal parties voluntarily engaged in shared decision-making as they work toward a common goal. Risko and Bromley also emphasise the importance of teacher collaboration because it "moves professionals ... from the deficit model to one that affirms and is responsive to students' strengths, backgrounds, beliefs, and values" (2001, p. 11). Most importantly, Risko and Bromley (2001, p. 12) propose that collaboration "reduces role differentiation among teachers and specialists, resulting in shared expertise for problem solving that yields multiple solutions to dilemmas about literacy and learning". In addition, the collaborative relationship between discipline experts and language practitioners also needs to extend beyond the first year of study and one disciplinary expert (Jacobs, 2005, 109).

Limited interaction contexts encourage an ad hoc form of collaboration between language practitioners and discipline experts which does not sustain the embedding of discourse structures within the content class. In addition, language practitioners cannot presume to be a discourse expert after a brief "look in" on the tacit knowledge discipline experts have acquired over a period of time (Jacobs, 2007a). Therefore, language and content lecturer collaboration requires sustained and "visible partnerships" (Paretti, 2011) as well as the creation of "discursive" (Jacobs, 2007b), "levelling" (Marshall, Conana, Maclons, Herbert & Volkwyn, 2011), "intellectual" (Paretti, 2011) and "dialogic" (Mills, 2010) spaces "to construct dialogue to categorise experiences in mutually understood ways" (Mills, 2010).

However, the practice reality is that sustained and interactive collaboration is complex, time-consuming, and often an *odd, estranged* and, sometimes, *uneasy* relationship exists between discipline expert and language practitioner. Therefore, at the research site, although sustained and interactive collaboration spaces were needed to situate and embed the teaching and learning of writing in different genres (kinds of text) in mainstream curricula (Jacobs, 2007b), they did not occur as a practice in 2010. Time and teaching workload constraints, increased student numbers, staff capacity, language/engineering faculty campus separation and, possibly, lack of buy-in, resulted in the collaboration remaining an add-on, superficial and limited practice. The disinclination of engineering staff to collaborate and *their* apparent lack of buy-in is illustrated by their poor response to a questionnaire the language practitioner disseminated requiring the ranking of their identified list of critical literacy-concern areas after the initial call for collaboration at the end of 2009. when the DALs language practitioner disseminated a questionnaire. Although the entire engineering faculty had participated in the collaboration project launch and had brainstormed their academic-literacy concerns, only three engineers responded to the questionnaire and provided their ranking of the combined engineering faculty's identified academic-literacy concerns. Their ranking was as follows:

1. Problem-solving skills: logic, reasoning (cognitive)
2. Reading: synthesising, analysing, summarising and interpreting information and providing "answers relevant to questions"

3. Writing: rigorous, concise, coherent, cohesive
4. Language: own words, definitions, discipline-specific terms
5. Visual: writing from plans, diagrammes, graphs, figures
6. Presentations: effective presentation styles using PP
7. Other problems: copying and pasting, rote learning

The ranking highlights the cognitive emphasis in engineering learning as well as the understanding of literacies like reading and writing as the acquisition of individual, discrete skills which are technically transportable across socio-cultural contexts (Collins & Blot, 2003, p. 65). A consequence of literacy "commonsense" or skill understandings is that most discipline experts in HE focus on the content knowledge of the discipline as their core responsibility and often construe problems with discourse as "language problems" (Gee, 1990, p. 73) for which language practitioners are responsible. However, literacy (in the sense of ability to use written language) is not a technology made up of a set of transferable cognitive skills but a constellation of practices which differ from one social setting or discourse community to another. The skill concept of literacies also needs to be questioned as literacies practices are specific practices manifested in different contexts whose meanings are more dependent on the processes by which they are acquired than on the specific skills applied (Street, 1996; Clark & Ivanič, 1997, p. 5; Boughey 2002; McKenna, 2003). Therefore, literacies and discourse understandings are not wholly contained in observable units of behaviour or activities as activities associated with written texts will involve values, attitudes, feelings, patterns of privileging and purposes and social relationships (Street, 1993 p.12) which are often internal processes. This makes the collaboration process complex as literacies or writing as text cannot be usefully separated from specific local circumstances in which they occur or from the broader institutional and socio-historical contexts which inform those particular discourses.

However, in response to the disciplinary experts' identified academic-literacy concerns, the first-year Communication Skills 1 course was redesigned as Communication Principles: Module A. To address the reading concern, the Module A course design included multiple reading texts for textual analysis (concern 2) and simulated the report and presentation structure of the content class by requiring group report submissions and the presentation of a mechanical process observed (concerns 3, 4, 5, 6). However, *jointly* achieving literacy tasks for course reading material was also problematic. For example, the need to include real-world contexts and authentic engineering reading material to facilitate the scaffolding of students to acquire the discipline's discourse was not made available by engineering lecturers. Even after continuous requests for engineering lecturers to provide authentic reading texts to be included in the course design, these were not forwarded or made available. Possibly, as knowledge and discourse understandings are internalised and operate at an unconscious level, the discipline experts never saw the need for this request and/or did not know how, or have the inclination or time to respond.

Even though the study's collaboration practices were still emerging and on the fringe, the context realities reinforced the need for sustained, systematic and reciprocal interaction and "visible partnerships" (Paretti, 2011) that are multi-voiced. Discourse and academic-literacies requirements are often considered "an invisible dimension of the curriculum" with the rules or conventions viewed as commonsense knowledge and not "explicitly taught within disciplinary courses" (Coffin, Curry, Goodman, Hewings, Lillis & Swann, 2003, p. 3). Therefore, open, dialogic and intensive collaboration practices are required to negotiate and discuss literacies understandings and discourse requirements to make them tacit. Language practitioners are able to "view language as opaque" (Jacobs, 2007b, p. 872) as they have an understanding of teaching and learning of language-related literacies like writing and "experience in scaffolding marginalised students into discourses". So, with

sustained and reciprocal collaboration practices, language practitioners can bring discourse understandings to conscious levels so that discipline experts can gain a critical understanding of teaching discipline-specific literacies like writing as they improve their "noticing skills" and gain linguistic proficiency or the "knowledge of discourse conventions and organising the information flow" (Hinkel, 2004, p. 10). Language practitioners can also assist discipline experts in asking critical questions of the text so that they become meta-aware of discourse patterns and generic structures that shape genres in mainstream disciplines. This does not mean that language practitioners know disciplinary discourses better than content lecturers, but that through reciprocal and sustained interaction, content lecturers can develop a view of themselves as *insiders* of an academic discourse community from the *outsider* perspective of language and literacy teachers (Jacobs, 2007b, p. 875).

However, effective and successful collaboration practices do not occur naturally, so both language practitioners and discipline experts need to be apprenticed to make explicit literacies understandings as well as discourse requirements which discipline experts often find difficult to articulate. In addition, to complicate the process, literacy practices are also pitched at higher levels of abstraction and refer to behaviour, social and cultural conceptualisations that give meaning to the uses of reading and/or writing. Therefore, the creation of "dialogical" (Mills, 2010) and "discursive" (Jacobs, 2007b) spaces are vital to inform, negotiate, and discuss responses to literacy acts, to make explicit embedded rhetorical patterns and to create discourse meanings in disciplines.

As collaboration spaces also need to be reciprocal to push academic-literacies teaching and learning practices towards a critical pedagogy, the "burden of persuasion" (Geisler, 1994) also rests on discipline experts. On the one hand, language practitioners need to bring tacit awareness of the workings of disciplinary discourses and the inequalities that discourse practices often set up in classrooms to the level of consciousness for disciplinary experts (Jacobs, 2007a, p. 21). On the other hand, discipline experts need to be aware that students often have to copy or "bluff" (Bartholomea, 1988, p. 273) and "invent" (McKenna, 2004, p. 279) the expectations within the lecturer's mind to gain access to the discourse or academic literacies as these expectations are seldom made overt and often act as gatekeepers for success in HE (Ferris, 2003, p. 8; McKenna, 2002; 2004). Therefore, disciplinary experts also need to have a critical awareness of their discipline's discourse practices and create ways and opportunities to change and modify their teaching and learning practices. This necessitates discipline experts acquiring a "meta-awareness of the nature of genres" (Wardle, 2004) so that they can produce critical learners with similar genre meta-awareness (Jacobs, 2007a, p. 22).

Finally, collaboration practices should not remain at a local disciplinary level in HE institutions. Jacobs (2007b, p. 877) emphasises the need for "strategic alliances" between language practitioners and discipline experts at various levels within HE institutions. This requires that language practitioners are familiar with the teaching and learning processes and practices of various disciplines and departments and build credibility by infusing their work in system processes and practices. Therefore, discourse development does not only include particular forms of language organisation beyond grammatical structure of sentences; it also includes institutionally-generated sets of systematically organised statements, which give expression to specific social meanings and values.

Therefore, at meso-levels, affinity groups also need to be established across disciplinary boundaries that operate in structured discursive and dialogic spaces over sustained periods of time to promote professionalism and accreditation of literacies teaching and learning practices in HE (Jacobs 2007b, p. 877). This requires the creation of "institutional transdisciplinary community of practice" (Jacobs 2007b, p. 873) spaces to bridge language discourse divides with knowledge understood as discursively constructed and academic literacies as embedded within ways that the various disciplines construct themselves through language. This could lead to an integrated model of

academic literacies teaching and learning practices to promote student access to disciplinary knowledge and academic success.

Collaboration Practice Realities

The process of bringing tacit knowledge to explicit awareness "takes time and patient collaboration" (Jacobs, 2007b, p. 875), and when time is not invested and interaction not sustained, language practitioner and discipline expert collaborations tend to have unproductive consequences and set up "patterns of inequality" (Jacobs 2007b, p. 875). Hence, for discipline experts and students to become producers and possible changers of discourses and genres, they also need to be actively involved in the discourse dialogue by changing, contesting and pushing discourse boundaries through discursive and dialogic feedback practices as well as lecturer-peer negotiations. For example, at the research site, two mechanical engineering students assisted the language practitioner with the design of a report template by highlighting and discussing the essential requirements and procedures in the design process. Discursive and dialogic spaces were also created when the language practitioner attended the Design 3 class with their lecturer to give and discuss the class's draft report feedback and when the Design 3 lecturer provided technical feedback during the Design report presentations in the language class.

During collaboration practices, language practitioners also need to ensure that they do not assume the primary role of authority within disciplinary discourses, as this may compromise interaction between language and lecturers in mainstream disciplines (Jacobs, 2007b). Jacobs (2007b, p. 873) argues that language lecturers appearing to assume "expert" roles in the discourses of lecturers' disciplines, "which are not their own" may "undermine the disciplinary expertise of lecturers". The converse is that discipline experts also need to incorporate language practitioners into their disciplines and not regard them as "handmaidens" who carry the "burden of ... persuasion" (Geisler, 1994) and sole responsibility for making disciplinary discourses explicit for students.

Therefore, discipline experts need to be actively involved in the collaboration processes rather than "talked to" by language practitioners so that an integrated and "dual critical identity can be crafted in practice" (Jacobs, 2007a). Dialogic and discursive spaces allow language practitioners and discipline experts to discuss intertextual and interdiscursive experiences of language in mutually understood ways to contribute to the dynamic nature of discourses by enriching, critiquing and possibly changing it. This often requires "expanded roles" for language practitioners when collaborating with engineering lecturers to ensure "systematically ... unlock[ing]" (Jacobs, 2005, p. 109) tacit knowledge in engineering discourses which are often understood at unconscious levels and to make explicit and embed discourse rhetorical patterns in discourse teaching and learning practices.

Way Forward: Implications

Studies by Boughey (2002) and McKenna (2003) have shown that language practitioners and discipline experts need to change their conceptualisation of academic discourses as generic transferable skills and autonomous bodies of knowledge which maintain the role of language practitioners as service lecturers for engineering departments. Little benefit is derived from this model, least of all for the students who grapple with disciplinary forms of writing and the highly-technical language of engineering. As discipline experts have often been on the inside for so long that they have forgotten "what it's like to be outside of it" (Jacobs, 2005, p. 107), they tend to conflate understandings of language, literacy and discourse, which lead to simplistic understandings of how students may be inducted into engineering discourses. Therefore, spaces to nurture and extend

language practitioner and discipline-expert collaborations are needed to embed the teaching and learning of discipline-specific literacies within disciplines. Jacobs (2005, p. 109) suggests the following sustained, interactive and systematic collaboration practices to embed a more dynamic insider/outsider collaboration relationship:

- Expanded roles for language lecturers to unlock the tacit knowledge regarding literacy practices of discourses to help make explicit and unconscious discourse understandings
- Negotiation of common understandings of how to integrate literacy practices including team teaching, joint assessment, allocation of marks
- Exposure of language practitioners to engineering literacy practices to make explicit the rules governing disciplinary discourses

For successful and effective collaboration, Fullan (1993) also describes the need for content lecturers who are committed to being active learners and who value and practice collaboration with their colleagues. Therefore, it is important to consider how collaborative efforts are being implemented as lack of commitment and exclusive institutional cultures may lead to feelings of resentment among lecturers. Discipline experts and language practitioners also need to feel that collaboration partners are not intruding on their personal classroom domain. Therefore, Dove and Honigsveld (2010, pp.18-19) recommend that current and future collaborative practices:

- Start small and slowly
- Have realistic expectations for practitioner and colleagues
- Find time for planning, or explore electronic means of communication
- Expand joint planning and parallel teaching to more extensive collaborative initiatives over time
- Advocate establishing collaborative teacher practices as accepted forms of professional development

The difficulties and complexities of collaborative practices and processes are, however, worth the effort with Dove and Honigsveld (2010, p. 3) describing the success of sustained collaboration practices. In their study, collaborative practices and co-teaching arrangements have completely and successfully replaced all ESL pull-out services in the Minnesota Public Schools in the United States. The use of cooperative planning and organisational techniques have enabled discipline experts and language practitioners not only to discover how to improve their lesson delivery and differentiate instruction for L2 students, but they also offer peer support to each other and engage in formal or informal mentoring and peer coaching arrangements (Dove & Honigsveld, 2010, p. 4). These sustained collaborative practices have not only created a model of teacher support for novice lecturers, they may also lead to teacher leadership development for more experienced faculty (Dove & Honigsveld, 2010, p. 4).

Conclusion

As with any new and challenging institutional initiative, all involved in collaboration practices need to begin slowly and transparently, gathering support from content lecturers who are willing to participate and building new relationships with those who may be reluctant. With carefully planned and sustained interaction as well as long-term planning, buy-in may be possible from all stakeholders, and institutions may be able to establish a collaborative culture over time, supporting collaboration and co-teaching and allowing teacher leadership to emerge.

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