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**Transfer from English for Academic  
Purposes to disciplinary modules**

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Doctor of Education (EdD)

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28 October 2019



# Abstract

Transfer has been defined as learning in one context impacting performance in another context and is considered a priority aim for education. Transfer is critical for English for Academic Purposes (EAP) programmes in tertiary settings and yet it remains poorly understood. Research into EAP transfer rarely explores how transfer operates in various disciplinary contexts, and mostly focusses on students' general perceptions of this transfer rather than on textual evidence. This study investigated transfer operated by twelve participants from a Systemic Functional Linguistics (SFL)/Genre informed English for General Academic Purposes (EGAP) module to Life Science, Maths, Chemistry, and Engineering modules. The methods involved a triangulated perspective addressing students' perception of transfer, textual evidence of transfer and the discipline lecturer's evaluation of an assignment. Student texts from the EAP module and the discipline were analysed using a broad SFL framework; semi-structured interviews with the participants were conducted and analysed with a multi-framework approach, including Legitimation Code Theory and SFL. Results indicate that an SFL/Genre approach to EGAP course design impacts transfer positively by making linguistic resources visible to the students and enabling them to analyse and make appropriate language decisions in the new contexts of their discipline. Most participants applied their EAP knowledge judiciously in the disciplinary writing context. Results also reveal that not all knowledge was transferred equally; moreover, three of the twelve participants reported minimal transfer. Further analysis of the interview data showed that students' dispositions towards knowledge in the EAP module may play a role in transfer. Beyond investigating transfer from an SFL/Genre EAP module, the thesis, therefore, also revisits the notion that motivation is an important factor in transfer and proposes a deeper orientation to disciplinary knowledge structures and the concept of affiliation as a more satisfactory explanation for a lack of transfer.



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# Introduction

Transfer of learning has long been a major concern for educators and policy makers. Some of the earliest scholarly accounts date from the 1900s when psychologists started recognizing transfer as an elusive goal of education (Thorndike & Woodworth, 1901). More recently defined by Perkins and Salomon as occurring when “learning in one context or with one set of materials impacts on performance in another context or with another set of materials” (Perkins & Salomon, 1994, p.6452), this ability to apply learning beyond the immediate context is seen as ‘the ultimate aim of teaching’ (McKeough, Lupart, & Marini, 2013). This centrality of transfer rings particularly true for the English for Academic Purposes (EAP) discipline which aims to help students gain academic literacy and study skills and apply them to their tertiary studies (Hyland & Hamp-Lyons, 2002). Yet, transfer is a concept that is still relatively poorly understood in the teaching of EAP field (TEAP). Indeed, very little is known about the ways students taking an EAP module at the start of their undergraduate studies actually transfer their learning to their discipline modules. The existing EAP transfer literature mostly addresses the issue from psychological and educational perspectives, highlighting learners’ attributes such as motivation, self-efficacy or their perception of similarity of contexts as key elements. Crucially, it will be shown that *content knowledge* in the EAP curriculum has rarely been a focus in the conceptualization and investigation of transfer. The way *knowledge* itself and its underlying structure can affect transfer across contexts had not been addressed until a series of recent social realism studies, in particular from Legitimation Code Theory (Maton, 2014) in collaboration with Systemic Functional Linguistics (SFL) (Martin, 2013) started investigating the issue of transfer, termed ‘cumulative learning’ from a sociological and linguistic perspective. This thesis aims to contribute to current understandings of transfer from EAP provisions by addressing this new development which complements existing psychological and educational analyses. It will explore ways in which transfer is affected, not only by attributes of the learner but also by attributes of the knowledge that is shared in the teaching and learning experience

The study presented in this thesis was motivated by the researcher’s EAP teaching and curriculum design experience in a tertiary education institution in Hong Kong. The context in Hong Kong, for Cantonese-speaking students who transit from Cantonese medium of instruction (CMI) schooling to English medium of instruction (EMI) university studies present challenges to their academic success which are addressed through EAP provision which, in the researcher's institution, was based on skills (reading, writing, speaking and listening), and on grammatical accuracy. The researcher found this approach to be limited in the support it provided to students facing such hurdles. When compared with students whose schooling was done in an EMI context, CMI students faced what was perceived by

the researcher as a social injustice which was poorly addressed by the EAP provision in place. The questions raised led the researcher to the approach described in this thesis, a socio semiotic approach which, by understanding language as key to the processes of learning and teaching, and by addressing disciplinary specificity, aims to provide a more satisfactory support to students whose academic literacy level may impede their achievement.

The context of this study is a higher education institution in Singapore and the setting of the pedagogical intervention is an EGAP module provided to undergraduates in their first year (although a few also take it in their second year). The module is coordinated by the researcher and the participants of the study were taught by the researcher over a three-semester period in 2016-2017. Students of the institution take a written English entrance exam and, according to results, may be streamed into a compulsory academic writing/EGAP module. As is the case in many universities across the globe, most students then proceed to a further academic literacy module embedded and tailored to their specific discipline. A difference, however, with many EAP contexts globally, is that the EAP module caters for Singaporean students who have been schooled in English medium of instruction establishments (although their mother tongue may not always be English), with only a few ASEAN or Mainland Chinese students in the cohort (falling under what might be called non-English L1).

The study investigated how an attention to EAP syllabus content knowledge in a 12-week standalone English for General Academic Purposes (EGAP) module affects transfer which students operate in their disciplinary modules. Specifically, it investigates whether a specific pedagogic intervention which boosts knowledge about language and disciplinary specific meaning-making, using a SFL/Genre approach impacts transfer.

The thesis will answer the following research question:

In what ways does an EAP curriculum informed by SFL impact transfer from an English for General Academic Purposes module to discipline modules?

In particular, the thesis aims to answer the above question through the following three sub-questions:

1. In what ways can SFL and LCT as an overarching theoretical framework of knowledge inform teaching for transfer in an English for Academic Purposes module?
2. What evidence of transfer is there between an EAP module grounded in SFL and writing tasks in disciplinary modules?
3. What can explain any differences in perceptions of transfer or actual transfer amongst participants?

Chapter one, *English for Academic Purposes and transfer: knowledge blindness*, introduces the issue of transfer from EAP provisions to show that current understandings stem mostly from a psychological perspective with a focus on learner's attributes (such as motivation and self-efficacy) but that other influential factors, such as the curriculum design, and syllabus content knowledge of the EAP module have mostly been omitted in discussions. Chapter one relates the issue of transfer to two significant debates within the EAP field, that of specific vs general provisions, and that of explicit vs implicit teaching of knowledge about language and revisits the concept of common core knowledge in EGAP provisions.

Chapter two, *Making knowledge about language visible: thinking about transfer through a sociological and linguistic lens*, details the informing frameworks of the study: Recent research from a sociology of education perspective, Legitimation Code Theory, is reviewed to argue that attention to content knowledge in the EGAP curriculum, in particular knowledge about language (KAL), and the relation of this knowledge to its disciplinary context may foster transfer. SFL is then presented as the means to boost KAL in the EGAP module. An SFL/Genre approach to EAP provisions allows, it is argued, for knowledge about language and meaning-making in specific disciplines to be made visible to learners. Description of academic/scientific discourse and specific disciplinary discourse shows the type of language which may be usefully taught to EGAP students.

Chapter three, *Methodology*, describes the research design. This is a practice-based, mixed-method study, which employs textual data and interviews to investigate both textual evidence and perceptions of transfer in four Science, Technology, Engineering and Mathematic (STEM) disciplines - namely- Life Science, Chemistry, Engineering and Maths. SFL and LCT are deployed to analyse the various data. The pedagogical intervention design grounded in SFL/Genre is also described as an *instantiation* common core curriculum. An SFL technical term, instantiation refers to the relation between abstract linguistic categories and their concrete examples in text. This will be developed in Chapters 2 and 3. This curriculum includes detailed knowledge about language, grounded in SFL theory. Language is analysed at various 'strata' including, after Martin and Rose (2007) grammar and discourse semantic and links to social context. Language is also described as fulfilling three general functions - namely the interpersonal, ideational and textual metafunctions to respectively enact relationship (tenor), experience (field), and organization (mode). These concepts provide a means to address disciplinary discourse specificity from the EGAP provision.

Chapter four, *Results*, presents the results from twelve participants. Starting from an overview of what transfers to the participants' disciplinary texts, this chapter weaves vignettes of textual and interview evidence to describe the different ways the knowledge highlighted in the EAP module is transferred across to various STEM disciplinary modules. The chapter then reports

on the differences observed in transfer between students, focussing on issues of orientation to knowledge and of affiliation.

Chapter five, *Discussion*, addresses the research sub-questions in turn, discussing the main threads generated in chapter four regarding the differences observed in the transfer of elements of linguistic knowledge and the differences observed between participants. In doing so, the chapter suggests reasons why some knowledge about language and meaning-making are likely to transfer across contexts while other types are not. In the focus on the learners' perception of transfer, the chapter also revisits the EAP literature's notion that motivation is a key factor in the occurrence of transfer. Through an analysis of the students' orientation to knowledge and the type of affiliation to their discipline they express in their interviews, the thesis proposes a more satisfactory explanation to a lack of transfer than the concept of motivation.

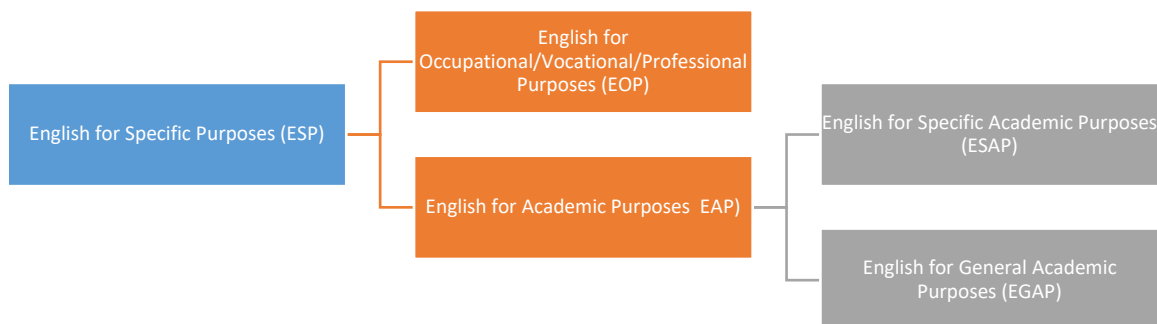
In Chapter six, *Conclusion*, the thesis first discusses the contribution of the studies to the field, its limitations and the further questions it has raised. The final thoughts concern the researcher's cumulative learning experience in the doctoral programme.

# Chapter 1: English for academic purposes and transfer: knowledge blindness

## 1.1 Introduction

EAP is a field of academic knowledge, a discipline and a field of practice (the teaching of EAP, TEAP) (Hood, 2016). Hyland defines the aims of EAP provisions as ‘teaching English with the aim of assisting learners’ study or research in that language’ (Hyland, 2006, p.1). Emerging from the English for Specific Purposes in the 1980s, EAP and TEAP have become dynamic fields. TEAP has grown and developed mainly due to the shift in student populations in English speaking universities, be it in the UK, Australia, Hong Kong or Singapore, where, increasingly, students are linguistically, educationally and culturally varied (Hyland, 2010) and come to higher studies with diverse levels of proficiency in the language of instruction. Beyond the diversification of the student cohort, it is also the linguistic demands inherent in undergraduate programmes which have become complex. As Hyland puts it, students ‘must learn rapidly to negotiate a complex web of disciplinary-specific text-types, assessment tasks and presentational modes in order to [...] graduate’ (Hyland, 2006, p.3). These evolving higher education contexts present challenges in terms of academic literacy and discourse competencies which universities have traditionally addressed through the provision of a combination of EAP modules. These may be taken by students whose first language is not English, but also by students whose first language is English or who have been schooled in English medium of instruction environments, as is the case in Singapore, this study’s context. EAP provisions may take many shapes, from separate standalone modules (sometimes called in-session or pre-session EAP) to ‘embedded’ (delivered within a content/disciplinary module). As shown in Figure 1, the teaching of EAP subdivides into English for Specific Academic Purposes (ESAP, where content is tailored to one homogeneous disciplinary group, e.g. English for Engineers) and English for General Academic Purposes (EGAP, which caters for multi, and mixed-disciplinary groups) (Jordan, 1997). Much research on the teaching of EAP in these various contexts and conditions has been conducted. However, when arguably, the *raison d’être* of EAP is to enable transfer of linguistic skills/performance across to different contexts, or to equip ‘students with the communicative skills to participate in particular academic and cultural contexts’ as Hyland & Hamp-Lyons (2002, p.2) state in their editorial of the inaugural issue of the *Journal of Academic English Purposes*, the literature’s relative silence on transfer is surprising.





**Figure 1** English for Specific Purposes (adapted from Jordan, 1997, p.3)

This chapter will first address the general transfer literature to highlight the definitions and the factors thought to impact successful transfer (1.2). The subsequent sections will then review the EAP literature which treats of transfer to show that EAP syllabus content knowledge as a factor has either been ignored or skirted (1.3). Finally, the issue of transfer will be problematized with respect to EAP provisions, revisiting the specific vs general debate and the way and type of knowledge about language that may be helpful when aiming for transfer. It will also be explained below why this thesis adopts the term transfer rather than one of the many others that have been competing with it.

## **1.2 Transfer: theoretical frameworks, factors and strategies**

Transfer has been a rich area of research for psychologists and educationalists with several conceptualizations and theoretical frameworks being proposed (McKeough et al., 2013; Perkins & Salomon, 1994; Salomon & Perkins, 1989). Factors that promote or hinder transfer have been studied, along with educational strategies likely to have an impact.

In their seminal 1989 article, psychologists Salomon and Perkins conceptualized transfer's internal mechanisms around the cognitive processes entailed, namely *low-road transfer* and *high-road transfer*. *Low-road transfer* refers to the spontaneous, automatic transfer of highly practised skills, with little need for reflective thinking because the two contexts (the initial learning context and the new context where transfer should occur) are very similar. Salomon and Perkins give the example of transferring skills from driving a car to driving a lorry. *High-road transfer*, by contrast, occurs through intentional mindful abstraction of knowledge from one context and application to a new context. Such transfer can either be

*forward-reaching*, whereby one mindfully abstracts basic elements in anticipation for later application, or *backward-reaching*, where one faces a new situation and deliberately searches for relevant knowledge already acquired. High-road transfer can be both forward and backward-reaching but always involves conscious, mindful abstraction to reach beyond the immediate context. According to Salomon and Perkins (1989), abstraction creates the bridge from one context to another. They suggest that this abstraction must be mindful because it must be understood and this requires mindfulness. Gick & Holyoak (1983) concur, arguing that for transfer, the abstraction must be genuinely comprehended, not just learned as a formula. In particular, the person must grasp the relationship between the decontextualized representation and the ‘raw instances of which it is an abstraction’ (Salomon & Perkins, 1989, p.126).

Perkins and Salomon also conceptualise transfer as ‘*near*’ and ‘*far*’ to describe the similarity or difference of the contexts. This classification has been used in other frameworks such as in educational psychologists Barnett & Ceci’s (2002) whose taxonomy classifies transfer according to *distance* (similarity between the original learning context and the new context in terms of content, physical setting, task purposes, modality as well as closeness of time). Barnett and Ceci also address the *nature of the learning* that transfers (whether the knowledge is context-dependent or can be generalised) and the *memory demands* (whether there is prompting or explicit reference to the initial context). Near transfer is more likely to occur than far transfer which, according to Barnett and Ceci, is difficult to achieve. Haskell (2001) argues that the crucial question regarding transfer is to foster the learner’s ability to perceive when and how the new context is similar to a previous one.

Three main factors, beyond the similarity of contexts, have been highlighted as having significant impact on transfer. A first element concerns the initial educational context: curriculum design and content have been shown to impact transfer (Haskell, 2001). Moreover, the choice of instruction methodology and whether transfer is explicitly fostered appears to play a significant role (Gist, Stevens, & Bavetta, 1991). A second factor relates to the new context and whether it explicitly promotes transfer. This is called transfer ‘climate’ (Merriam & Leahy, 2005). Finally, the literature on transfer emphasises individual learners’ characteristics such as positive expectations and perceptions of the relevance of the educational programme (Axtell & Maitlis, 1997) as well as motivation and self-efficacy (or self-beliefs in one’s ability) as significant variables in transfer (Merriam & Leahy, 2005). Haskell (2001), for example, argues that “significant and general transfer is primarily the consequence of personality and other dispositional characteristics such as attitude, motivation, and feeling” (Haskell, 2001, p. 116). Motivation is described as an underemphasised element in several transfer studies (Belenky & Nokes-Malach, 2012;

Goldstone & Day, 2012). In Health Care education, for example, Botma, Rensburg, Coetzee and Heyns (2015) conceptualised a framework for design for learning transfer that places motivation as the core reason why students may not apply their learning in the real world (in the nursing profession in their study).

The strategies aimed at enhancing transfer have mainly revolved around the idea of explicitly 'teaching for transfer' (Salomon & Perkins, 1989). 'Hugging' (Perkins & Salomon, 1988), for example, is a term that describes teaching strategies that foster low-road transfer, and 'bridging' are strategies for high road transfer, which in the literature is described in cognitive terms as requiring deliberate mental processes. The bridging strategies consist of helping students anticipate where they might apply the new cognitive tool in the future. This can be forward or backward bridging. For example, a history teacher who helps students to decontextualize and generalize the forces at play from one specific historical event to another engages bridging strategies. Students are also prompted to abstract some common principles that can be linked back to previous lessons, thereby training students to reach backward in their knowledge by asking them to find analogies or differences. According to Salomon and Perkins (1989), such activities can promote transfer by showing students what it means to think historically.

In recent years, emerging conceptualisations of transfer have rejected the notion implied in the metaphor 'transfer', that transfer is the transportation and application of a static set of knowledge items. Alternative perspectives have theorised transfer as a dynamic process (Beach, 2003; Hager & Hodkinson, 2009; Lave, 1988; Packer, 2001), and an interactional process (Jornet, Roth, & Krange, 2016). For many researchers, the metaphoric term 'transfer' itself should be abandoned (Tuomi-Grohn & Engestrom, 2003). For them, *boundary crossing* or *'learning as becoming'* is a better description of what is entailed in transfer. In fact, the term transfer is criticised for projecting a very limited view of learning as a 'series of acquisition events' of a set of isolated propositions or skills which are independent of the learner (Hager & Hodkinson, 2009). Lave (1996, p.151) writes: 'learning transfer is an extraordinarily narrow and barren account of how knowledgeable persons make their way among interrelated settings'. These scholars argue that traditional transfer theory ignores the context in which learning occurs and as such criticise the context-free, atomistic, generic approaches common to many educational endeavours. Lave and Wenger (1991) understand learning as occurring through participation in human social practices. This impacts the way 'transfer' is conceptualised: rather than a transportation of a set of knowledge, the process is of participation which leads to increasingly higher levels of performance and higher levels of acceptance in the community through the concept of 'legitimate peripheral participation'. For them, the learners' learning trajectory moves them

from peripheral to expert participation and transfer occurs as they become increasingly apprenticed, acculturated, into the community. In the *participation* metaphor, learning is seen as inextricably contextual and involves transforming prior learning to use in a new context. In the same way, Engle (2006) has argued that the social environment is key to ‘transfer episodes’, and developed framing interactions to analyse how students bring prior learning to bear on new contexts. The *transformation* metaphor recognises transfer as a process whereby learners become ‘attuned to the affordances’ of the learning contexts (Greeno, Smith, & Moore, 1993) and distances itself from an objectivist view of knowledge.

Beyond knowledge, it is argued that transfer is about learning and that this is influenced by the learner’s dispositions (Hager & Hodkinson, 2009) which they define, as sociologists Bourdieu and Wacquant (1992), as a set of deep-seated orientations that guide people’s actions in any context. The Bourdieu concept of *capital* is also key to the process of transfer, according to Hager and Hodkinson (2009). Capital, in Bourdieu’s theory, refers to the various types of ‘assets’ a person possesses, which are cultural (knowledge, education background or linguistic), economic (financial situation), symbolic (assets that confer social standing and prestige) and social (network). This capital can impact the way a person adapts and thrives in a new context. Hager and Hodkinson argue that rather than seeing knowledge and skills as isolated, context-free items, they are in fact integral to a person’s dispositions and capital. They see, like social realists do, that knowledge is an entity that has real consequences (Maton, 2014; Maton & Mueller, 2007; Young & Muller, 2013) but they add that this knowledge becomes changed within the learner. Chapter two delves into this issue with reference to social realism. Finally, as well as dispositions, it is learner’s orientation, in particular, *semantic orientation*, the meaning-making predispositions individuals bring to a communication event through their backgrounds and previous meaning-making experiences and exposure (Coffin and Donohue, 2014) which may play an important role in the occurrence of transfer. As Maton (2009, p.55) notes ‘the different orientations to meaning students bring with them to education’ constitute an essential element for a thorough understanding of cumulative learning’.

Along with the several metaphors that have been developed in the research reviewed, many terms have been put forward to describe the ability to make one’s learning experience usable in other contexts. In Chapter 2, the term ‘*cumulative learning*’ (from a social realist perspective) will be introduced. It represents a systematically and coherently planned growth of knowledge across the years of schooling *within* a discipline. Educational linguist Macken-Horarik (2011) adds the further distinction between cumulative learning and *portable learning* (the application of this body of knowledge to various contexts). Other terms are encountered in the literature, such as *transference* (Bergmann & Zepernick, 2007) and *transcendence* (Feuerstein, Feuerstein, Falik, & Rand, 2002). Both this proliferation of

terms in the literature and the familiarity of the term transfer in the EAP literature have led to its adoption in this thesis. However, it is understood that the metaphor of transfer does not represent a literal reality that it does not presume a view of learning as an acquisition of context-free propositions, and so it is not adopted in its narrow sense. The different understandings of transfer are key to this thesis and will be revisited in the next section of Chapter 1, and in Chapter 2 as well as in the discussion chapter.

None of the studies above specifically address EAP, but many of the questions raised are closely related. For example, a standalone EGAP module is more likely to require high-road transfer to operate because there is little possibility to cater for extensive, repeated practice that leads to automation (low-road transfer). However, the high-road concept of mindful abstraction raises questions as to exactly *what* knowledge in EAP can be mindfully abstracted in order to be recalled and applied in a new writing/communication context, or what knowledge would support the learner's transformation. The contestation of the meaning assumed within the metaphor of 'transfer' is also very pertinent to the EAP field and will be discussed below with approaches that foreground skills rather than linguistic or writing knowledge. The next section will present an overview of the literature on transfer associated with EAP and show that these important questions have not been adequately addressed thus far.

### **1.3 Transfer related to EAP: discipline and language as blind spots**

This section highlights that despite the arguable centrality of transfer in the English for Academic Purposes (EAP) discipline, the literature on transfer from EAP modules remains relatively scarce and focusses mostly on psychological attributes of the learner. Crucially, *knowledge* (understood here as content knowledge taught in the EAP module), and in particular knowledge about language and about disciplinary meaning-making, has long been ignored as a factor of importance.

When related to EAP, in particular a pre-sessional or in-sessional EGAP module, the concept of transfer is very complex because the contexts where students are expected to transfer their EAP learning are often vastly different from the initial one (where EAP instruction takes place), invoking far and high-road transfer. Transferring learning from EAP to other study contexts involves applying learning to a vast range of new settings, different in types of tasks and texts. Gardner & Nesi (2013), in their analysis of the BAWE corpus (the British Academic Written English corpus of student assessed writing tasks across universities and disciplines), have identified 13 genre<sup>1</sup> families that the various disciplines rely on to create, share and evaluate knowledge. These genre families include, among others, case studies, design specifications, literature surveys, explanations, essays and proposals (Nesi & Gardner, 2012, p.258). The purpose of each of these genre families has direct implications on the choices the writer makes at the text structure, discourse semantic and lexicogrammatical levels (to be described in Chapter 2) (Coffin & Donohue, 2014) and so transferring learning from EAP to these diverse contexts represents an undeniable challenge.

This complexity perhaps goes some way to explain why the literature is scarce on EAP transfer. Few studies have attempted to measure the impact of EAP quantitatively, using tests such as IELTS to show that overall structure and argumentation is better managed after EAP instruction (Archibald, 2001) but that this improvement was mostly noticeable in lower level students (Green, 2005). Storch & Tapper (2009) found that academic vocabulary and structure in post graduate writing were improved after an EAP intervention. Dyson (2016) found that a systemic functional linguistic literacy approach led to better performance in the area of sources use (which includes skills such as paraphrasing), and of grammatical accuracy. However, these studies are usually concerned only with the *immediate* impact of the EAP module on the students' general writing performance and they measure this impact

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<sup>1</sup> The term genre refers to goal-oriented (used to get things done), staged (they follow a recognizable pattern of steps in order to achieve the goal) social processes (we participate in genres with other people) (Martin & Rose, 2008).

in the *same* context (the IELTS writing test in the example above), and so the question of impact in the discipline is ignored. Studies that do focus on EAP instruction's impact in the learners' disciplines are rare and are often concerned solely with students' perceptions of this impact. Terraschke and Wahid (2011) for example, found that students who took an EAP course were better able to talk about their studying and were less disappointed with their scores than direct entry –non EAP- students. In an Australian university, Dooey (2010) analysed foreign students' perception of the usefulness of the EAP module showing that students felt better prepared for their disciplinary course requirements. What this entailed however was not measured in students' written products in the discipline.

Following the theorization of transfer seen above, these EAP studies tend to describe the concepts of transfer from a psychological perspective, highlighting factors such as individuals' motivation and dispositions, 'transfer climate' (the support which the new context provides for transfer) as having a profound impact on transfer (James, 2012) and perception of task similarity or difference.

Motivation is highlighted in the EAP transfer literature as a major factor impacting transfer: In his study of 40 EAP students' levels of motivation to transfer, James (2012) found that students' attitude to transferring knowledge and skills was positive, but only 5% made conscious efforts to transfer, most of them saying that the discipline tasks were too different or that the discipline lecturers did not emphasise the importance of EAP-gained skills/knowledge. Students with a high level of self-efficacy (who perceived themselves as fairly strong in English) were also more likely to make an effort to transfer than the self-perceived weaker ones (James, 2012). The concept of motivation is loosely defined as a combination of effort, desire for and attitude towards learning which impact the degree to which a student will apply learning from one context to another. James shows that learners' perception of similarity of task, or of relevance of the EAP module content differ and attributes this to varying levels of motivation. However, no explanation is given as to why students may be differently motivated.

Within Composition Studies, Driscoll and Wells (2012) have also argued that individual dispositions are key to transfer processes. They argue that barriers to transfer lie within interpersonal factors. For them learner dispositions include personal characteristics such as motivation, persistence, and willingness to engage with the content, as well as alertness or sensitivity to opportunity to apply learning. They argue, drawing on educational psychology research, that dispositions can be context-specific whereby learning is valued in one context but not in another (applying to any learning event regardless of its type). In their study, Driscoll and Wells (2012) found four specific disposition that enable or hinder the participants' successful transfer of knowledge. First, *value* (if students do not see the value of a specific learning experience, they fail to look for connections and therefore fail to

transfer) was found to hinder transfer (Driscoll, 2009). *Self-efficacy* (after Bandura, 1977) concerns students' beliefs about their own ability to complete a task and when related to transfer, low self-efficacy may prevent learners from taking the necessary steps such as trying to apply their knowledge across contexts. *Attribution* refers to the way learners' locus of control influences their behaviour. When one places the cause of their success on themselves, they have a high internal locus of control and tend to report more transfer from a writing module to their discipline; when learners have a high external locus of control (their level of performance is dependent on external forces), they report less ability to transfer (Driscoll, 2009). Finally, *Self-regulation* entails a range of learning skills strategies. The authors argue that each of these four types of dispositions could be generative (enabling transfer) or disruptive (hindering it). Like James, however, the discussion stops with the onus being left on the student and no explanation is attempted as to why students may be differently disposed. First-Year Composition syllabi tend to be general in nature, often not focussing on academic genres at all, so this may explain why in Driscoll's study, her Life Science student did not see any relevance of the module for her disciplinary writing.

Transfer climate refers to the support for transfer which a student perceives in the context where transfer is measured (the second context) (Burke & Baldwin, 1999). James (2010) explains that transfer climate in EAP concerns the characteristics of the disciplinary module which may facilitate or inhibit transfer of learning outcomes from the EAP provision. James (2010) investigates transfer climate and argues that students can perceive a lack of support for transfer from their disciplinary lecturers when these dismiss the EAP module or pay little attention to academic literacy.

Finally, the EAP transfer literature highlights task similarity or difference as a crucial element that promotes or hinders transfer. Difference in task is shown as an obstacle in several studies (Beaufort, 1998; Dyke Ford, 2004). However, according to James, it is students' perception of similarity/difference, which is a factor, not actual similarity/difference, which he argues is a very subjective term. He claims that "if an individual does not perceive on some levels a similarity between learning and writing tasks and contexts, transfer is unlikely to occur for that individual, regardless of how similar those tasks and contexts may appear to others" (James, 2008, p.79). In the more general literature on transfer, distance is not linked to perception. Detterman (1993), for example, explains that the likelihood of transfer occurring 'is directly related to the similarity between two situations' (p.15). While to a certain degree there is some subjectivity in the term similarity, this justification in the EAP literature also points to a reluctance to critique the contents of the writing module in these studies, a reluctance to see language-based modules' content knowledge as a real factor in transfer processes. Similarity/difference is a real construct that



needs closer attention. Students' perception of transfer, however subjective, is likely to be impacted by the *actual* similarities and differences of contexts.

The literature above shows a lack of empirical research of transfer from EAP instruction to other disciplinary courses (although the next paragraphs will highlight a small number). Several EAP transfer studies (as in Archibald, 200, and Storch & Tapper, 2009, above) are in fact studies into the effectiveness of the EAP provision on the student's language proficiency. Transfer to student's meaning-making in other disciplines is rarely explored, and when it is, remains (as shown in the studies conducted by James, 2008; 2012) at the student's perception level rather than evidenced in student texts (or other tasks in their disciplines).

A few studies have focussed on elements of knowledge from EAP modules that transfer to disciplinary modules. James (2006) analysed elements of a Content-based EAP module that transferred to students' 'other modules' assignments and found that EAP module concepts such as *syntactic patterns, organising ideas, developing topics, establishing coherence, using appropriate vocabulary and paraphrasing* were reported by learners to transfer. Leki and Carson's (1994) participants reported their perception that the writing process learned in EAP was useful; Synthesizing and summarizing sources, rhetorical skill (including organisation, transitions and coherence), language proficiency (grammar and vocabulary) was also listed as useful by the students. Other studies, such as Dyke Ford's (2004) showed that rhetorical knowledge such as audience awareness, sense of purpose, organization, use of visuals, professional appearance, and style, was transferred between a technical writing course and their Engineering assignments. In this study, Dyke Ford (2004) also examined assignments which were designed with the Engineering subject specialist. She observed that the abstract rhetorical strategies (for example, audience awareness which is used as a guide to make rhetorical choices) did not transfer but that the genres taught in the technical writing course were often referred to by students who remembered them as a template. Ong's research (2014) is also notable in that it attempts to address the current gaps in the transfer literature in going beyond the perception analysis and by exploring transfer in a disciplinary context. Ong conducted her research from an Academic Literacies perspective and found that one of her participants made use of a series of items taught in the EAP module (synthesizing, text types such as argumentative, referencing styles and conventions, changing sentences from the active to the passive, hedging and cohesive devices). Shrestha (2017) studied the way three Business students transferred learning from a dynamic assessment context to their Business writing task and found that genre features were transferred across contexts (although with different success).

However, several studies also highlight a lack of transfer. Students often do not see the relevance of the EAP module for addressing their needs in disciplinary modules (Snow & Brinton, 1988). Ong's participants preferred taking a real-life model text to follow the structure than the text structure taught in EAP which they found could not be applied to their postgraduate texts. Counsell (2011) interviewed EAP students about the writing strategies they had transferred into their Business Faculty core modules but found that none of the generic skills taught were consistently transferred to the disciplinary context. In a study that compared outcomes from an EGAP and an ESAP module, researchers found that the ESAP students were marginally better prepared for academic studies (Jones, 2011). Spack (1997) was also relatively pessimistic after studying a Japanese student's transfer from an Academic English module to the discipline, claiming that 'there is no guarantee that skills and strategies learned in an English as a second language (ESL) program actually will be applied in new situations' (p.50). Similar conclusions were reached by Hosking et al (2008) after finding that only overall essay structure seemed to transfer from an Academic Literacy programme (for disadvantaged students in a South African University). Snow (1993) argues that even if learning transfer occurs, it is not clear what conditions promote this transfer. For Benzie (2011), the assumption that presenting students with a generic set of academic skills leads to transfer in the discipline is erroneous because academic literacy consists of practices that vary across fields and disciplines. She demonstrates this by reporting on the different literacies expectations shown in EAP provisions and degree programmes documents. Indeed, research from an Academic Literacies perspective has shown that academic literacies go beyond a set of discrete skills (Street & Lea, 1998). Benzie argues that as long as academic literacy is perceived and taught as a set of discrete items, and not as a product of disciplinary specific social action, little transfer can be expected. Ong, in her PhD study (2014), also takes an Academic Literacies perspective to argue that student identities and their previous literacy experience should be factored in if transfer is to occur. This is discussed in 1.4.1 in more details.

In many of the studies reviewed, the EAP syllabus is not well described or theorised. Rather, it seems to be the simple fact of attending an EAP module (regardless of its shape or underpinnings) that is taken into consideration. In the James (2006) study for example, the description of the EAP module under study only consists of the aims, and general elements of the curriculum: expository and persuasive writing; rhetorical process; organisation strategies; grammatical and mechanical conventions. Confirming that the module may not have a strong underlying theoretical frame, James (2006) explains that each tutor develops their own materials and assessments. When faced with students who perceive the EAP module as irrelevant, James (2006) does not question the content knowledge of the module. Other studies suffer from the same problem: the EAP module content knowledge is not defined beyond very broad skills, as if assumed to be non-consequential on the occurrence

of transfer. Ong (2014) for example, acknowledges the importance of the module content, but does not go beyond a general description of a wide-angled EAP module. In the methodology section, the module is described as being organised ‘along the traditional lines of language teaching and include reading skills, writing skill, listening skills and speaking skill, which are delivered across thematically-based units selected on the basis of their anticipated relevance to students’ future academic disciplines’ (Ong, 2014, p.64). By and large, in the EAP transfer literature, the role of the content knowledge itself in the EAP module is left unquestioned.

An attempt has been made to consider content knowledge as a factor in transfer in the recent North America First Year Composition programmes (FYCP) research. However, content knowledge is defined as ‘*subject matter*’ (topic or themes used in the EAP module); for example in James (2008) the concept of task similarity and difference is linked to ‘subject matter’ similarity/difference whereby EAP Engineering students who write a general essay about an Engineering topic are described as experiencing task similarity. In a similar way, Wardle (2007) argues that transfer is promoted if students write about *writing processes* as subject matter. She describes an EAP curriculum which sees students investigate their own (or other students’) writing processes and habits. Students write about writing practices, they conduct auto-ethnographies and research writing problems and might conduct primary research about writing and this is what help them gain a " flexible and transferable declarative and procedural knowledge about writing”(Wardle & Downs, 2014, p. 280). In the same tradition, Dew (2003) for example argues that the general FYC approach (where topics were non-academic) does not lead to transfer and proposes to instead focus students’ attention on knowledge about writing and rhetoric. Similarly, in their recent book ‘*Writing across Contexts*’(Yancey, Robertson, & Taczak, 2014) describe a Teaching for Transfer (TFT) approach and argue that making rhetoric and writing knowledge the subject matter of the composition course impacts directly on students’ transfer of knowledge. This approach includes an acknowledgement that writing is related to context and so concepts of audience awareness, context and rhetorical situation and exigence are included as content knowledge. However, in these approaches, this attention to context-dependent rhetorical knowledge is not related to any specific discipline and there is not attention to language beyond overall text organisation and a few common grammatical errors.

The North American Genre tradition has also explored content knowledge as a factor to transfer from writing programmes and argues that *genre knowledge* provides the strategies (or the ‘mental grippers’, after Beaufort, (2007, p.8)) that learners can draw on in new contexts (Bawarshi & Reiff, 2010; Devitt, Reiff, & Bawarshi, 2004; Downs & Wardle, 2007; Wardle, 2007; Yancey et al., 2014) In this approach, students build genre knowledge by analysing the type of content the genre should include, the text moves (stages), whether

the tone is formal or informal, or whether the genre requires a specific format (Bawarshi & Reiff, 2010; Beaufort, 2007). It is however difficult to assert whether this transfer, in fact, takes place as the research often only reports on student's perceptions at the end of the module, as is the case in Dew (2003) or focusses on a very small sample of students (3 in Yancey et al., 2014). In the North American Genre approach, there is acknowledgement that writing and academic discourse is discipline-dependent in the importance given to context and different audience, purposes and structure. But even with this concession to context, very little knowledge about the discipline meaning-making practices and the role language plays is considered. There is in fact hardly any mention of knowledge about language beyond 'sentence structure' in the studies mentioned above. And while some aspects of text overall staging/structuring are described in the genre awareness activities through the focus on moves, there is no explicit link to a fuller description of language at the lexico-grammar level. At the more delicate levels of language, the authors revert to matters of accuracy and 'good grammar', or syntax. Dew (2003) for example promisingly fronts *Language* in her article 'Language Matters: Rhetoric and Writing as content course', yet no language theory is mentioned, and the only language knowledge alluded to is 'sentence-level competencies' (2003, p.88). In these approaches, then, knowledge about the students' disciplinary context is not attended to, knowledge about language and about meaning-making, including specific disciplinary discourse knowledge is also skirted. In this approach, the knowledge that is thought to transfer is bound to general rhetoric and writing process knowledge.

This section has highlighted the limited attention to content knowledge as a factor to transfer in the EAP curriculum, leaving this key element a poorly understood variable in the transfer equation. This state of affairs goes some way to support sociologist of education Karl Maton's grievance about what he terms '*knowledge-blindness*' (and 'knowledge myopia') in educational studies (Maton, 2014, p.3). For Maton, knowledge blindness is defined as educational practices (in research or curriculum) that 'focuses attention on processes of learning and whose knowledge is being learned, but obscures what is being learned and how it shapes these processes and power relations' (Maton 2014, p.7). While knowledge is claimed to be at the heart of our modern societies, Maton explains, "what that knowledge is, its forms and its effects, are not part of the analysis. Instead, knowledge is treated as having no inner structures with properties, powers and tendencies of their own, as if all forms of knowledge are identical, homogeneous and neutral" (p.2). Maton's Legitimation Code Theory (LCT) is a Social Realist school of thought which has decried the negative impact of this knowledge blindness not only on research but also on pedagogies and curriculum (Wheelahan, 2010). Recently, the concept of transfer, termed 'cumulative learning' (Maton, 2009, 2013) has been revisited through the social realist lens, focusing on the actual content of a programme. The way LCT develops our understanding of transfer with its focus on knowledge structures is explained in Chapter 2 where LCT concepts are

used to analyse the EAP knowledge base to search for content knowledge which may impact transfer. More specifically, knowledge blindness of disciplinary meaning-making and of knowledge about language that enables students to make meaning in their discipline is addressed through a SFL/Genre approach.

This review has presented transfer as a complex phenomenon likely affected by a constellation of elements of which only a few have been explored in depth. This is especially true of the EAP field where psychological elements such as the learner's attributes (motivation, self-efficacy) and transfer climate (the way the new context supports transfer) have been investigated, but where research into transfer from a knowledge perspective is less comprehensive. Motivation has been presented as an influential factor, but many questions remain as to what this concept means, and what influences it. Before turning to the LCT and SFL theoretical frameworks in Chapter 2, a discussion of the influential debates in TEAP field that have indirectly addressed transfer, is provided. In particular the debate around general vs specific provision is useful to overview as it relates to the type of knowledge which might be included in an EAP provision/module. The second debate relates to explicitness of knowledge about language in the curriculum, which is also relevant to transfer as it also concerns issues of mindful abstractions.

## **1.4 EAP knowledge and the issue of transfer: revisiting the EGAP 'common core'**

The previous section has raised the issue that little attention has been given to curriculum design in the literature on transfer from EAP programmes. It has also highlighted how rarely the literature articulates the detailed content of EAP programmes, as if this were commonly shared understanding that needs no reassessment. This section explores this knowledge-blindness further, arguing that the little attention traditionally given to knowledge about language as a resource for making meanings in the disciplines has restricted the possibility for an EGAP curriculum to promote transfer. Traditionally, EGAP programmes follow a common core curriculum (see 1.4.1), providing general content that may be applied to a range of disciplines despite the fact that the literature on transfer from EAP is generally quite pessimistic about this actually occurring (Benzie, 2011; Counsell, 2011; Spack, 1997). The section first provides a short overview of the specific versus general debate before arguing that a social semiotic approach to language and a clearer understanding of the nature of the knowledge involved in EAP programmes can bridge this dichotomy and address knowledge-blindness.

## 1.4.1 The specific versus general debate

As seen in the beginning of Chapter 1, EAP constitutes a branch of English for Specific Purposes and subdivides into English for Specific Academic Purposes (ESAP) e.g. for Engineering and English for General Academic Purposes (EGAP) which is concerned with academic English in all fields (Flowerdew, 2014; Gardner, 2016; Hyland, 2002; Jordan, 1997). Underlying the debate around the value of each of these approaches, but not always explicitly mentioned is the issue of transfer and whether the development of the communication skills needed for study purpose can be seen as ‘a set of discrete, value-free rules and technical skills usable in any situation’ (Hyland, 2002, p.387) or whether a wider conception of what is at stake should be adopted. EGAP proponents support the view that there is an EAP transferrable common core knowledge; which students can transfer to their disciplinary contexts (for example, Hutchinson & Waters, 1987) while the specificity advocates see transfer as being at best only superficial from an EGAP module (Hyland, 2002). This dichotomy between specific and general provisions in terms of transfer seems to be based on the belief (by the ESAP proponents) that transfer is mainly influenced by the similarity of contexts (near transfer). While the following discussion shows that the specificity arguments are very compelling for many different reasons, this assumption that transfer cannot occur when the tasks are too different should not be left unquestioned. The next paragraphs will widen the discussion to the different bodies of knowledge that are involved in EAP provisions to clarify the basis for the selection of syllabus items in EAP. It will then be suggested that there may be a middle ground between the specific and the general approaches to EAP.

The EGAP curriculum has centred on what has been termed the common core syllabus, or common core knowledge about language and skills which can be transferred across any discipline. The most significant characteristic of the traditional body of knowledge usually included in an EGAP syllabus is its restricted recognition of context. In the earliest incarnations of EGAP syllabi, language skills and study skills (for example, reading strategies, writing processes, listening and note-taking, speaking in seminars) were isolated from any specific context of use. Essays, reports, projects, case studies are taken as one situation which necessitates the student to deploy planning, writing drafts, revising, summarizing, paraphrasing, and synthesizing, in an academic, plain, style, organized appropriately, using quotations and bibliography (Jordan, 1997). Several scholars have defended the validity of a general approach to EAP, arguing that there are generic skills that are identical across disciplines (Dudley-Evans & St John, 1998; Hutchinson & Waters, 1987). Even one of the staunchest proponents of specificity, Hyland (2006), admits that the

fact we can differentiate at all between academic and non-academic discourse points to some existing common features of such discourse, which he lists as: high lexical density, high nominal style and impersonal constructions.

However, arguments against the common core have been very convincing. Hyland (2006), expressed that there were

[...] serious doubts over a ‘common core’ of language items. A major weakness is that it focuses on a formal system and ignores the fact that any form has many possible meanings depending on its context of use. Defining what is common is relatively easy if we are just dealing with grammatical forms that comprise a finite set, but becomes impossible when we introduce meaning and use. By incorporating meaning into the common core we are led to the notion of specific varieties of academic discourse, and to the consequence that learning should take place within these varieties. (p. 12)

The very beginning of ESP highlighted discipline specificity against general English provisions (Halliday, MacIntosh, & Strevens, 1964) and emphasized the need to make empirically-driven curriculum decisions. Recent corpus studies have confirmed that disciplines vary in terms of practices and discourse. This variation include genres (Gardner & Holmes, 2010; Gardner & Nesi, 2013), expression of stance (Hyland, 2000), academic vocabulary (Hyland & Tse, 2009) and study skills (Wingate, 2006). Even the common academic language features highlighted by Hyland are disciplinary-specific as found in corpus research (Gardner, Nesi, & Biber, 2018). When looking at larger data sets of student writing, Gardner, Nesi and Biber (2018) found that academic features such as stance markers (both personal and towards external sources), elements of modality, as well as informational density (including nominalisation and abstract nouns) occur differently in various disciplines, genres and levels. Ethnographic research (within the Academic Literacies tradition, for example) also criticises the concept of common core. Academic Literacies is an approach to writing and EAP which sees writing as a social, situated practice. Because disciplinary discourses are situated, expectations and demands vary across disciplines and even lecturers in the same discipline (Street & Lea, 1998). For Academic Literacies scholars, this throws into doubt the whole concept of ‘transferability’ and that academic writing can be addressed through ‘discrete, portable package of competencies’ (Lillis & Tuck, 2016). Research into disciplinary discourse from a systemic functional linguistic perspective has also uncovered much evidence of specificity. This body of knowledge will be described in Chapter 2.2 in relation to the four focus disciplines in this thesis: Life Sciences, Maths, Chemistry and Engineering and will not be detailed here.

The debate over general and specific EAP provisions highlights the dilemma EGAP provisions face. As the EGAP curriculum strives for ‘transferrable’ items of knowledge, disciplinary context specificity seems to be unattainable. The literature highlighted above and the specificity view rests on the underlying belief that the more general the EAP syllabus is, the less transfer can happen. In light of the corpus and ethnographic evidence presented above, this is quite reasonable and also explains the reasons why some studies report that students do not see the relevance of a general writing/EAP module for their specific disciplinary writing needs (Currie, 1999). However, this relation can perhaps be looked at more closely if we consider the various elements of knowledge both in the discipline and in the EAP realm which an EGAP may address to promote transfer. In the following section, it is argued that the common core defined as ‘non-specific’ can be revisited and extended with the help of a robust language theory which straddles the various levels of meaning-making from context to social purpose and genre, discourse semantics and lexicogrammar (as theorised in SFL and presented in Chapter 2 in more details). Recently, Gardner (2016) has developed a genre-instantiation approach to TEAP based on the BAWE corpus, which bridges the specific vs general divide engaging systemic functional linguistic theorisation of language and corpus linguistics. The genre instantiation approach enables students to engage with instances of the thirteen genres families that Nesi and Gardner propose (2012). In this approach, the common core includes both elements of general, abstract knowledge (what the genre families are and the social purposes they serve) and the specific knowledge (the instantiation of these genres in each discipline). As Gardner argues, the constraints of the EGAP should not be a justification for ignoring issues of specificity. A genre instantiation approach is based on corpus evidence of specificity but also on some level of commonality in the form of the genre families. It provides the means to bring items from the disciplinary knowledge realm into the scope of an EGAP module; ‘teaching a general EAP point with access to instances from across the disciplines is one way around these issues’ (Gardner, 2016, p.168). Gardner (2016) recommends teaching three at least of the genres from the genre families and to provide a range of samples from the various students’ disciplines. Previous EAP practitioners tried to find concrete ways to make a general provision as useful as possible to students. For example, Swales and Feak (1994) argued that, even in EGAP, disciplinary specificity can be brought to students’ awareness in order to introduce students to the complexity and variability of academic discourse (Swales & Feak, 1994). Johns (1997, 2008) as well as Lee and Swales (2006) developed a ‘learner-as-disciplinary- ethnographer model’ (Belcher, 2006, p.146) to train students for the ‘specificities of their circumstances’ (Hyland, 2002, p.393). Activities include sending students to investigate their own disciplinary contexts, compiling portfolios and in the case of Lee and Swales’ 2006 study, to teach students to compile and explore a corpus made of disciplinary texts. However, it is unclear what the tools are that may enable such



questioning. As Gardner states, ‘this puts the onus heavily on the students’ (2016, p.150). Ethnographic methods of exploration lack grounding in empirical knowledge of the disciplinary discourse to equip the students with concrete tools to analyze their own context specificity. Without any specific theory of language, such as SFL, as Gardner’s instantiation approach uses, the link between context and language is perhaps less effectively highlighted (this link will be developed in Chapter 2). In Chapter 3, an EGAP module will be described which aims to bring specific disciplinary discourse knowledge into the EGAP module, also exploiting the concept of instantiation.

Corpus linguistic research into disciplinary variation has revolutionized our knowledge about the way disciplines construct, share and evaluate knowledge. At first sight, corpus linguistics insights may bolster the argument for ESAP by showing that much of the knowledge included in traditional EGAP modules is unlikely to help students when they are ‘in deep’ in their disciplinary contexts. However, this same corpus linguistic research may also, in fact, point to a body of knowledge about ‘real’ commonalities across disciplines which may, along with a theory of language that links context and language and a pedagogy that makes explicit knowledge about language, constitute the basis for an EGAP syllabus that might address the challenge of transfer in more satisfying ways. This would represent a shift in our conception of the common core, from a detached body of knowledge and skills, to an empirically evidenced knowledge of commonality across disciplines and language systems as well as specific instances in the disciplinary context which would enable EGAP students to access specificity. In order to discuss what this body of knowledge may be, Chapter 2 will detail two theoretical frameworks: Legitimation Code Theory and SFL.

## **1.4.2 A Social semiotic approach to language learning**

One of the issues with the common core is that the theoretical underpinning, in particular towards language and the role of language in learning is not clearly articulated. The place of language in education and the learning process has been argued as key by social semiotics scholars. Halliday (1993), for example, described a language-based theory of learning where language is ‘the essential condition of knowing, the process by which experience becomes knowledge’ (p.94) and argued that language should not be isolated from any aspects of learning. Halliday proposed a threefold perspective of the role of language in learning: *learning language*, *learning through language* and *learning about language* (Halliday, 1993). Learning, for Halliday, and social semiotic scholars, is learning how to mean and developing one’s meaning potential and therefore, language is key to success in learning. In this view, academic knowledge is not limited to content knowledge but includes language

and literacy ( Christie & Martin, 2007; Coffin & Donohue, 2014; Lemke, 1990; Rose & Martin, 2012). Language is not a disconnected ‘carrier’ of the content but ‘rather, knowledge, behaviors, and language develop symbiotically’ (Coffin & Donohue, 2014, p.4). This is an approach to teaching and learning which Coffin and Donohue have called a Language as Social Semiotic (LASS) approach, where language as a meaning-making resource is integral to learning disciplinary content knowledge.

Such views of the role of language in learning and teaching is grounded in decades of research into language and pedagogy, especially within the systemic functional linguistic tradition. SFL researchers argue that learning is developing one’s meaning-making repertoire, one which shifts from common sense, practical everyday meanings to the abstract, theoretical meanings which Coffin and Donohue (2014) call decontextualized, (following Hasan (2009)) and which are characteristic of the language of schooling and even more so the language of the university (Coffin & Donohue, 2014; Lemke, 1990; Schleppegrell, 2011). As students progress through the years of schooling, their language repertoire expands and adjusts to express increasing levels of abstraction, judgment, evaluation, and interpretation required in their discipline and this is not an automatic process for all (Christie & Derewianka, 2008; Coffin & Donohue, 2014). From a social semiotic approach, Hasan (1996, p.233) argues that learning ‘can be regarded as a semiotic phenomenon if we conceptualise it as an ability to access and utilise a new meaning potential’ (Hasan, 1996, p.233). A social semiotic perspective on language also means that learner’s semantic orientation<sup>2</sup> can be taken into account. Their previous learning experience plays a part in their ability to access, understand and reproduce the discourse of their discipline. From this perspective, as argued by, among others, Bernstein (1971) and Hasan (2009), a lack of orientation to the decontextualized language which is key to the creation of academic knowledge, may lead to failure. From a social semiotic perspective, the role of the EGAP module then is to raise students’ awareness of how these meanings are made according to their specific disciplinary contexts. In other words, EGAP should be concerned with, to adapt Halliday’s threefold perspective, knowing language (using language in the discipline), knowing through language (learning the disciplinary concepts through language) and knowing about language (knowing how language makes academic meanings) (Halliday, 1993). Several studies have shown the positive impact a functional grammar approach can have (Klingelhofer & Schleppegrell, 2016; Myhill, Jones, Lines, & Watson, 2012; Myhill, Jones, & Lines, 2018; Rose, Rose, Farrington, & Page, 2008) From a social semiotic perspective, then, it has been argued that knowledge about grammar (but a grammar focused on functional meaning-making rather than a formal, traditional approach centered on rules and grammatical accuracy) is impactful and beneficial for learners (Locke,

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<sup>2</sup> As explained in 1.3

2010; Schleppegrell, 2017). This thesis argues that knowledge about functional language may enhance transfer and can be taught in an EGAP module, that knowledge of language (language in use) can be somewhat practiced in the EAP context, and that (disciplinary) knowledge through language is an elusive aim in the TEAP context but can still be somewhat approached by explaining how knowledge in the disciplines is made through language.

Not all agree with a social semiotic view of the language of science, or that giving this amount of attention to language and meaning-making serves any purpose, other than complicate things that are perceived as simple. Some see science as a body of theories which 'are communicated in language but somehow exist independently of language' (Halliday, 2006, p.182). Publications on Plain English or Technical English, for example, attest to this conception of language through a reluctant reference to prescriptive do's and don'ts (see for example Fenton, 2017 for guidelines on how to write scientific reports). These prescriptions (such as 'avoid the passive voice') not only downgrade the importance of language in scientific endeavor and teaching and learning but are also often not verified in studies of authentic academic texts (Drury & Jones, 2010).

Others have argued that knowledge about language and of genre, is tacit and only acquired unconsciously as part of some purposeful, communicative activity in context where the genre is used (Dias, Freedman, Medway, & Pare 1999). These authors argue that knowledge about language does not lead to knowledge of language. In their longitudinal study, these authors found no transfer of genre occurring from academic to workplace contexts. Freedman (1993) also observed students picking up genres without explicit teaching and so drew the conclusion that teaching genre knowledge is unnecessary, a claim made based on six Law students who were able to write a Law genre new to them without explicit teaching. Freedman was unperturbed about generalising this finding to a whole range of students who may arguably be very different from these law students. Freedman also claims that explicit teaching may lead to overlearning or misapplication and so may lead to negative transfer (when previous learning is applied in a context where it is not appropriate). In fact, a meta-analysis of second language instruction research overwhelmingly showed that explicit instruction (including genre knowledge) yields positive and long-lasting results in student's learning (Norris & Ortega, 2000).

The movement against explicit teaching of Knowledge about Language (KAL is defined as 'a coherent, dynamic and evolving body of knowledge about English language and how it works' in the Australian Curriculum: English, ACARA, as cited in Jones and Chen 2012, p. 149) is also, partially at least, linked to the concern that KAL (including Knowledge about Genre) is too prescriptive, and somehow works against the interest of learners either by suppressing their creative voice or by preventing them from being critical. Studies into EAP

transfer mentioned above do seem to show that learners may take model texts for templates (Dyke Ford, 2004). Martin (2012), however, explains that reservations about modelling (which is the process of making explicit a shared knowledge about genre, staging and linguistic realisations) leans on a fear that genres may be seen (and taught) as idealised models and as a way to uncritically naturalise hegemonic discourses (argument made by, among others, Freedman, 1993; Freedman & Medway, 1994). Within the SFL tradition, scholars also express the concern that teaching texts as products keeps out the essential dimension of the mental processes involved in creating this text and claim that most of the SFL Sydney School tradition relies on the ‘text as product’ orientation, and that ‘students are presented with finished products, which are post-mortemised, and then the student is encouraged to emulate them’ (O’Donnell 2013, p.248). For O’Donnell, dynamic knowledge such as thematic progression across a text constitutes useful knowledge of how texts develop. Undoubtedly, future research into choice as a recursive process could be invaluable for writing pedagogy. However, texts can be usefully seen as products (which are the realisations of the ‘completed’ selections made in the language) and as process (Fontaine, 2013). In fact SFL Sydney school scholars such as Martin and Rose also argue that texts should not be taught as products but as dynamic processes. Kalantziz & Cope (2012) and many SFL/Genre scholars also argue that explicit knowledge about the way language works, in fact, empowers students to be both creative and to become subversive if they wish. Making knowledge about language conscious is beneficial for students as Myhill et al (2018) have argued. This conscious knowledge about language is called metalinguistic knowledge – ‘the explicit bringing into consciousness of an attention to language as an artefact, and the conscious monitoring and manipulation of language to create desired meanings grounded in socially shared understandings’ (Myhill, 2012, p.250). Metalinguistic knowledge is always involved when writing and is comprised of an awareness of genres, of grammar and of the writing process. For Myhill et al (2018), metalinguistic knowledge is both knowledge about and knowledge of language, what she coined ‘knowledge-in-action’ (Myhill et al, 2018).

Within the SFL tradition, metalinguistic knowledge, or knowledge in action is related to the notion of *choice*, or whether explicit knowledge can be called upon deliberately. Proponents of an explicit, visible knowledge about language in academic literacy programmes argue that this visibility enables learners to make choices deliberately in new communication situations. This follows Martin and Rose’s advice that ‘the crucial skills that language learners actually need are to recognize categories of language patterns at each level as they read texts, to interpret each instance of these categories in relation to their experience and goals, and to use these language patterns flexibly in their writing’ (Martin & Rose, 2007b, p.4). In SFL theory, *choice* does not describe an intentional process (Fawcett, 2013;

Fontaine, 2013). However, the degree of intentionality involved in the choices made from the language resource is likely very dependent on the context, as well as the attributes of the speaker. One can argue that a university student is likely to make more conscious choices within meaning systems when writing a high-stake assignment, than another, less formal text. For Myhill, writing is about deliberate decisions about shaping a text (Myhill, 2012). An important element of the socio semiotic approach to teaching writing developed by the ‘Sydney school’ (the SFL-informed genre pedagogy developed in Australia in the 1990s) is the Teaching and Learning Cycle (TLC) (Rothery, 1996) which consists of sample text modelling (see Chapter 3). The aim of the TLC goes beyond teaching texts as products but aims to bring to the fore knowledge about language that allows students to make choices more deliberately to suit the communicative goal. Rose’s work (2009) on the detailed reading strategies and the joint construction stage constitute a means of slowing down this unconscious dynamic process to bring it to students’ awareness, or in Halliday’s words below ‘to bring language back to consciousness’ (Halliday, 2012, as cited in Rose, 2015, p.1). Halliday (2012) explains how literacy training is, in fact, an act of bringing to consciousness:

Language is unique among cultural processes in the extent to which it remains below the level of consciousness (Halliday, 2012:78). [...] what the school requires is for you to bring language back to consciousness. There’s no way to avoid this, partly because you have to do this in learning to read and write. Becoming literate means reflecting consciously on your language (Halliday, 2012, as cited in Rose, 2015, p.1)

If, as Halliday explains, literacy is about becoming conscious of language, this seems to support the notion that explicit teaching of knowledge about meaning-making is useful in promoting learning, and by extension in promoting transfer. Vygotsky called this process ‘deliberate semantics’(Vygotsky, 1986). In this perspective, metalinguistic knowledge is key to decision-making in writing as it provides choices as the writing unfolds. Explicit knowledge about language as a meaning-making resource, far from a static body of decontextualised grammatical rules which may be known (declarative knowledge) but not used (procedural) enables writers to make informed decisions as their text unfolds.

## **1.5 Conclusion**

Chapter 1 has described the challenges that transfer represents for EAP modules, especially EGAP modules. It has been argued that much of the literature on transfer takes a cognitive and a psychological perspective which places the learner and cognitive processes at the heart of the process. The same has been observed in the limited literature available on transfer from EAP programmes and more generally academic writing programmes. In these studies, it has been argued that the impact of knowledge content in the curriculum design has not been investigated sufficiently, highlighting what has been termed ‘knowledge blindness’. This knowledge blindness also concerns the lack of knowledge about language as a context-dependent resource and the lack of attention to meaning-making in the discipline as a potential key to transfer. It has been argued that EAP provisions operate at the crossroads of several knowledge domains, from formal linguistic knowledge, to writing processes, disciplinary meaning-making and that a social semiotic approach to language may provide a way to include much knowledge about language (and other semiotic systems) in an EGAP syllabus. What this knowledge consists of for academic language in the disciplines of Biology, Chemistry, Maths and Engineering (the focus of this thesis) will be detailed in Chapter 2. It has also been argued that an EGAP curriculum which attends to knowledge *about* language may support better knowledge *of* and knowledge *through* language.

Chapter 2 provides the theoretical framework for the study. It first describes a sociological framework, Legitimation Code Theory, which provides the analytical tools to explore what in the typical EGAP provision curriculum may be hindering transfer potential. It then describes SFL theory as well as SFL/Genre pedagogy as a means to address the obstacles to transfer highlighted by the LCT analysis. Finally, it provides an analysis of four disciplines’ discourse to consider the general and specific knowledge about meaning-making in the discipline that may usefully be included in the EGAP curriculum to foster transfer.



# **Chapter 2: Making knowledge about language visible: transfer through a sociological and linguistics lens**

Chapter 2 describes the theoretical frameworks that inform this thesis. First, Legitimation Code Theory is used to explain how knowledge structures play a role in transfer and how knowledge blindness in EAP provisions may hinder transfer. The chapter then addresses this by explaining how a linguistic-informed approach, here systemic functional linguistics (SFL), may be used to provide the necessary knowledge of disciplinary meaning-making to support the instantiation approach which was briefly explained in Chapter 1. Chapter 2 then provides a description of academic discourse and of the four disciplines under study in this thesis: Biology, Chemistry, Maths and Engineering. The chapter then considers the type of knowledge from the disciplinary specific discourse descriptions which may be included in an EGAP module to support students' meaning-making in their discipline. The conclusion presents the research question and three sub-questions drawn from the identified blind spots in the current understanding of transfer in EAP.

## **2.1 Transfer through the Social Realist lens: bringing knowledge to the forefront**

### **2.1.1 Social Realism and Legitimation Code Theory: theorizing knowledge structure**

Legitimation Code Theory is a sociological toolkit, rooted in Bernstein and Bourdieu's theories (Maton, 2014). Part of a broad social realist approach which sees knowledge as both socially produced and 'real' (as having concrete impact, consequences), LCT aims to provide analytical tools to research and to change educational practices by investigating the underlying codes that are at the heart of what is considered 'legitimate' in knowledge practices across institutions and disciplines (Maton, 2014). In LCT, the concept of transfer is referred to as 'cumulative learning' (Maton, 2009), and describes students being able to apply what they learn from one context to another. Cumulative learning is therefore likened to Salomon and Perkin's (1989) high-road transfer (Maton, 2009). This is contrasted with

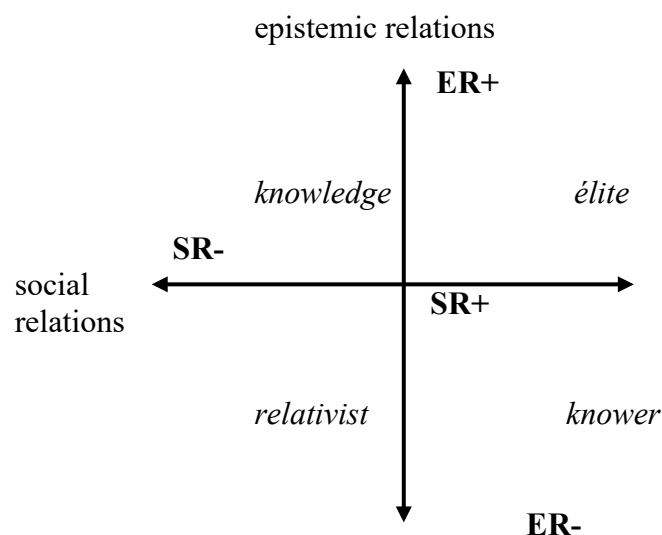


‘segmented learning’ where students learning is strongly linked to a context and cannot easily be applied elsewhere. In the LCT toolkit, two dimensions, specifically, are relevant to transfer/cumulative learning: *Specialization* and *Semantics*.

Bernstein classified knowledge into *horizontal discourse* which refers to every day, common sense knowledge (Bernstein, 2000). *Vertical discourse*, on the other hand, describes scholarly knowledge and is characterised by meanings that are less related to the immediate context and by a “coherent, explicit and systematically principled structure, hierarchically organised” (Bernstein, 2000, p. 160). Within vertical discourse, Bernstein distinguishes between *hierarchical knowledge structures* (typified by the Sciences) that tend to subsume and integrate previous knowledge towards greater abstraction and *horizontal knowledge structures*, which are characterised by a series of opposing languages, or schools of thought, often taking the centre stage not by developing and subsuming a previous approach but by offering a competing view. Hierarchical knowledge structures build knowledge by integration and subsumption of previous knowledge while horizontal knowledge structures collect knowledge segmentally. Maton (2009) shows that knowledge structures can also be analysed at the curriculum level to reveal whether a lesson, a module or any other educational ‘unit’ fosters students’ cumulative learning. Maton (2009) developed specialization and semantics to conduct such analysis. An LCT analysis can be enacted on an EGAP curriculum/syllabus to systematically highlight what may hinder or promote transfer.

### **2.1.2 Specialization: bringing knowledge to EAP practice**

*Specialization* refers to LCT’s conceptualisation of the nature and the structure of knowledge in the disciplines (Maton, 2014). Specialization distinguishes between epistemic relations (ER: the relation between knowledge and its object/focus) and social relations (SR: the relation between knowledge and its authors or subjects) (Maton & Chen, 2016a). Specialization therefore analyses ‘what’ or ‘who’ is viewed as ‘legitimate’ in various disciplines. From these relations, specialization codes of legitimation have been generated: some disciplines can be classified as ‘*knowledge code*’ (where the legitimacy comes from the knowledge itself), ‘*knower code*’ (where the attributes of the knower are more powerful in establishing legitimacy) as well as ‘*élite code*’ (where legitimacy comes from both knowledge and knower’s attributes) and finally ‘*relativist code*’ (where legitimation comes from neither knower nor knowledge) (Van Krieken et al., 2013). The specialization codes can be charted on a Cartesian plane, giving the 4 quadrants shown in Figure 2:



**Figure 2** Specialization plane (Maton, 2014, p.30) . Figure used with permission.

Specialization codes within a discipline are relevant to the issue of transfer because, according to Maton, high road transfer is linked to knowledge codes. A clear and visible articulation of knowledge in a curriculum is more likely to create the opportunity for cumulative learning while, educational practices that downplay knowledge or where the basis for achievement is less visible to the learners (Maton 2014) may lead to less opportunity for cumulative learning. While cumulative learning may be possible from any type of coding orientation, the key may be that the basis for achievement should be visible to learners.

There are indications of weaker epistemic relations in the lack of theorization that characterizes many EAP programmes and which may be a hurdle for cumulative learning. Hyland observed that ‘many EAP courses still lack a theoretical or research rationale and textbooks too often continue to depend on the writer’s experience and intuition rather than on systematic research’ (Hyland, 2006, p.5). The BALEAP<sup>3</sup> Framework of Accreditation shows an attempt to address this and indeed, there are attempts in various locations to strengthen epistemic relations in both curriculum design and in teacher training (Ding & Bruce, 2017; Gardner, 2016). Yet, the extent to which EAP practitioners ground their practices in theory remains unclear (Ding & Bruce, 2017) with a recent survey of the BALEAP community revealing that the extent to which theory underpins practice tends to be low and very disparate (Cowley-Haselden & Monbec, 2019). Ding and Bruce (2017) have argued that the EAP knowledge base, for EAP practitioners, should include expertise in methods of enquiry to analyse academic practices in the disciplines (such as ethnography)

<sup>3</sup> BALEAP stands for the British Association of Lecturers of English for Academic Purposes <https://www.baleap.org/>

and an expertise in the various theoretical analytical tools to investigate discourse of the disciplines, in particular, genre theory, corpus linguistics, Academic literacies and key elements of SFL as crucial. However, Ding and Bruce (2017, p.151), observe that ‘whilst the hostility of practitioners to theory may not be, and is unlikely to be, universal, it does suggest that the relationship might be dysfunctional’ and highlight that while EAP has grown in terms of research into academic discourse, practice and practitioners are divorced from these developments. In the case of EAP, then, the research into academic discourse has been oriented towards knowledge, but the teaching of EAP may remain in the knower code quadrant.

Weaker epistemic relations are also particularly noticeable when it comes to knowledge about language (KAL), another topic of debate in EAP. Ding and Bruce (2017) explain how EAP requires much progress and expertise in curriculum development. Turner (2004) has criticised EAP practice for its ‘intellectual short-cut mentality’ and criticises the study skills and language work (by which the author means formal, error-focused grammar) approaches as ‘intellectually void’ further labelling the field a ‘patchwork and fragmented field’ (p.97). Chapter 1 highlighted how in the EAP common core syllabus, knowledge about language can often be confined to the editing part of the writing process and therefore lean on a formal conception of language. Language as a meaning-making resource and its role in learning the disciplinary knowledge is often ignored (Coffin, 2010). This thesis argues that this lack of focus on a functional knowledge about language constitutes a form of knowledge-blindness which can have significant impact on learning outcomes.

Social relations can also be analysed as tending to be stronger (SR+). As shown by Ding and Bruce (2017), EAP practitioners often come from a wider English teaching or English as a Foreign Language (EFL) background, which means that their practice may be influenced by this environment and emphasise the knower’s attributes. School English, for example, has been analysed as exhibiting knower code characteristics (Christie & Macken-Horarik, 2011). Cowley-Haselden and Monbec’s survey of the BALEAP community highlighted perceptions among some practitioners of EAP as an ‘intuitive’ practice. The reluctance to engage with theory and this characterization of the EAP teaching as a non-theoretical, intuition-driven endeavour, a practical skill, highlights orientation towards SR in some EAP practitioners (Cowley-Haselden & Monbec, 2019). The characterisation of the legitimate knower in the TEAP field is also worth exploring as it is also indicative of stronger social relations. With admittedly less currency than in previous decades, the ideal knower in EAP has often been associated with the native speaker of English. Braine (1999) warned of this emphasis on the knower’s attributes when describing the Native English Teaching programmes in Japan and Hong Kong arguing that these policies protect the legitimacy of a certain type of knower who is not necessarily knowledgeable or qualified, and prevents

other types of knowers, in this case non-native English speakers, as well as knowledge to be considered as legitimate (Braine, 1999). These types of policies and programmes contribute to Thomas' (1999) claim that non-native English speaking EAP teachers tend to face issues of 'credibility' (Thomas, 1999).

Because stronger epistemic relations are characterised by the explicitness of principles, skills and procedures, while social relations emphasise the attitude and disposition of the knower (Maton, 2009), educational linguists have recommended, in disciplines like School English (analysed as knower-code), the strengthening of epistemic relations to foster cumulative learning. To achieve this, they have boosted the visibility and explicitness of knowledge about language (Christie & Macken-Horarik, 2011; Macken-Horarik, 2011) and have leant on a functional approach to English, based on a systemic functional linguistics language theory and metalanguage, claiming that this can help build cumulative knowledge of text and linguistic systems <sup>4</sup>(Christie & Macken-Horarik, 2011). They argue that making the basis of achievement visible to students might enable better transfer to other contexts. For Martin (2012), the SFL/Sydney school has *verticality* which enables a mapping of powerful genres and their use in curriculum, a modelling of genres as 'ideal' types, the discussion of distinctive features of a genre and the establishment of visible and explicit criteria for evaluation. Much of the educational work within the SFL theory and pedagogy can be defined as strengthening epistemic relations by making knowledge about language visible (Martin, 2012). Within the TEAP field voices calling for a shift from an atheoretical 'service commodity' to an 'intellectual academic endeavour' are starting to become louder (Ding & Bruce, 2017). At tertiary level, several initiatives have aimed to strengthen epistemic relations by adopting a social semiotic view of language; for example, the LASS approach (Coffin & Donohue, 2014) and the SLATE project (Dreyfus, Humphrey, Mahboob, & Martin, 2016) describe theoretically- grounded academic literacy provision in various disciplines, which explicitly brings to students' consciousness the way language enables meaning-making and learning in the disciplines. Maton and Chen (2016a), however, argue that the specialization code orientation is not itself the problem- namely that cumulative learning is possible also in a knower code orientation- but that making the basis of achievement visible to students is key to cumulative learning. This was shown in the study of a code clash between Chinese students' knowledge code orientation and their new Australian knower-code online learning environment (Maton & Chen, 2016a). In this case, Chen and Maton did not recommend a strengthening of epistemic relation but rather for the knower code basis of achievement (for example, the learner's expected attitude in an online forum) to be made explicit. This thesis argues that transfer is influenced by the explicitness

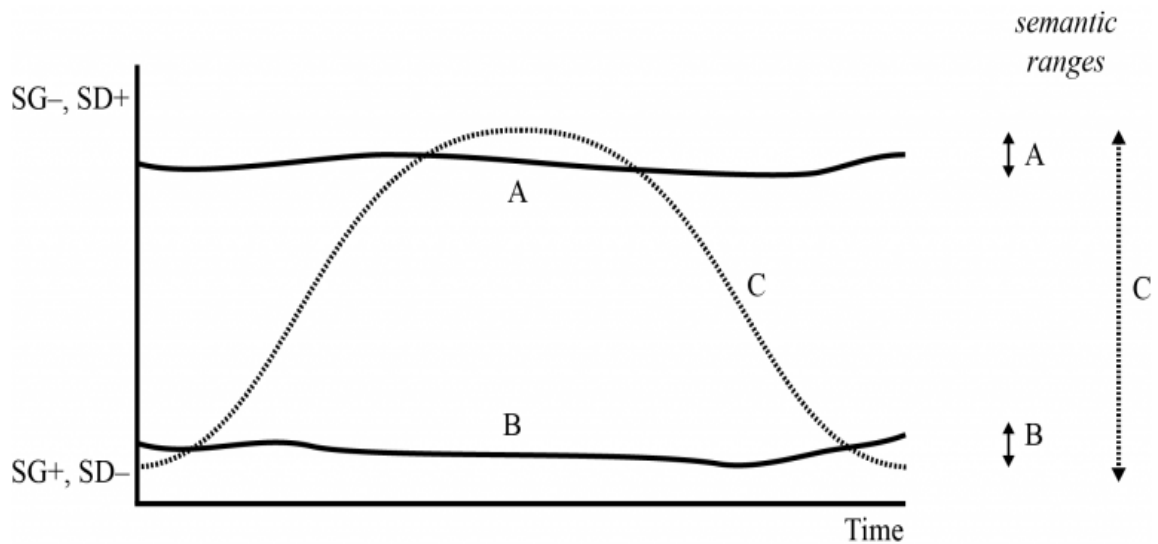
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<sup>4</sup> The theory is explained in 2.2

and visibility of knowledge in the curriculum. In the case of EAP, Ding and Bruce (2017) show that the EAP field (the research) is knowledge oriented: it relies on rigorous research based on a range of theoretical approaches such as corpus linguistics, or systemic functional linguistics, and produces incremental knowledge about the discourse of academia. EAP practice, however, may not have been evenly impacted by these theoretically-driven developments (Cowley-Haselden & Monbec, 2019; Ding & Bruce, 2017). Without ignoring that some of the basis of achievement in academic writing may also be related to the knower's attribute, a great deal of the success in the way students write in their discipline relies on concrete knowledge of disciplinary meaning-making. This should be addressed in EAP programmes to promote cumulative learning.

### **2.1.3 Semantics: conceptualising knowledge structures according to their dependence on context**

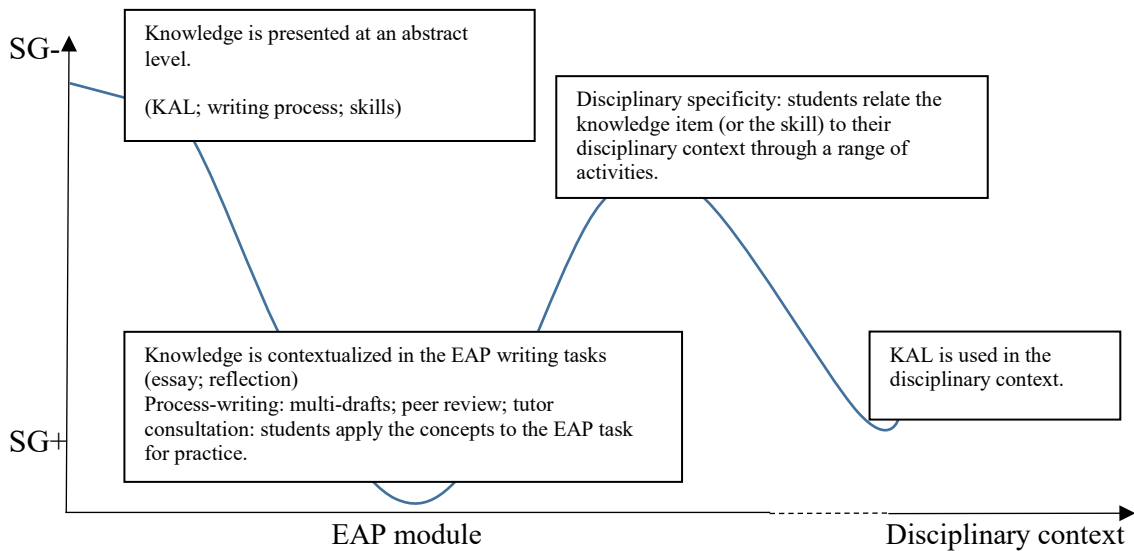
The second LCT dimension that impacts cumulative learning is *Semantics*. This dimension is directly drawn from Bernstein's work which outlines the relations between knowledge and its social and cultural context (Bernstein, 2000). For Bernstein, knowledge can be described in terms of its close/far relation to its context. Maton calls this relation *semantic gravity* (SG). Knowledge claims that are tied to a context (and cannot be applied to another) are said to exhibit stronger semantic gravity (SG↓) and those that are decontextualized, more abstract and generalizable to other contexts are said to show weaker semantic gravity (SG↑). Maton argues that cumulative learning is constrained by context dependent knowledge, that exhibits stronger semantic gravity (SG↓) and enabled by context-independent knowledge, that exhibits weaker semantic gravity (SG↑). Variation in semantic gravity is envisaged on a continuum. The strengthening or weakening of semantic gravity over time (for example over a lesson, a syllabus, a moment of classroom interaction or a piece of student writing) can be plotted on a graph to show a semantic profile and a semantic range (see Figure 3). The line tracking the variation of semantic gravity across the elements being studied forms semantic waves. When there is no variation, the line is called a semantic high/low flatline.



**Figure 3** Three semantic profiles (Maton, 2013, p.13). Figure used with permission.

Semantic waves can be applied to the analysis of curriculum structures as well as classroom interaction and students' essays and are, according to Maton (2013) and others (Martin & Maton, 2013), key to cumulative learning. Maton analysed class interaction and observed frequent downward semantic shifts, whereby the teacher unpacks highly decontextualized ideas (SG-) into simpler, more concrete examples (SG+). What Maton observed, however, is that teachers rarely re-packed these meanings into abstract terms again. Instead, they tended to pick another concept and start unpacking it. This was termed the '*down escalator profile*'. For Maton (2013), this single directional downward shift in the semantic scale constitutes a threat to cumulative learning because, as he hypothesizes, contextualized knowledge might be too tied to the immediate context to be used again in future contexts. This echoes Perkins and Salomon's (1994) notion of mindful abstractions, an essential element to transfer of learning and aligns with the calls from McKeough, Lupart and Marini (2013) to foster generalisation in order to improve transfer.

In the teaching of EGAP, semantic gravity can also help us revisit the debate over specific and common core/general provisions. Rather than seeing these two approaches as incompatible, the concept of semantic gravity enables knowledge in EGAP to be conceptualised (and included in an EGAP syllabus) at various levels of semantic gravity (as shown in Figure 4). The x axis represents time, with the first part showing the EAP module, and the second, the disciplinary module.



**Figure 4** Semantic gravity: from the EGAP curriculum to the discipline

LCT, with its focus on epistemic relations and relation to context in order to promote cumulative learning, raises several questions for EAP. What content would be plotted on the semantic waves of an EAP curriculum to enable both cumulative learning and portability? What might constitute the knowledge that can be abstracted and become ‘portable’ to the subject discipline? The EGAP module used as the pedagogical intervention in this study adopts a systemic functional linguistic/Genre approach to address these questions. The theory is briefly outlined below for its suitability to strengthen epistemic relations in the context of EGAP and its ability to link language with context.

## **2.2 Systemic functional theory for EGAP**

First developed by Michael Halliday, Systemic Functional Linguistics is a theory that describes language as a meaning-making resource which users draw on according to contexts (Halliday & Matthiessen, 2014). In this study, SFL underpins the EAP pedagogical intervention that aims to promote transfer. It also provides part of the analytical framework deployed on the textual and interview data, which will be described in the methodology chapter (Chapter 3). Chapter 2 provides a brief theoretical overview of SFL and continues with an SFL analysis of academic discourse, then of the four disciplines under study in this thesis.

### **2.2.1 SFL theory overview**

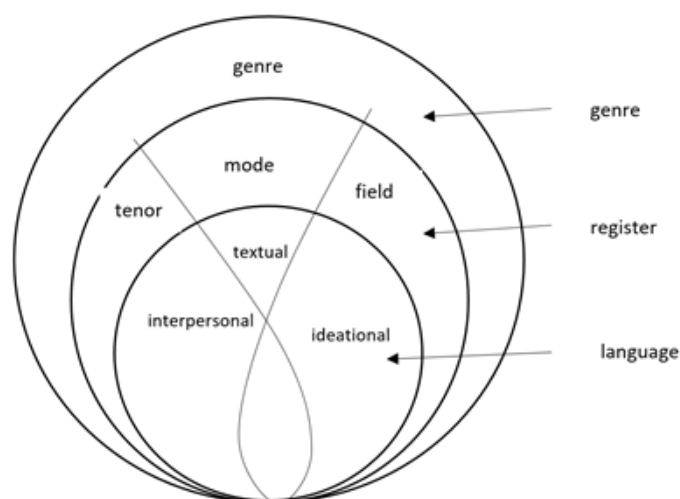
SFL views language as a social semiotic system, a resource for making meaning. First elaborated by Halliday (Halliday & Matthiessen, 2014) and extended by Martin and colleagues (Martin & Rose, 2007a; Martin & Rose, 2008; Martin, 1992), SFL describes language as a system of choices which are made according to the social context. SFL theorizes language on levels of abstraction (strata): phonology/graphology, lexicogrammar, discourse semantics, register and genre (Martin & Rose, 2007a). The aim of transfer being to apply knowledge in different contexts, SFL theory is particularly interesting because of its focus on context-dependent language choices, its stratified view and its attention to three main functions of language (see below). SFL provides the means to analyse language use in different contexts in a principled way in order to select appropriately from the language system. A brief overview of the theory is provided, and in particular of the main theoretical concepts which are significant for transfer potential from one educational context (the EAP module in our case) to other educational contexts (the students' core disciplinary modules). These concepts are Context, including Genre and Register, Discourse Semantics, Lexicogrammar and Instantiation.

Halliday (1978), following Malinowsky (1935), stratified social **context**, 'the total environment in which a text unfolds' (Halliday, 1978, p.5), into 'context of situation' and 'context of culture'. The context of culture is the broader context, while the context of situation is the immediate situation in which the text occurs. Patterns of social organisation in a culture are manifested in social interaction in context of situation then realised as patterns of discourse (Rose, 2010). Halliday relates the context of situation to three main social functions of language: that of enacting interactants relationships and power relations (tenor), that of construing the experience (field), that of weaving ideas as meaningful



discourse (mode). Martin (1992) calls the three dimensions of tenor, field and mode, **the register** of a text. Following Martin and the Sydney School (a series of SFL-informed pedagogical initiatives), several educational linguistics studies have interpreted register as referring to context of situation (Humphrey, 2017; Dreyfus et al, 2016). This is the conceptualisation which this study has adopted. Each dimension of social context (tenor, field and mode) is realised by what Halliday has called ‘metafunctions’ of language: the interpersonal metafunction (the kinds of relationships), the ideational metafunction (the social action that is taking place) and the textual metafunction (the role of language in organising the discourse).

In the Sydney School, **Genre** is modelled at the stratum of culture, beyond register. It is linked to context of culture. For Martin, Genre is a configuration of field, tenor and mode patterns. ‘Situation’ and ‘culture’ are reconstrued as social semiotic strata – register and genre (as shown in Figure 5).



**Figure 5** Genre, register and language (adapted from Martin, 2009, p.12)

**Genre** is defined as a ‘staged, goal-oriented social process’ (Martin & Rose, 2007a, p.8; Martin & Rose, 2008), unfolding texts which follow stages and recognizable patterns which social actors deploy to achieve a certain goal. Martin and Rose (2007), among others have classified common elemental genres according to social purposes. These elemental genres are classified into three broad social purpose categories called ‘engaging’, ‘informing’ and ‘evaluating’ (Rose & Martin, 2012a, p.128). Figure 6 shows the complete School genres taxonomy which includes narratives, different types of explanation genres, procedures, classifying, descriptive and compositional reports, expositions, discussions, and more.



**Figure 6** Knowledge genres in the school (Rose & Martin, 2014, p.276). Reproduced with permission.

Genres were mapped for several school subjects, such as English and Literature (Christie & Macken-Horarik, 2007; Rothery & Stenglin, 1997), History (Coffin, 2006; Schleppegrell, 2004); Geography (Wignell, Martin, & Eggins, 1989) and Science (Halliday & Martin, 1993; Lemke, 1990). The genres were compiled according to their social purpose, and modelled for their expected stages, the elements, obligatory or not, which serve a specific purpose and occur in a specific order. The resources deployed at the lexicogrammatical level are also described (Coffin, 2006).

At the tertiary level, Nesi and Gardner (2012) map thirteen genre families, which will be described in 2.2.2.

## Register

Register conceptualises three context variables:

- *Field* concerns the topic and the relationship between them
- *Tenor* concerns the relationship between participants in a communicative event
- *Mode* concerns the ‘channel or medium’ (Martin, 2012) of the text, its construction and organisation as spoken, written or multimodal.

The SFL architecture differs in the Halliday model and the Martin model, with Martin placing Genre above the three register variables as a configuration, while Halliday considers Genre as part of mode, part of the register strata. This thesis generally adopts the Martin model because, pedagogically, it is very useful to be able to consider shifts in field, tenor and mode in different stages of a genre (the lab report in Biology exemplifies these shifts within the same genre as will be shown in 2.2.3). Also, conceptualising Genre above the register stratum allows for various instantiations of the same genre to vary according to the individual register variables (for example, a student may discuss their essay with peers, and then write the formal piece for assessment which would involve variation in tenor and mode). The difference in models also creates some confusion regarding metalanguage at more delicate levels. For example, when discussing cohesion at the lexico-grammatical level and at the Discourse Semantic level, the term conjunction points to different items (and also overlaps).

The SFL architecture connects the register variables to **Discourse Semantics systems**, organised into three meaning systems, or metafunctions as shown in the table below (Humphrey, 2017). Halliday’s ideational metafunction is further divided into the experiential (representing experience) and the logical (reasoning, linking ideas through logical relations). This additional distinction was also thought useful in terms of pedagogy and will be revisited in Chapter 3 when the EGAP intervention is described.

<b>Dimension of context (register)</b>	<b>Metafunctions of Language</b>	<b>Meaning related to</b>
<b>Field (topic or subject matter)</b>	Ideational: Experiential & Logical	Representing experience Reasoning, linking ideas through logical relations
<b>Tenor (writer/audience roles)</b>	Interpersonal	Interacting with audiences
<b>Mode (channel of communication)</b>	Textual	Organizing coherent texts

**Table 1** Metafunctions and meanings (adapted from Humphrey, 2017, p.7)

The **Discourse Semantics** stratum proposed by Martin (1992) is concerned with the systems of meanings that reach across whole texts, the meanings beyond the clause. These are the systems of IDEATION<sup>5</sup>, CONJUNCTION, NEGOTIATION, APPRAISAL, PERIODICITY and IDENTIFICATION (see Table 2). Ideation is concerned with construing experience, and focuses on the people, the places and the activities involved. Conjunction details logical meanings between the experiential meanings as they are realised through clause complex and a range of cohesive devices (which overlaps with aspects of Halliday’s system of COHESION). Negotiation is concerned with interpersonal meanings in dialogue, and is related to speakers’ roles and moves in dialogue. Appraisal focusses on evaluative meanings and attitudes and values in a text. One aspect of Appraisal, Engagement, describes how quoting, concession and modality are used to ‘introduce a range of voices’ (Martin & Rose, 2007a, p.25). Periodicity is concerned about information flow across a text. Identification is a textual system which tracks participants and how they are referred to across a text through various types of referencing. The third column in Table 2 lists some of the linguistic resources that are related to each discourse system. They will be described more fully below when they are of concern for academic meaning-making, in particular in writing.

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<sup>5</sup> small caps are used to indicate the name of a system

The **lexicogrammar** stratum describes how these discourse semantic systems are realised through clause level features (Table 2).

<b>Metafunction</b>	<b>Discourse Systems (sets of meanings)</b>	<b>Linguistic resources/instantiation in texts:</b>
<b>Ideational</b>	IDEATION: ‘representing experience’	<i>Taxonomic relations Activity sequences</i>
<b>Ideational</b>	CONJUNCTION: ‘connecting events’	<i>External conjunctions Internal conjunctions</i>
<b>Interpersonal</b>	NEGOTIATION: ‘enacting exchanges’	<i>Speech functions, mood, exchange sequences</i>
<b>Interpersonal</b>	APPRAISAL: ‘negotiating attitudes’	<i>Attitude, judgement and appreciation Graduation; Engagement</i>
<b>Textual</b>	PERIODICITY: ‘Information flow’	<i>Theme, New, macroTheme, macroNew, hyperTheme, HyperNew,</i>
<b>Textual</b>	IDENTIFICATION: ‘tracking people and things’	<i>Referencing</i>

**Table 2** Discourse systems and metafunction (adapted from Martin & Rose, 2007a, p.8)

### **Instantiation**

Instantiation is a key element of SFL theory and is particularly useful when thinking of transfer across contexts. Instantiation refers to the way the language system, which is a ‘virtual thing’ (Halliday & Matthiessen, 2014, p.28), is ‘instantiated’ in the form of text. Instantiation represents ‘the movement from the system as potential to the production of text as specific instances of the system’ (Bartlett & O’Grady, 2017, p.6). When considering language through an instantiation perspective, each text is an instance of the underlying system and the systems represent the underlying potential of a language. Text and system are related along what has been called the cline of instantiation. Whenever we shift our perspective between text and system — between data and theory — we are moving along this instantiation cline. ‘The system ... is the potential that lies behind the text’ (Halliday & Matthiessen, 2014, p.49). The concept of instantiation is crucial to an approach to EGAP which addresses issues of disciplinary specificity. With this perspective, it is the ‘system’ (the abstract, the virtual thing) which is conceptualised as core knowledge. The examples seen from various disciplines are then conceptualised as the instances. The system of APPRAISAL for example can be taught as an abstract meaning-making system while the disciplinary specific uses of appraisal language features are instances of the system. Gardner

(2016) described the Genre instantiation approach as a similar way to use the theory in pedagogy that aims to bridge the EGAP and ESAP dichotomy. In the Genre instantiation approach, the abstract, common core knowledge was situated at the genre level. Nesi and Gardner (2012) in their investigation of the BAWE corpus classified student assignments according to social purposes, generating thirteen genre families. In the Genre instantiation approach advocated by Gardner (2016), this knowledge about social purpose and genre/text types as well as stages for these was conceptualised as the common core to be taught to EGAP students. The EGAP intervention in Chapter 3 extends this to encompass language systems at discourse semantic and lexicogrammatical levels that express ideational, interpersonal and textual meanings.

The next section shows how these SFL concepts, and where useful, other approaches to genre such as English for Specific Purposes (ESP), have been used to describe Academic discourse. In section 2.2.3, I will then highlight the specificity of academic discourse through a brief description of the four disciplines relevant to this thesis.

## **2.2.2 Academic Discourse**

Academics have developed a specific language to communicate their thematic content through a range of spoken and written genres (Lemke, 1990). The rich SFL research into academic and disciplinary discourse has described the linguistic resources that academic meaning-making leans on in various disciplines. These are resources that students need to express ‘the high levels of abstraction, judgement, evaluation and interpretation’ required of them at university (Coffin and Donohue, 2014, p.3). This section provides a set of academic discourse features at generic and register, discourse semantic, and lexicogrammatical levels, which are described as characteristic in the literature and might therefore be useful for students in tertiary level to become aware of.

### **Genre and Register**

Academic genres such as published research articles and their structure and conventions have been extensively described. In the English for Specific Purposes (ESP) tradition, research has focused on the structure of published research articles (Swales, 1990). The IMRD (Introduction, Methods, Results, Discussion) stages have been found to be prevalent in scientific articles and in the assignments which students write, such as lab reports. Research articles tend to be flexible in their macro structure and may also adopt the Introduction^ Literature^ Method^ Results and Discussion^ Conclusion stages - the sign ^

indicates 'is followed by' - (Lin & Evans, 2012). These stages fulfil the social purpose of recording a specific scientific experiment and discussing its results (Nesi & Gardner, 2012).

It is worth noting that, in the English for Specific Purposes (ESP) genre tradition, the academic article has also been studied for its introduction section and the Swales' CARS model (Create a Research Space) which enables scientists to position their studies within a body of knowledge which, having identified a gap, they argue they are expanding or completing through the moves of '*establishing a territory, establishing a niche, and occupying the niche*'. Rhetorical approaches such as Myers' (1990) have focused on the types of argumentation that occurs in academic endeavors, from grant proposals to end of research publications.

In the SFL tradition, genres can be classified at the elemental, macro and family level. According to Martin (1985), elemental genres introduced at school include *descriptive reports, taxonomic reports, procedures and explanations* as well as *exposition* and *discussion*. These genres are used to achieve specific social purposes. Veel (1997) explains that the written genre of report is used to observe and record academic activity (descriptive reports) or to classify knowledge (taxonomic reports). To challenge existing knowledge and to engage in arguments and persuasion, students (and academics) write *expositions* and *discussions*. These genres are also described in terms of stages (for example: Goal^ Material^ Steps for *procedures*). In higher educational settings, these elemental genres combine into extended texts, or macro genres which link several elemental genres in various logical relations to achieve a social purpose (Dreyfus et al., 2016; Martin & Rose, 2008). Dreyfus et al. (2016) describe the undergraduate Biology lab report as a macro-genre because it contains several elemental science genres such as descriptions and classifications, as well as analytical exposition and explanations.

Genres have also been classified into genre families. Nesi & Gardner (2012) compiled and analysed the BAWE corpus, a collection of postgraduate and undergraduate student assignments in a range of disciplines from universities in the UK to map the types of writing requirements and to highlight commonalities and differences across assignment types and disciplines. The authors classified assignments according to their social purpose into 13 genre families, which bridge discipline boundaries: *Essay, Methodological Recount, Critique, Explanation, Case Study, Exercise, Design Specification, Proposal, Narrative Recount, Research Report, Problem Question, Empathy Writing, and Literature Survey*. When comparing the prominence of these genres in various disciplines, Gardner and Nesi (2013) found that Engineering, Physical Sciences and Life Science students are likely to write a far wider range of genres than the Arts and Humanities students who mostly engage in writing essays. In fact, in the Life Sciences (Biology), and Physical Sciences (Engineering, Chemistry, Maths), they show that all the 13 genre families are represented,

with Methodology recounts, Case studies, and Critiques being particularly prominent in the Science groups. These genre families are ‘abstractions’ derived from observations of instances which are similar in terms of social purposes and staging, and which despite disciplinary variations highlight commonalities which can be usefully made visible to EGAP students. Of particular interest for EGAP students from scientific disciplines is the lab report, a very common assignment type which seeks to develop a range of skills from research to critique. The lab report reflects the values of the disciplines, in Science, that is objective measurements of materials, chemicals, or living organisms, as well as replicability and reliability (Parkinson, 2017). Generally following the IMRD stages, the lower undergraduate years may focus on parts of the stages only to progress to a whole IMRD research project in the upper years (Nesi & Gardner, 2012). Nesi and Gardner (2012) contrast the lab report with the research report which tends to occur in higher undergraduate years and beyond, and sees the student take charge of the whole study, from the literature review to the research question and the experimental design. The lab report, on the contrary, (also called *a practical*) focusses on the experimental methods and procedure and aims to develop students’ familiarity with the lab procedures and techniques and the foundational knowledge of the discipline and aims to teach students how to develop an argument about scientific experiments and results.

Academic written register exhibits high level of abstraction, density and formality which is reflected in the discourse semantic and lexicogrammar resources deployed.

### **Discourse Semantics: meanings across whole texts**

At the discourse semantic strata, ideational meanings are realized through IDEATION, the organization of phenomena into taxonomies of composition or classification which are related in activity sequences through the system of CONJUNCTION (or logical relationships of time, cause, comparison, condition, concession...) (Martin, 1992). Academic discourse, is characterized by uncommonsense taxonomies which classify and categorize the entities realized by the lexical elements of a text ( Martin & Rose, 2007a; Martin, 1992). The way these lexical items relate constitute taxonomic relations which may be ‘part-whole’, class, contrasting, repetition or synonyms. Classifying taxonomies are particularly important in abstract, academic discourse. These are used to construe a particular class of things (the superordinate) and to map its sub-type (its members). Through the system of CONJUNCTION, taxonomies are related in activity sequences, a series of events that are usually implicitly chronological, but which in scientific fields, Martin and Rose (2007) note, often imply an implication sequence (a relation of cause and effect).

CONJUNCTION involves meanings that relate experiential elements in terms of addition, comparison, time and consequence. Martin and Rose (2007) call this ‘external conjunction’



as it relates ideational meanings. This system includes logical metaphors where the logical meaning is presented as a process such as *to lead* in the case of causality. The discourse semantic system of CONJUNCTION is also concerned with internal relations, links which are more textual and rhetorical in nature and organise the argument.

Interpersonal meanings are realized in part through the system of APPRAISAL. APPRAISAL maps the range of evaluative language the genre draws on to achieve its goal (Martin & White, 2005). The resources of APPRAISAL enable the writer to establish stance, to orchestrate the voices from external sources (endorsing and distancing from them), and evaluate the subject matter. The APPRAISAL framework maps out the following three sub-systems: ATTITUDE, GRADUATION AND ENGAGEMENT. ENGAGEMENT is described below in terms of its lexicogrammatical realisations.

NEGOTIATION is another system that realizes interpersonal meanings, and concerns spoken exchanges, but this will not be developed here as it is not a focus in written academic genres.

The discourse semantic system of PERIODICITY (Martin & Rose, 2007a) describes the way information flows across whole texts. Important resources used to structure and signpost the conceptual development in a text are macroTheme and hyperTheme (Ravelli, 2004).

MacroTheme (also referred to as ‘introduction’) and hyperTheme (often known to students as ‘topic sentence’) provide a type of compositional scaffolding for students. MacroThemes predict meanings and hyperThemes both predict and accumulate meanings across a text (Martin & Rose, 2007a). HyperTheme is defined as an ‘introductory sentence’ that predicts the content of the paragraph (Martin, 1992). HyperThemes have been described in Ravelli (2004) as performing the double function of summarizing or linking back the preceding paragraphs and announcing the current paragraph’s main idea (also called retrospective and prospective connections). Hood (2008) shows how hyperThemes also encode interpersonal meanings, especially in an invoked way (indirect) through the Appraisal resource of Graduation. For example, in the hyperTheme below, the expressions in italics provide an attitudinal meaning which aligns the reader to interpersonal meanings to come in the paragraph.

*Over the past two decades* [grad:+ scope], there has been *a great deal of* [grad:+ quantity] research investigating student motivation and engagement. (Taken from Hood, 2008, p.223)

In her study of four introductory segments of research articles, Hood (2008) also found that attitudinal elements in HyperThemes echo and support interpersonal meanings made in preceding text, showing that Ravelli’s retrospective and prospective connection concerns not only experiential meanings but also interpersonal ones.

Smaller waves of information are managed through the resources of Theme (the point of departure of the clause) and Rheme (what is being said of the theme). Halliday (1994) defines Theme as ‘the point of departure’ (1994, p.34) and identifies it as the first ideational element in a clause. Scholars have deviated from this definition to include the subject of the main clause in Theme (Berry, 1995; Davies, 1994; Forey, 2002). This is labeled ‘extended Theme’ (Forey, 2002, p. 8). Where, in the example below (taken from Igor’s lab report in the data for this study), Halliday would consider the marked Theme ‘from the calculations’ as the Theme and the rest as the Rheme, Forey’s approach includes the subject of the main clause ‘the limiting reagent in the synthesis of CuI’ as Theme. This approach enables a tracking of the topical Theme over a text, which is crucial in identifying what element in a text is given ‘special status’ (Halliday, 1994, p.37) and in giving insights into the stance and ‘the purposes of the writers’ (Fries, 1995, p.319). For a full description of the ways different scholars have analysed Theme, see Forey (2002).

Example: (Igor’s lab report, Extract 19)

Marked Theme	Subject	Rheme
extended Theme		
From the calculations,	<b>the limiting reagent in the synthesis of CuI</b>	is CuSO <sub>4</sub> .5H <sub>2</sub> O .

Thematic progression refers to the way themes interact with each other, with Rhemes and with features such as hyperTheme (McCabe, 1999). One of the earliest mentions of the notion of thematic progression is attributed to Daneš (1974) who looks at how Themes relate to preceding Themes and Rhemes and describes three common patterns consisting of constant progression (the same Theme is used in the following sentence), linear (the Theme connects with an element of the previous Rheme - also called zigzag), and derived (where Themes in a paragraph relate back to the Rheme that develops the hyperTheme).

Identification is the other discourse semantic system that realizes textual meanings. It is concerned with presenting and tracking participants through a text through various types of reference (Martin & Rose, 2007a, p.173).

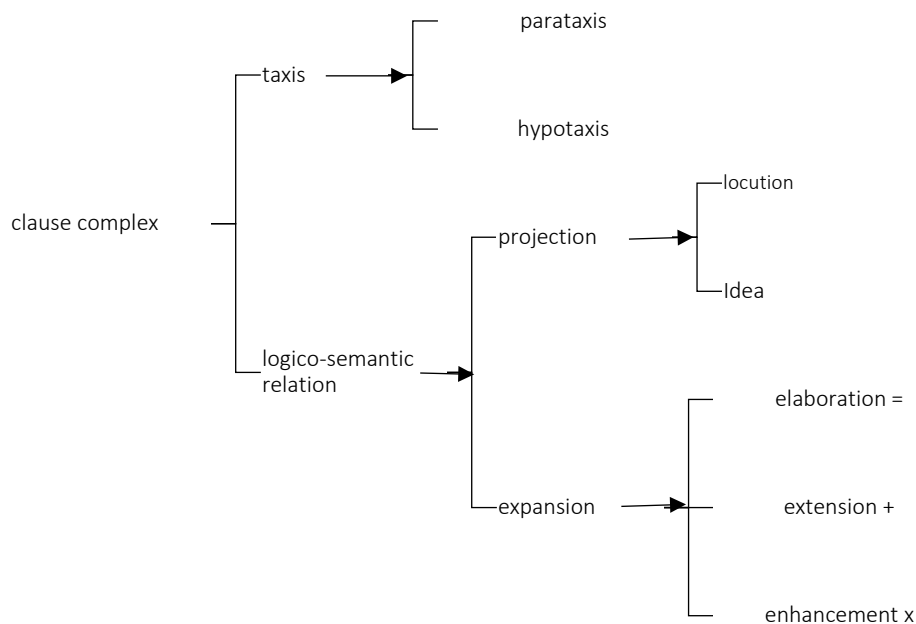
## **Lexicogrammar: meanings at clause level**

Halliday, with others, focused on the lexicogrammatical level, in work antecedent to the descriptions of higher strata presented above (Halliday & Hasan, 2014; Halliday & Matthiessen, 2014) to chart the evolution of the language of science from Chaucer to Newton (Halliday & Martin, 1993). For Halliday and Martin, 'it is the grammar that does the work; this is where knowledge is constructed' (1993, p.13). Typical lexicogrammatical features specific to academic English and which therefore may be of interest for EAP curriculum to focus on, include grammatical metaphor, the noun group and its modifiers, and logical relations (Halliday & Martin, 1993).

The noun group is at the heart of academic writing (Halliday, 2006). The evolution of the use of the noun group in schooling has been documented (Christie & Derewianka, 2008; Halliday, 2006) and studies have shown that the complexity of academic language at tertiary level also rests on the increasing complexification of the noun phrase (Biber, Gray, & Poonpon, 2011; Lu, 2011; Parkinson & Musgrave, 2014). In their corpus linguistics study, Parkinson and Musgrave compare the use of noun phrases in an EAP student corpus with a MA theses and journal article corpus, showing that there is a developmental progression of the use of various pre- and postmodifiers according to students' stage of academic writing development. This confirms Biber et. al.'s (2011) findings and highlights complexification features that EAP students are unlikely to have mastered and which are increasingly needed (as shown in the academic journal corpus used in the study). These findings have a clear impact on the choice of features that should be made visible in the EAP module to assist students with this progression.

The lexicogrammatical features that realize the discourse semantic system of CONJUNCTION are external conjunctive relations realized congruently by conjunctive linkers (*As a result*) or incongruently through logical metaphor (for example, a process such as *to lead*) and anaphoric (also called general) nouns (*reasons, factors* for logical relations of cause/consequence) (Martin, 1992).

Experiential meanings are also logically connected through the resource of clause complex which is formed when 'two or more clauses are linked together in certain systematic and meaningful ways' (Eggins, 2004, p.255). Clause complex includes two systems: *taxis* (how clauses are linked in relations of dependency or independency) and *logico-semantics* (the way clauses are linked to create logical meaning) as shown in Figure 7 below. Logical relations include the systems of projection and expansion (see below for overview of systems).

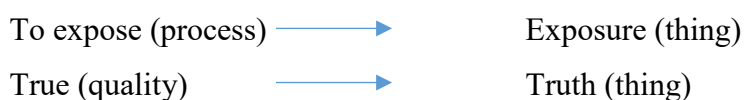


**Figure 7** System of the clause complex (adapted from Eggins, 2004, p.259)

The lexicogrammatical features that realize the discourse system of APPRAISAL are used to create texts that are both persuasive and ‘objective’. Academics write texts with heteroglossic meanings (texts where diverse opinions and stances are acknowledged) and need to critically engage with their sources and dynamically position their readers in relation to their argument and these sources. To do this, they engage resources such as evaluative lexis, modal verbs and adjuncts, reporting verbs expressing varying degrees of endorsement (Martin & White, 2005). ENGAGEMENT is grammatically realized through modality (to express negotiability and probability) and by distancing and endorsing resources.

The discourse semantic system of PERIODICITY is realized grammatically by resources such as general nouns (abstract nouns such as ‘*issue*’, ‘*reasons*’), referencing pronouns (‘*it*’, ‘*they*’, ‘*them*’), conjunctive adverbs (‘*nevertheless*’) and lexical chains (synonyms) (Halliday & Hasan, 1976, 2014). Extending Halliday and Hasan’s general noun classification, Ravelli (2004) describes generic nouns (‘*way*’), semiotic abstractions (‘*notion*’, ‘*idea*’, ‘*concept*’) and grammatical metaphors (‘*variations*’, ‘*possibility*’, ‘*occurrence*’). Cohesion across sentences is also realized through the various patterns of thematic progression (seen above) which interact with other cohesive features such as lexical cohesion (chains and sets) or referencing (Halliday & Hasan, 1976, 2014; Martin & Rose, 2007a; Martin, 1992).

Finally, a key element of academic discourse is grammatical metaphor which occurs when meaning is expressed with a non-congruent lexicogrammar choice instead of a more direct realisation of the discourse semantics strata by the lexicogrammar (Byrnes, 2009; Martin & Rose, 2007a; Ravelli, 2004). For example, a process (most congruently represented by a verb) can also be realized by another element of lexicogrammar, a noun, or an adjective so that it becomes reconstrued as a thing or a quality:



Grammatical metaphor has developed in the English language to enable the non-commonsense, abstract meanings in scientific and academic discourse (Martin & Rose, 2007a).

The examples of grammatical metaphor above (*'exposure'*, *'truth'*) are called nominalisation, the most common type of grammatical metaphor where logical or experiential meanings are realized through a noun group. This resource constitutes a crucial means to expand a students' semantic resource and is, according to Halliday (2002), one of academic writing's most distinctive characteristics and, 'one of the factors that contributes most to the overall effectiveness of a text' (Halliday, 1998, p.203). The use of experiential and logical grammatical metaphor is indeed seen as a watershed stage of literacy development which usually occurs in secondary school (Christie & Derewianka, 2008; Martin & Rose, 2008) and is textual evidence of the student's shift from common sense register to more abstract modes of meaning-making (Coffin, 1997). In the same way modifier types occur in developmental stages, so does grammatical metaphor which develops in stages from the child's reliance on congruent grammar, to the use of faded metaphors and the more sophisticated types of congruent to incongruent shifts to 'thing', 'quality', 'process' and 'circumstance' (Derewianka, 2003). Nominal and logical metaphors, as well as abstract nouns, are used to package dense ideas and track logical relations. Logical relations between ideas are often 'buried' within the clause, in a verbal group, for example a relation of manner being expressed by a conjunction in (a) and in the verbal group in (b) (taken from Martin, 1992, p.201):

- (a) We mated two champions. **Thus** we won a lot of prizes.
- (b) Mating two champions **enabled** our winning a lot of prizes.

In this section, a brief overview of the SFL description of academic discourse has been provided. The next section describes the specificities of the four disciplines which are the focus of this study: Biology, Chemistry, Maths and Engineering.

### **2.2.3 Disciplinary specificity**

The language of science has evolved over centuries to construe the evolving scientific activities it expressed and is recognizable and distinct from other more common sense discourse in the way it projects an image of authoritative and objective description of the world as it is, using a range of features such as the passive voice which makes actors disappear and increases the impersonality of Science (Lemke, 1990). The discourse of science has been the object of much research from a range of theoretical perspectives focusing on genre and register as well as discourse semantic and lexicogrammar. This study concerns the transfer that operates from an EGAP module to core undergraduate modules (mostly Year 1) in Biology, Chemistry, Maths and Engineering. The meaning-making resources that are specific to these four disciplines are briefly outlined to allow for a more informed analysis of the results of the study. Where available in the literature, the information is organized according to language strata seen in 2.2.1 (Genre and register, Discourse Semantics and Lexicogrammar). Drawing on each discipline's specific educational research, challenges related to literacy will be highlighted.

## **Biology**

### **Genre and Register**

The analysis of the BAWE corpus found that in Life Sciences, the most common assignment genre is the Methodology Recount, followed by the Essay and the Explanation (Gardner & Nesi, 2013). According to Dreyfus, et al. (2016), Biology undergraduate students are first apprenticed into the knowledge of the discipline through written genre of the *lab report*, which guides them to classify and describe knowledge, and experimental procedures. They then progress towards a second type of genre, *the research article* which is aimed at expert audience to disseminate research findings (research report), evaluate findings (critical review), summarize 'unsettled' findings (exploratory review), and summarize 'settled' findings (descriptive review). Within the early years assignment, *Explanations* are widely used for students to demonstrate their understanding of the field knowledge (Nesi & Gardner, 2012). In their early undergraduate years, Biology students focus on procedures and procedural recounts as well as explanations (which guide students through scientific procedures and foundational knowledge in the lower undergraduate years), to exposition and discussion in the upper undergraduate years and beyond where

students build the potential to challenge and expand scientific knowledge. Analysing the development of ideational resources in student text, Hao and Humphrey (2009) identified three genres within the family they called ‘Experimental Report’: the lab report (first and second year), the research report (upper undergraduate year) and the published research article. This trajectory across the undergraduate years and beyond has impact on linguistic demands at the discourse semantic and lexicogrammatical levels.

### **Discourse Semantics**

At tertiary level, both in pedagogical genres and in research articles, APPRAISAL resources start playing a more prominent, although often implicit, role to support purposes of evaluation, challenge and justification (Dreyfus et al., 2016). Hood (2005) identified two fields in Biology research articles: the *field of study* (the topic being explored) and the *field of research* (the experimental procedures) and showed that the field of study is often associated with evaluative resources. In particular, Hood analyzed the persuasive functions of research articles introduction, labelling this the ‘*Research Warrant*’ macro-genre. Hood shows how evaluative meanings are used implicitly to manage ‘objectivity’ and critique of others’ research (Hood, 2010).

Other interpersonal meanings are expressed in the range of genres undergraduate Biology students write. For example, while in descriptive reviews, findings are presented as settled through the use of verbal groups such as ‘*are found to be*’, in exploratory reviews, Dreyfus et al (2016) found that explicit heteroglossia resources were used (authors and modality as well as more distancing reporting verbal groups). Finally, research findings are evaluated through the ‘coupling’ of resources from IDEATION and APPRAISAL (Hao & Humphrey, 2009) in what Hao and Humphrey (2013) call ‘burnishing’ or ‘tarnishing’ depending on whether the evaluation is positive (endorsing) or negative (distancing). These linguistic resources realize meanings about worthiness and necessity of the research, as well as effectiveness and efficiency of the methods and are woven into the text to persuade the reader. For Hao and Humphrey (2009) making visible the ‘what’ is being evaluated in research warrants and the ‘how’ it is being evaluated means students can become aware of the resources that realize a scientific argument (p174).

### **Lexicogrammar**

The noun group and its classifying adjectives and defining clauses are resources that are consistently used in Biology writing. HyperThemes may contain packaged abstract groups which are then unpacked in subsequent sentences. According to SLATE researchers, “this packing and unpacking through the use of logical metaphor and causal/temporal conjunctions is an important way in which students show their knowledge of the biological phenomena.” (Dreyfus, et al., 2016, p.200). Grammatical metaphor is also increasingly

important as the need to summarize previous research in order to establish a ‘gap’ increases. Resources such as modal verbs (*may, might*), concessive conjunctions (*although*), positive attitude choices such as ‘*better*’, ‘*more effectively*’ become increasingly common over the undergraduate years.

This detailed knowledge about meaning-making in Biology may be useful for students, especially as they transition from school Biology and shift to discussion for which their linguistic repertoire may be unprepared (Dreyfus et al., 2016). Therefore, an EGAP curriculum may be beneficial if attention is given to developing a pathway for interpersonal resources that relate to the development of students’ field knowledge from the foundational incursion into knowledge required in the explanation genre to a role of evaluator and creator of disciplinary knowledge required in the research report.

## **Chemistry**

Blackie (2014), a Chemistry educator, describes Chemistry as one of the most hidden sciences. In Chemistry, phenomena happens in the atomic or molecular realm, far from sensory observations. Chemistry is also a ‘central science’ as it provides atomic and molecular understandings of matter which are used in a range of other sciences. Because of the deeply abstract subject matter, the language of Chemistry has evolved into a very specific one, coined *Chemish* (Markic & Childs, 2016). Learning Chemistry requires various skills ranging from mathematical proofing to understanding organic reaction mechanisms, all of which rely on a mastery of this complex language of Chemistry.

### **Genre and Register**

From a generic perspective, Nesi and Gardner (2012) rank Methodology Recount as the most predominant genre in Chemistry students’ assignments. As in Biology, Chemistry at undergraduate level relies on lab reports in the lower years and then on research reports in the upper year once students have gained the foundational knowledge and processes. Rhetorical moves of biochemistry research articles have been analysed to highlight several moves in the various stages of the articles. For example, results usually include *restating methodological issues, justifying methodological issues, announcing results, commenting on results* (Kanoksilapatham, 2005). The linguistic features in this move structure have also been extensively described (Kanoksilapatham, 2007). A Chemistry lab report follows a specific type of logical argumentation patterns in laboratory reports or scientific papers (Markic & Childs, 2016). The stages of a Chemistry report include a flowsheet (a diagram which summarizes the lab procedure) and a report of procedure, which is the recount of the experiment. The next stage is the Yield (or results) followed by the answers to the questions raised in the lab report assignment sheet. This stage involves the justification for the procedure in order to obtain the sample (Drury & Jones, 2010).



### Discourse Semantics and Lexicogrammar:

Very little is available in the SFL literature that concerns discourse semantics in Chemistry discourse. The WRiSE platform identifies textual resources as very specific and important in Chemistry meaning-making. Thematic progression is needed to produce a coherent sequencing of procedures and in the questions segment. Explaining the procedures of an experiment and answering the questions for a lab report also involves careful attention to paragraph level cohesion with referencing words, lexical choices and conjunction to show contrast and causal meanings (WRiSE, 2012).

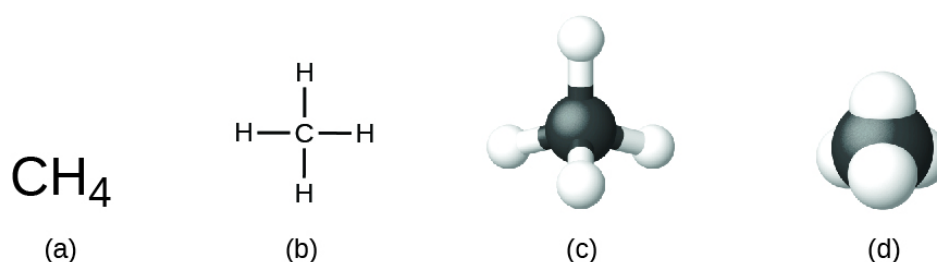
At lexicogrammatical level, procedure recount tends to be written in past simple and in the passive voice. An impersonal tone is maintained by removing the actor (Drury & Jones, 2010). For example:

The sequence **was blasted** using a standard nucleotide blast to compare the given nucleotide sequence with the database of nucleotides. (Kali's disciplinary assignment, method section)

Cohesion is reliant on accurate referencing for example, the shift from the indefinite article when an item is first mentioned to a deictic (such as '*the*' or '*this*') which sets up 'reference chains' that helps the reader to track the participants and the relationships between them (WRiSE, 2012). In a corpus study of Chemistry textbooks, Yang (2017) highlights technical terms and nominalisations as prominent, and specific verbal processes (such as '*involve*', '*indicate*' and '*represent*' to define terms and phenomena) to represent disciplinary knowledge. In research articles, particularly in the results sections, phrases such as by+ nominalization ('*by measurement*') were found to be frequent (Bruce, 2009). Logical relations are construed through verbal group ('*lead to*', '*depend on*' being the most common), as well as modality such as '*can*' and '*may*' as essential resources to express the disciplinary content.

Chemistry knowledge is represented through the specific language of Chemistry, *Chemish*, which includes a rich synergy of verbal language, maps, equations, algebra, numerical data and graphical forms (Markic & Childs, 2016; Taber, 2015). A specific characteristic of Chemish is its symbols which express precise disciplinary knowledge which could not be expressed by verbal language and which can remain out of view for students (Blackie, 2014; Liu, 2009; Liu, See, & Owyong, 2011). For example, the linguistic representation '*Methane*' does not provide the information on the chemical compound which is clear from its representation in the chemical formula  $CH_4$  (one atom of Carbon and four atoms of Hydrogen). In the same way, while language gives clues in term of scientific classifications

(‘sulphuric acid’ shows that acids can be of different types), its symbolic representation  $H_2SO_4$  enables us to also capture the numeric relation between the constituents (Liu & Taber, 2016). Mathematical symbols are also used to represent chemical reactions through equations with a plus sign (+) indicating ‘adds to’ or ‘reacts with’ and an arrow ( $\rightarrow$ ) indicating the resulting reaction. Beyond symbolism, special representations (see Figure 8) are also used to further condense information.



From: [https://opentextbc.ca/chemistry/wp-content/uploads/sites/150/2016/05/CNX\\_Chem\\_02\\_04\\_MethaneRep.jpg](https://opentextbc.ca/chemistry/wp-content/uploads/sites/150/2016/05/CNX_Chem_02_04_MethaneRep.jpg)

**Figure 8** Visual representations in Chemistry

Chemical symbolism expresses a dense and abstract knowledge involving quantification and submicroscopic processes, all of which can be challenging for Chemistry students to access as much remains implicit (Blackie, 2014; Liu & Taber, 2016).

Chemistry students in an EGAP module may require awareness of the genre of the lab report and of dense technical field expressed in multimodal systems. While the literature does not explore interpersonal meanings in Chemistry as has been done extensively in Biology, it may be the case that a similar trajectory of interpersonal resources applies.

## **Maths**

Teaching students advanced mathematical meaning-making involves socializing them into the culture and values of Maths and a way of thinking which embraces abstraction and formalism (Ben-zvi & Arcavi, 2001). Maths at university revolves around studying theory and solving problems (“How do undergraduates do mathematics?”, 1994). Advice for Maths undergraduate includes the need for accurate and clear exposition, one that counteracts the ambiguity of verbal language and one that pays special attention to logical flow to enable readers to follow a student’s writing easily. From a systemic functional linguistic perspective, mathematical discourse is described as a multisemiotic construction, consisting of choices in the mathematical symbol, the graphs and visuals and the language systems (Doran, 2016; O’Halloran, 2005). The grammar of Maths is aimed at problem solving and this is enabled by intersemiosis (the meanings that arise from the relations and

shifts between the three semiotic systems) (O' Halloran, 2005). Maths meaning-making occurs through a 'set of relations that are both precise and infinitely iterative' (Doran, 2017, p.214). These relations include arithmetic relations of addition (+), subtraction (-), division (/), which O'Halloran coined as 'operative processes'.

### **Genre and Register**

The main written genre in Maths is proof which involves solving a given problem. Doran (2016) classified the mathematical genres, from the macro genre of *Problem* and the two 'solution' genres of 'Quantification' (where the problem works towards a numerical Result) which is very common at school and 'Derivation' (where the Result stays in pronumerical form). Both genres adopt the same generic stages (Situation ^ Reorganisation ^ Results) (p.179).

### **Discourse Semantics**

In proofs, or longer mathematical texts, Doran shows that the sequence of statements are organized through a pattern of *recurrent themes*. This is a particular feature of the discourse semantics of Maths because while the equation allows for any element to come first, writers prefer to keep a constant theme progression to allow the writer to keep hold of the field and to link each statement with surrounding text. Within this textual focus on logical meaning and economical encoding, resources of spatial arrangement such as alignment of the = sign and the ellipsis (the constant theme is not repeated) are used. O'Halloran (2005) states that the notion of theme is fundamental to the textual organization of mathematical proofs. In her analysis of mathematical discourse, O'Halloran (2005) suggests the left side of the equation functions as a theme, and the right side as a rheme (after Halliday's description). Multiple themes including a conjunction and marked themes (in the form of dependent clause 'if  $x=4$ ') are also prominent. The articulation (the right hand-side of the equation) is the element that changes and pushes the proof forward, acting as a generic stage in the overall text. Doran (2016) gives the example of a high school textbook (see Figure 9), and a problem where the student has to calculate the net force acting on a ball.

A ball weighing 500g rolls down a hill with an acceleration of 3.0 ms<sup>-2</sup>.

What is the net force acting on it?

Taking the downhill direction as positive and applying Newton's Second Law to the ball:

$$M=500\text{g}=0.5\text{kg}, a = 3.0 \text{ m s}^{-2}$$

$F_{net}=ma$	<i>Situation</i>
$= 0.5 \times 3.0$	<i>Reorganization</i>
$= 1.5 \text{ N}$	<i>Results</i>

**Figure 9** Problem from high school textbook, adapted from de Jong et al. (1990, as cited in Doran, 2016, p.176)

In this equation, the theme (F<sub>net</sub>) is constant and ellipted and relates directly to the question posed. The *articulations* (the right hand side) start with the technical equation then progresses to numerals, then to the final result, bringing language back. Doran labels these as genre stages: *Situation* (which provides the situation, the assumed knowledge from where to start, here the technical equation and the question) and *Result* as the beginning and end point respectively. In between is the stage *Reorganization*, where the manipulation, the 'working out' of the problem, involving numerals, is detailed. The Reorganization stage can be expanded indefinitely and used to make mathematical thinking explicit in teaching and in assessment. This *Reorganization* stage can be problematic because decisions must be made of what can safely remain implicit (and even may be superfluous for a specific problem), and what must be made explicit for the reader to follow the proof. An additional stage is the *Interpretation*, where the whole problem is rounded off with a language statement that foregrounds the results (this, as Doran explain, may be more common in Physics than it is in Pure Maths, as this resemiotisation into language allows for the abstract to be related again to the empirical and to be re-aligned with the broader question that was expressed in words.

The discourse semantic systems of CONJUNCTION and CONTINUITY are also predominant (see below). Taxonomies are also important. For example, the technical term isosceles triangle plugs this item into a dense web of disciplinary knowledge (O'Halloran, 2005, p.77) involving

classification (a type of triangle, itself a type of polygon) and composition part/whole (at least two sides of equal length).

### **Lexicogrammar**

At the clause level (the mathematical statement seen above), conjunctions such as *if, so that, on the other hand* occur frequently and are placed on the left hand-side (O'Halloran, 2005). Nominalisations are also highlighted in O'Halloran (2005), with relational processes being used to link experiential meaning repackaged into noun groups. In the example below (O'Halloran, 2005, p.82), nominalized processes are bold and relational processes are underlined:

**The connection with the first interpretation** is that if we sketch the curve  $y=f(x)$ , then **the instantaneous rate of change** is **the slope of the tangent to this curve** at the point where  $x=a$

As Dawkins & Roh (2016) have argued, much meaning in mathematical language can remain implicit for students and should therefore be made visible to support their learning. For them, as long as students are unaware of this metalinguistic knowledge about Maths discourse, they are not speaking the same language as their instructors. Understanding of language and symbols as semiotic systems plays a crucial role in inculcating students into Maths discourse and values. From an EGAP perspective, Maths students may benefit from a focus on textual meanings.

### **Engineering**

Engineering is a discipline turned towards concrete problem-solving (Gardner & Xu, 2019; Wolff, 2017). In the BAWE corpus, Engineering is considered part of the physical sciences (Nesi & Gardner, 2012). Engineering is also characterised by its multi-disciplinarity, including Chemical, Electrical, Computer Science, Civil, Mechanical & Aeronautical, Mineral and Mining (Gardner & Xu, 2019), which makes the study of its discourse challenging.

### **Genre and Register**

The BAWE corpus has revealed that Engineering students may be writing much more diverse genres than counterparts in other disciplines (Gardner, 2008; Nesi & Gardner, 2012). Engineering students write assignments from the 13 genre families. This includes Methodology recounts (lab reports), Design Specifications, Case Studies, Research Reports, Critiques (evaluation of products), Essays (exposition, discussion), and Narrative Recounts (reflections) (Nesi & Gardner, 2012, p.30). This diversity reflects the fact that Engineers write for a diverse audience ranging from experts, public organisations, and the general

public (Gilmore & Millar, 2018). The IMRD (Introduction, Methods, Results and Discussion) structure is common in both the lab report and the project report (which tends to occur later in the undergraduate programmes). In design specifications, the structure often includes an introduction, followed by a theory section which is often very short and focusses on the purpose and basic design. The system design is then detailed, followed by a discussion, conclusions and a bibliography which usually lists commercial websites or manufacturers rather than academic papers. The 'system design' section is a highly multimodal segment of the report and provides specifications such as calculations and diagrams. The text surrounding the figures often reiterates and unpacks the meaning of the figure (Nesi & Gardner, 2012, p.186). Corpus research of published articles has revealed that the structure can vary across the constellation of Engineering disciplines (Kanoksilapatham, 2015).

### **Discourse semantic**

Gardner (2017) studied research articles in Mechanical Engineering (ME), Civil Engineering (CE) and Electrical Engineering (EE) to compare register features. The three disciplines presented a highly elaborated academic code, characterised by high technical density, nominalisation and grammatical metaphor. Engineering discourse is characterised by 'compressed procedural information', or the succinct expression of procedures through the passive voice (Gardner, Nesi & Biber, 2018). Ideational resources in Engineering are characterised by technical language but, as opposed to the hard sciences, and reflecting the applied nature of Engineering, and its practical focus, clauses are more often concerned with material processes, as shown in the frequency of bundles such as 'can be used', 'was/were used' in Materials and Methods section, and 'shown' in the results section (Gardner & Xu, 2019). As seen for Biology, interpersonal resources are used in abstracts to positively evaluate the study. Positive evaluative language is also used in introductions to emphasise the value of the study (Gardner & Xu, 2019). Modality resources are used in conclusions to point to further research 'Further research should aim to....' (Gardner & Xu, 2019, p. 31).

### **Lexicogrammar**

Corpus linguistic research in Engineering discourse has listed keywords in various Engineering disciplines (Gilmore & Millar, 2018; Mudraya, 2006) and Hyland (2008) has shown that lexical bundles (expressions of 3 or more words) set Engineering disciplines apart from others with significantly higher use of lexical bundles, in particular the '*noun group + of*' (for example '*the performance of the coder*') and passive bundles ('*The experiment setup is shown in Fig. 4*') or agentless passive (Gardner & Xu, 2019). While Gilmore and Millar (2018) highlight the high frequency of nominalisations in their corpus study, the variety of audiences and genres also means that students need to navigate different levels of formality and density and frequently have to adapt their language to non-experts, unpacking technicality and reversion to a more congruent grammar

(Hagan & Mort, 2018).

From an EGAP perspective, the challenge of Engineering discourse is that it is varied across the Engineering disciplines, although as shown by Gardner (2017) some commonalities do exist. The focus on problem-solving and design also means that Engineering discourse involves a very specific interaction between theory and practice, engaging information at different strength of semantic gravity, which students might usefully be made aware of

(Wolff, 2017). As in the disciplines seen above, multimodality is a key element of meaning-making, although in Engineering, this aspect varies between various Engineering disciplines. Mechanical Engineering and Electrical Engineering, for example, seem to be using more explicit references to figures and graphs than Civil Engineering (Gardner & Xu, 2019).

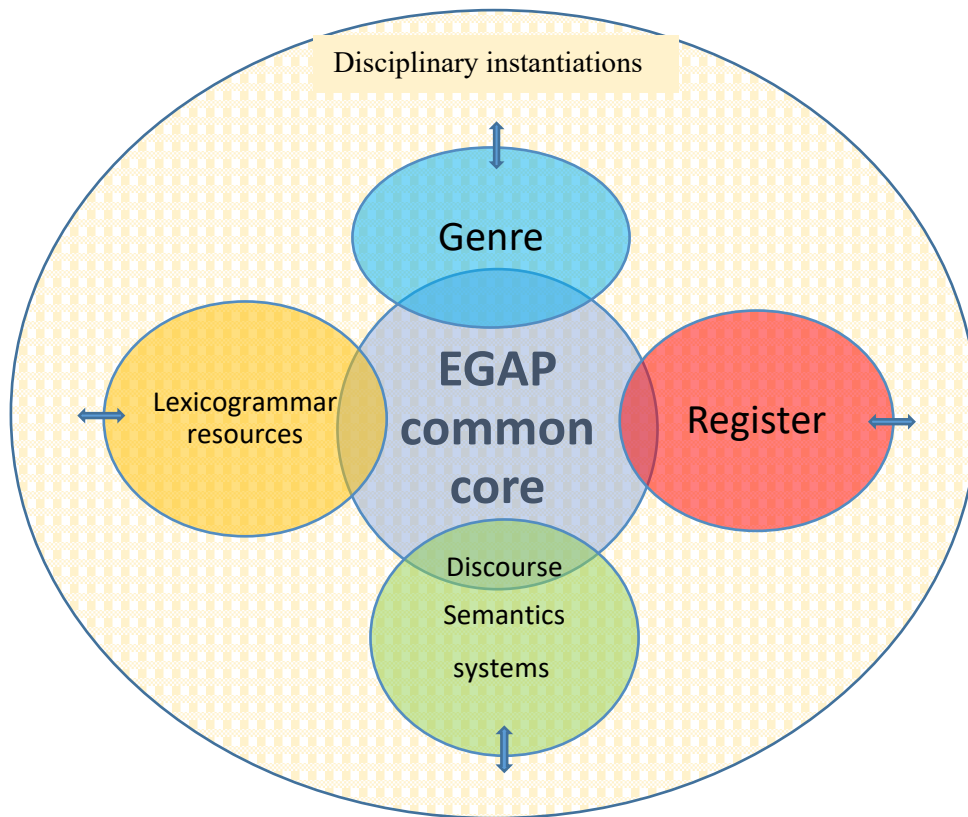
## **2.3 Conclusion: Research questions**

The disciplines described have both commonalities and specificities in the way they build, share and evaluate their disciplinary knowledge. A common thread in the literature reviewed is the implicitness of much of the key components of scientific meaning-making. Whether obscured references and inferences in Maths proofing (Dawkins & Roh, 2016), hidden evaluative meanings in Life Science argumentation (Hao & Humphrey, 2009), buried disciplinary meaning in Chemistry symbols and equations (Blackie, 2014) or waves of information at theoretical or abstract level in Engineering (Wolff, 2017), all point to the need to unpack and make resources visible to learners.

From the descriptions above, it is also evident that the discourse of Science is characterized by multimodality. In Biology, much meaning is conveyed through graphs, diagrams and visuals. In Chemistry, language alone cannot construe the whole knowledge, other semiotic systems are needed (Liu & Taber, 2016). Not all these elements can be candidates for an EGAP module syllabus. Chemish, for example, is firmly within the realm of the disciplinary subject lecturer. Incorporating elements of multimodal meaning-making in literacy modules might be very helpful for learners (Dawkins & Roh, 2016; Liu, 2009). However, it is also arguable that, for the purposes of the first year EGAP module, an emphasis on linguistic resources at stake is justified as language remains the prominent semiotic mode in classroom discourse, and often the mode that organizes the others in written texts (Coffin & Donohue, 2014). In the EGAP module described, time constraints have meant that the focus has been on language but future iteration of the module could usefully carve some time to address issues of multimodality.

Another insight gained in this disciplinary discourse review is that the resources of academic literacy are not a fixed reservoir but are in fact evolving across the undergraduate years (and beyond) to meet ever changing social purposes. In the context of school English, SFL scholars have recently connected their work with transfer and cumulative learning with Christie & Macken-Horarik (2011) arguing that an SFL informed English language learning approach can help build a cumulative knowledge of text and systems that is developed incrementally over the years of schooling and claiming that this might enable better transfer. Schleppegrell (2011) adds that this transfer can be supported through text analysis that aims to make these resources visible and this knowledge about language and meaning making in the discipline is what is hinted at in the picture of the rainbow used in the front page. Gardner (2016) sees the BAWE Corpus genre classifications as a way for EGAP provisions to cater for several disciplines within an EGAP module. The way each genre family is realized in various disciplines with slight variations but a common social purpose and common stages, is an element of core knowledge which can be exploited. The description of the four disciplinary discourse above also highlights that at the discourse semantic level, an EGAP module may usefully incorporate the various discourse semantic systems of appraisal, ideation, conjunction as well as periodicity as core resources in academic texts while some disciplinary specific teaching may also be possible. Grammatical metaphor is a resource that can be related to a wide range of disciplines. An awareness of the nature of the discipline may be an advantage when looking for bridges across. Halliday described language education (whether learning the mother tongue, the language of Maths, or the registers of written academic texts) as building a meaning potential (Halliday, 2009). It is argued that an explicit knowledge of disciplinary discourse may support the development of EGAP curriculum that helps learners on the expansion of their meaning potential. The common core can then be populated with knowledge about language at the genre, register, discourse semantic and lexicogrammatical levels as represented below.





**Figure 10** Multi-stratal instantiation approach to the common core curriculum

Chapter 2 has highlighted the blindness to knowledge about language in many EAP provisions and argued that this may hinder the possibilities of transfer. It has been argued that boosting epistemic relations can be done through making visible the way language expresses the dense and abstract meanings of the disciplines. Chapter 3 will describe an EGAP provision which recontextualises this knowledge with the aim to promote transfer. Chapter 4 and 5 will then answer the following question:

In what way does an EAP curriculum informed by Systemic Functional Linguistic impact transfer from an English for General Academic Purposes module to discipline modules?

# Chapter 3: Methodology

## **Introduction**

Decisions about the best ways to investigate transfer very much depend on how transfer is conceptualised. Chapter 1 and Chapter 2 have described tensions between approaches that predetermine context-free items of knowledge to be measured and counted, and those that adopt a ‘student-centred’ perspective to simply find out what students transfer and how this is mediated (Lobato, 2003). As part of social realist attempts to bridge similar dichotomies in educational research (Maton, 2014), this thesis takes the position that knowledge has real impact. In this thesis, the investigation of transfer knowledge items are somewhat predetermined by the EGAP syllabus. In the EAP module under study, these ‘fixed’ elements of knowledge are the systemic functional knowledge about language elements that are taught to support students’ development of their academic meaning-making repertoire (detailed in 3.4). However, these items of knowledge are not context-free (on the contrary, as explained in Chapter 2, they are taught as context-dependent) and so the design of the study can allow for investigation of transfer of knowledge as a contextualised process. This study also recognises that transfer is a socio-cultural phenomenon: by engaging a range of textual and interview data, the study aims to provide an account, not of isolated items of knowledge but of a dynamic, transformative process (Beach, 2003; Mestre, Jose, 2005) that also takes into account the learner’s attributes. Following Engle’s (2006) assertion that “transfer involves not just knowing but doing”, this thesis will track transfer as a conscious ability to use concrete knowledge from EAP into a disciplinary context. A recognition that transfer is also a process whereby learners develop their attitudes and dispositions, and ways to relate with a new community, as well as growing affiliation with their discipline over time also means that there is place in the thesis for a qualitative investigation of students’ interviews to understand the process more holistically.

## **3.1 Research questions**

The previous chapters have shown that the current understanding of transfer from EGAP modules is limited. Most studies have measured identical tasks, neglecting the specificity of disciplinary discourses and contexts; they have focused on students’ perceptions only, neglecting textual evidence; finally studies have generally not measured the impact of specific curriculum design on transfer, exhibiting knowledge blindness. In order to provide a perspective on transfer that includes both texts and perceptions and that investigates actual disciplinary contexts, the research questions are as follows:

## In what ways does an EAP curriculum informed by SFL impact transfer from the English for General Academic Purposes module to discipline modules?

In particular, the thesis aims to answer the above question through the following three sub-questions:

1. In what ways can SFL and LCT as an overarching theoretical framework of knowledge inform teaching for transfer in the context of English for Academic Purposes modules?
2. What evidence of transfer is there between an EAP module grounded in SFL and writing tasks in the disciplinary modules?
3. What can explain any differences in perceptions or actual transfer amongst participants?

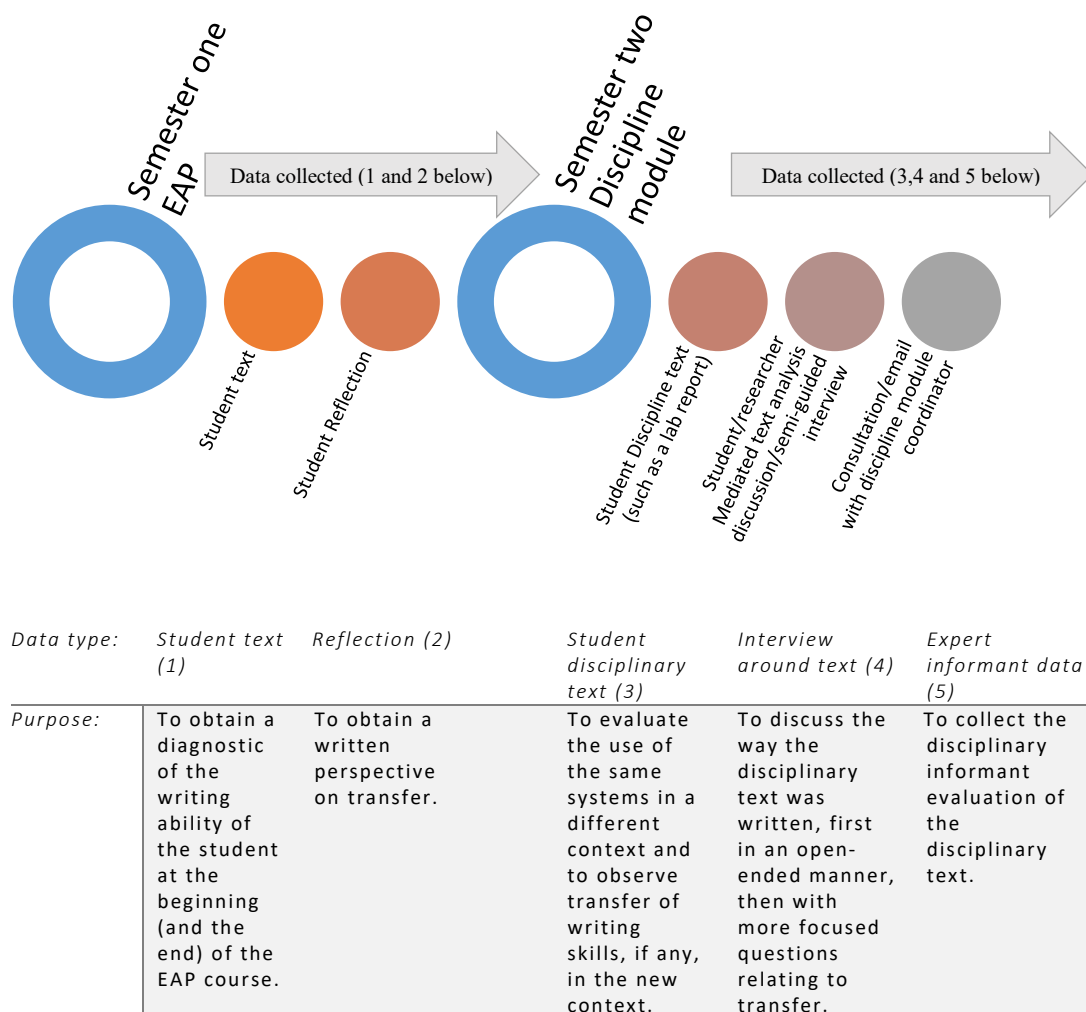
## **3.2 Methods**

This project adopts a practice-based methodology and follows 12 participants over 2 semesters of study. While it shares several common elements with an action research approach, it lacks sufficient iteration cycles to fully qualify as one. Elliot (1991, p.69) defines action research as “the study of a social situation with a view to improving the quality of the action within it” and in the same way, this project is initiated with the identification of a problem, namely the lack of understanding of how/whether an in-session EAP module achieves its aim of enabling students to use language effectively in their discipline. This project also uses a specific intervention (described in 3.3) to address this problem and then measures the outcome of this intervention by analysing students’ disciplinary texts and interviewing the students on their perceptions of transfer into their discipline. An action-research project, however, would, according to Carr & Kemmis (1986) start documenting earlier (from the planning of the intervention stage and would end after additional cycles).

A mixed-qualitative method approach was adopted with a focus on ethnographic and text-evidence/SFL approach to analysis as highlighted by Coffin & Donohue (2012). While ethnographic approaches can capture rich insights into the social context, the students’ literacy practices and their perspectives on the practices which give rise to the text (Gardner, 2012), SFL textual analysis can track linguistic evidence, creating a powerful explanatory combination and potentially addressing the shortage of such multi-perspective approach in the current EAP transfer literature.

### 3.2.1 Data collection and procedure

Data gathering took place over 2 semesters and in two distinct sites: the EAP module and a disciplinary module in the subsequent semester (see below for an overview of the timeline, data collection methods, and purpose).

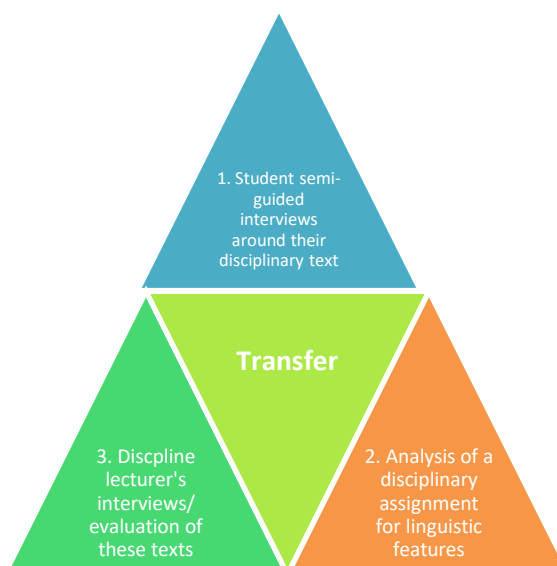


**Figure 11** Overview of data type, collection stages and purpose

Participants took the same EAP module, taught by the researcher in semester 1, 2 or 3. At the end of the EAP module, all students were invited to take part in the study. The participants who gave their consent were then contacted in the following semester to attend an interview around a disciplinary assignment. Texts written during the EAP module were collected retrospectively and included a text written at the beginning of the EAP module (1 in the figure above) to provide a baseline data to describe the students' writing performance and a reflection task (2) written at the end of the semester. Students were asked to provide a

core disciplinary assignment (3) for analysis and to attend an interview (4) to talk about this assignment. Finally, a course coordinator or tutor on the disciplinary module (5), the expert informant in Figure 11, was contacted to provide their insight about the student's assignment.

The data collected in the discipline was triangulated as shown below (Fig. 12):



**Figure 12** Data triangulation

It has been argued that many of the studies of transfer from EAP lack textual evidence and often measure impact of the EAP module across two similar writing tasks. The current study aims to provide a view of transfer from the discipline's point of view by focusing on a triangulation of data which fulfills a specific function towards giving a comprehensive understanding of transfer.

1. Students' semi-guided interviews aim to understand the students' perception of the transfer from EAP. Coffin and Donohue (2014) detail an ethnographic approach to investigating students' perception of their texts, which they call a '*mediated text analysis discussion*'. The students are prompted to explain the purpose of each stage of their text, from overall purpose to meanings at paragraph and sentence level. Coffin and Donohue used this method to shed light on the students' semantic orientation and how they were engaging with the tasks. In the present study, the interviews were conducted around the disciplinary text and recorded to allow for more detailed investigation.
2. Students' disciplinary assignments provide linguistic evidence of transfer.
3. Discipline lecturer's evaluation of the student's assignment ascertains its appropriateness.

The textual and interview data is described in more detail in 2.2.3.

### 3.2.2 Context and participants

The study took place at the National University of Singapore (NUS), an English medium of Instruction University, where students whose high school results in English require it, must sit an English writing test. According to their results in the English written test, these students are either streamed into a compulsory 4 modular credit, 48-hour EGAP course which they take in their first year of studies (a minority leave it to their year 2) or they are exempted. As noted in the introduction, in Singapore, EAP support is provided to students who are L1 English speakers, along with L2 learners (students from a range of ASEAN<sup>6</sup> countries or from Mainland China, whose first language is not English). In Singapore, the distinction between L1 and L2 is not straightforward: schooling in the city-state is done in English and one other language (the ‘mother tongue’, which may be Mandarin, Malay or Tamil, the three other official languages of the country). As a result, Singaporean students are all proficient in English and a combination of other languages and dialect. Rather than describing themselves according to L1 or L2 distinctions, they tend to talk about languages in terms of confidence and performance levels in writing and speaking.

**Recruitment process:** At the end of the EAP module, the researcher/tutor invited all students to take part in the study. The participants who gave their consent were then contacted in the following semester to attend an interview around a disciplinary assignment. Approximately 90 students were invited (5 classes taught by the researcher). Most returned their consent, and yet when, in the subsequent semester, they were invited to come for an interview, only 18 students responded positively. These 18 students were interviewed over 18 months (3 semesters). All were enrolled in a STEM degree programmes in Biology, Chemistry, Pure Maths or Engineering.

Of these 18 interviewees, 12 participants were retained. Criteria for selection included a complete data set (in some cases, the disciplinary expert could not be contacted), assignment type (when the assignment the participant brought to the interview was not from a core science disciplinary module, it was decided that the context was too different to be included). Details of the 12 participants are provided in Table 3 below. The participants represent a very homogeneous group in many respects (cultural, linguistic and educational background, discipline and assignment selected as well as age). With this homogeneity, any difference in occurrences of transfer may be significant. As can be seen in Table 3, some participants are interviewed on identical assignments (Reena, Lucy and Julia describe the same Life Science lab report on Gel Electrophoresis), while Walter and Igor are interviewed

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<sup>6</sup> Association of South East Asian Nations

around two subsequent lab reports in a core '*Experiments in Chemistry*' module. Walter and Igor, as will be seen, provide drastically different results on transfer, Walter being the participant who most clearly engaged his EAP module knowledge in the task, and Igor reporting no transfer at all. The same occurs with Yena and Sobek who discuss the same lab report. This parallel data represents an opportunity to analyze and explain the differences in transfer for an otherwise very homogeneous participant group.

The participants are also very representative of the EAP module cohort (which counts over 1500 students each year). Most are Singaporean, only 3 of the participants were schooled in another ASEAN country, although in an English-Medium of instruction high school. These are Paul (from Burma), and Dr Strange and Sobek (from Indonesia) who identify as non-English L1 speakers. Of the 9 Singaporean students, one indicates Mandarin Chinese as her first language while the others indicate that both Mandarin Chinese and English, including Singlish for spoken interaction, are languages commonly used in daily life, used in various contexts and with various levels of self-reported confidence. There are 6 participants of each gender which also reflects the whole EAP student cohort which usually has marginally more male than female students. This can be explained by the fact that boys interrupt their studies for a two-year military service before sitting the university writing examination, often leading them to report their academic writing skills have become 'rusty' and also by the over-representation of males in the Engineering program. This representative sample means that the findings may lead to pedagogical implications which can be more confidently applied to the rest of the cohort in future revisions of the module's materials and approaches.

Seven of the twelve pseudonyms may be labelled 'westernized', but this does not reflect an Anglocentric bias from the researcher, it reflects the origin of the participants' original names. Note that the pseudonym Dr Strange was jointly chosen by the student and the researcher at the end of the interview to reflect the results and his love for anything related to Marvel, not his academic qualification. Dr Strange is an undergraduate student.

**Table 3** Participant information overview

<b>Pseudonym</b>	<b>Dr Strange</b>	<b>Yena</b>	<b>Kali</b>	<b>Ben</b>	<b>Reena</b>	<b>Lucy</b>	<b>Sobek</b>	<b>Walter</b>	<b>Igor</b>	<b>Paul</b>	<b>Jane</b>	<b>Julia</b>
<b>Nationality and Gender</b>	Indonesian M	Singaporean F	Singaporean/Indian F	Singaporean M	Singaporean F	Singaporean F	Indonesian M	Singaporean M	Singaporean M	Myanmar M	Singaporean F	Singaporean F
<b>Language background (the language reported as stronger is indicted first)</b>	Bahasa Indonesian English-Medium of Instruction High School	English Mandarin	English Tamil	English Mandarin	Mandarin English	Mandarin English	Bahasa Indonesian English as L2	English Mandarin	English Mandarin	Burmese English as L2	English Mandarin	English Mandarin
<b>Discipline and year of study</b>	Pure Maths Year 1	Biology Year 2	Biology Year 2 Sem 1	Biology Year 1	Biology Year 1	Biology Year 1	Biology Year 2	Chemistry Year 1	Chemistry Year 1	Engineering Year 2	Engineering Year 1	Biology Year 1
<b>Module</b>	Fundamental Concepts of Maths	Lab Techniques in Life Sciences	Introductory Bioinformatics	Basic Physics of Life Science	Molecular Genetics	Molecular Genetics	Lab Techniques in Life Sciences	Experiment in Chemistry 1	Experiment in Chemistry 1	Signals & Communication Design Lab	Eng Principles and Practice 1	Molecular Genetics
<b>Assignment type and topic</b>	Maths Proof Exercise	Lab report: Lactate dehydrogenase (LDH)	Lab report Bioinformatic Characterisation of Sequence	Lab report Optical Microscopy of E-coli cells	Lab report Agarose Gel Electrophoresis	Lab report Agarose Gel Electrophoresis	Lab report Lactate dehydrogenase (LDH)	Lab Report Isolation of Chlorophyll & $\beta$ -Carotene from Plant Leaves	Lab Report Preparation and Spectrophotometric Analysis of Copper(I) Iodide	Lab Report Designing an analog passive Butterworth filter	Lab Report Electricity home consumption efficiency	Lab report Agarose Gel Electrophoresis
<b>Disciplinary expert evaluation type</b>	Written mark	Written feedback	Interview and written feedback	Written feedback	Interview and written feedback	Interview and written feedback	Written feedback	Written feedback	Mark reported by Igor	Written feedback	Written feedback	Interview and written feedback



### 3.2.3 Data: texts and interviews

Data was collected in two sites:

- **The EAP module:** participants EAP module writings were collected to provide a profile of the participant's writing abilities. The texts collected consist mostly of the earlier task written (a reader response or a problem-solution essay) and a critical reflection task written at the end of the semester.
- **A core disciplinary module** taken in a subsequent semester: This involved the analysis of a disciplinary assignment. As was shown in Table 3, 11 of the 12 participants discussed a lab report assignment. Descriptions of the modules can be seen in Appendix 1. Assignment prompts, when available, are provided in Appendix 8, under each participant's name.

The disciplinary assignment was discussed during a 25 to 35-minute recorded **semi-structured interview**. An interview was a way to gain the participant's perspective on transfer and on the writing process of the assignment. Following Coffin and Donohue (2014) mixed approach LASS case studies which are grounded in SFL textual analysis but also integrate aspects of Academic Literacies ethnographic approaches, this study focusses on an *etic* perspective, the textual evidence of transfer in a particular assignment (this will be detailed below) but through the interview (after Lillis' *talk around text*, 2001), the *emic* perspective (insider) can also be explored.

**Interview process:** The semi-structured interview employed in this study starts with an open-ended question, namely, '*How did you go about writing this text*' (after Coffin and Donohue, 2014) which allows for *emic* perspectives to emerge. However, the second part of the interview focusses on the pre-determined language elements taught in the EAP module (detailed below in 3.4; see interview protocol in Appendix 2). The table of instantiation was presented and a question is asked such as '*Did the assignment call for any of these language resources? Did you use any of these resources in your text?*' All interviews were transcribed and entered into the MAXQDA coding software (see screenshot in Figure 13 and sample coding screen in Appendix 4).

Finally, all discipline lecturers or module coordinators were invited to provide feedback on the assignments. The type of **feedback provided by the disciplinary lecturer** varies from a mark on the assignment task to a lengthy and detailed talk around text interview. This explains why in some cases, the researcher obtained detailed feedback on the assignments

and in other cases, only a mark indicated on the paper was available. This data was called upon to verify the appropriateness of the student assignment and for the information it provided on the expectations of the discipline for that specific module in that year of study.

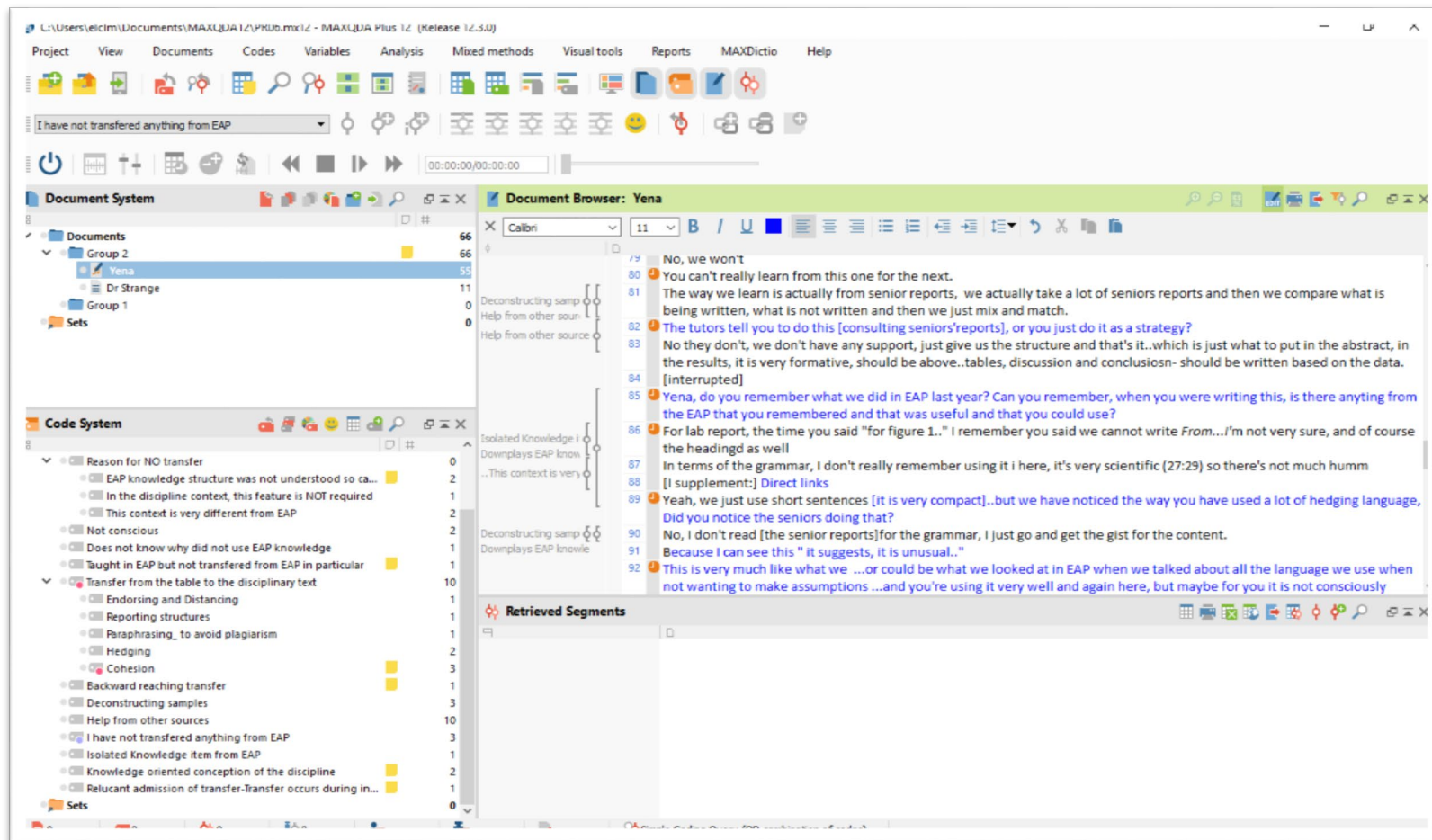


Figure 13 Coding software screens

### 3.2.4 Analytical frameworks

The frameworks used to analyse the data are varied and provide a complementary perspective. An overview is provided in Table 4 and a more detailed rationale follows.

	Data Type	Analytical Framework
Student texts collected in the EAP mod.	Text written at the start of the EAP module:	Evaluation of the text in terms of the <b>SFL content</b> in the EAP module, as shown in the table of instantiation (see Section 3.4.2) to provide a broad description of the participants' control over the resources that realise ideational, interpersonal and textual meanings.
	Week 13 Reflection Task on transfer:	<b>Content analysis</b> ( <i>what</i> transfers in terms of the SFL content (table of instantiation SFL categories, see Section 3.4.2).  <b>LCT Specialisation codes</b> (to be explained below).
Disciplinary assignment and interview	Student disciplinary assignments:	Evaluation of the text in terms of the <b>SFL content</b> as shown in the table of instantiation.  Consultation with disciplinary expert/module lecturer.
	Semi-structured interview:	Qualitative content analysis for mentions of the <b>SFL content</b> of the EAP module. <b>Grounded theory analysis</b> , followed by a more specific analysis of the data deploying: <ul style="list-style-type: none"> <li>• <b>LCT Specialization codes</b> (see below).</li> <li>• Linguistic analysis for indicators of <b>affiliation and identity</b> (this emerged from grounded theory analysis and will be explained below).</li> </ul>

Table 4 Analytical frameworks

#### Text analysis frameworks

SFL provides the framework to analyse *what* transfers. The disciplinary texts and interviews were analysed for reference to the resources that express experiential, logical, interpersonal and textual meanings (see Section 2.2). This is the knowledge about language which is taught during the EAP intervention, so the analysis tracks what in this knowledge transfers to the students' disciplinary texts. Distinction was made between what Myhill

(2012) has called metalinguistic knowledge and metalinguistic understanding. In her study of young writers, some used the metalanguage but demonstrated they did not understand its

function. In this study, beyond the simple mention of a feature, it was its link to its function, its contribution to meaning-making and its appropriateness for the context which were tracked.

**The role of the EAP texts:** The SFL metafunction analysis was also deployed initially on the EAP texts written at the beginning of the module, to draw a ‘linguistic’ profile of the participants and provide baseline data. These results are briefly mentioned in the results section at the start of each section. The profiles are also provided in the appendices, and the information is drawn on when it illuminates the findings (for example if it serves to demonstrate a clear change in students’ control over a type of feature). The use of the features in the EAP text is not compared with that in the disciplinary assignment, however, because the genres are too different to allow for meaningful insights to be drawn. As was shown in Chapter 2, especially Sections 2.2.3, linguistic features are genre bound so a different use of features across genres may simply indicate students are able to adapt their language use to the specific context. The research questions aim to investigate whether linguistic resources are used in a different context, the focus is on the transfer more than on the learning of the resources. Instead, the general control over these resources in the first EAP text will be presented at the beginning of each relevant section in the results to provide an insight into the participants’ writing ability and control over these resources in an essay genre at the beginning of the EAP module. While a study of the evolution of a learner’s repertoire would be possible from the data collected, this was not the aim of this study.

**The disciplinary texts** are analysed using the SFL framework. Such analysis can be exhaustive and due to the volume of the current data set (12 disciplinary texts, most over 4 pages long), it was decided that the analyst would perform a selective text analysis. Eggins (2004) recommends to analyse the text with the system that is likely to be rewarding for the question asked. In this study, I analysed the disciplinary texts first for the items of KAL taught in the EGAP module that were highlighted by the student as having been transferred deliberately to express a specific meaning. For example, participants described their use of modality resources to express required interpretative meanings in sections of their lab reports. Since transfer is also indicated by conscious decisions to *not* use prior knowledge when the new context does not warrant its use (Marton, 2006), occurrences of *deliberate non-transfer* were also analysed. I also analysed segments of the disciplinary texts to ascertain whether the meanings and their linguistic realisations supposedly not transferred were indeed not observed in the text. This was done for example for the noun group and nominalisation which were rarely mentioned as transferring.

This is not to say that other analyses of the texts (for example a comprehensive conjunctive and lexical relations analysis, a transitivity and clause complex analysis, or a fully developed thematic analysis, among others) would not yield useful results, but within this

doctoral study, and its commitment to surveying a sufficient number of students, this selective approach was deemed acceptable.

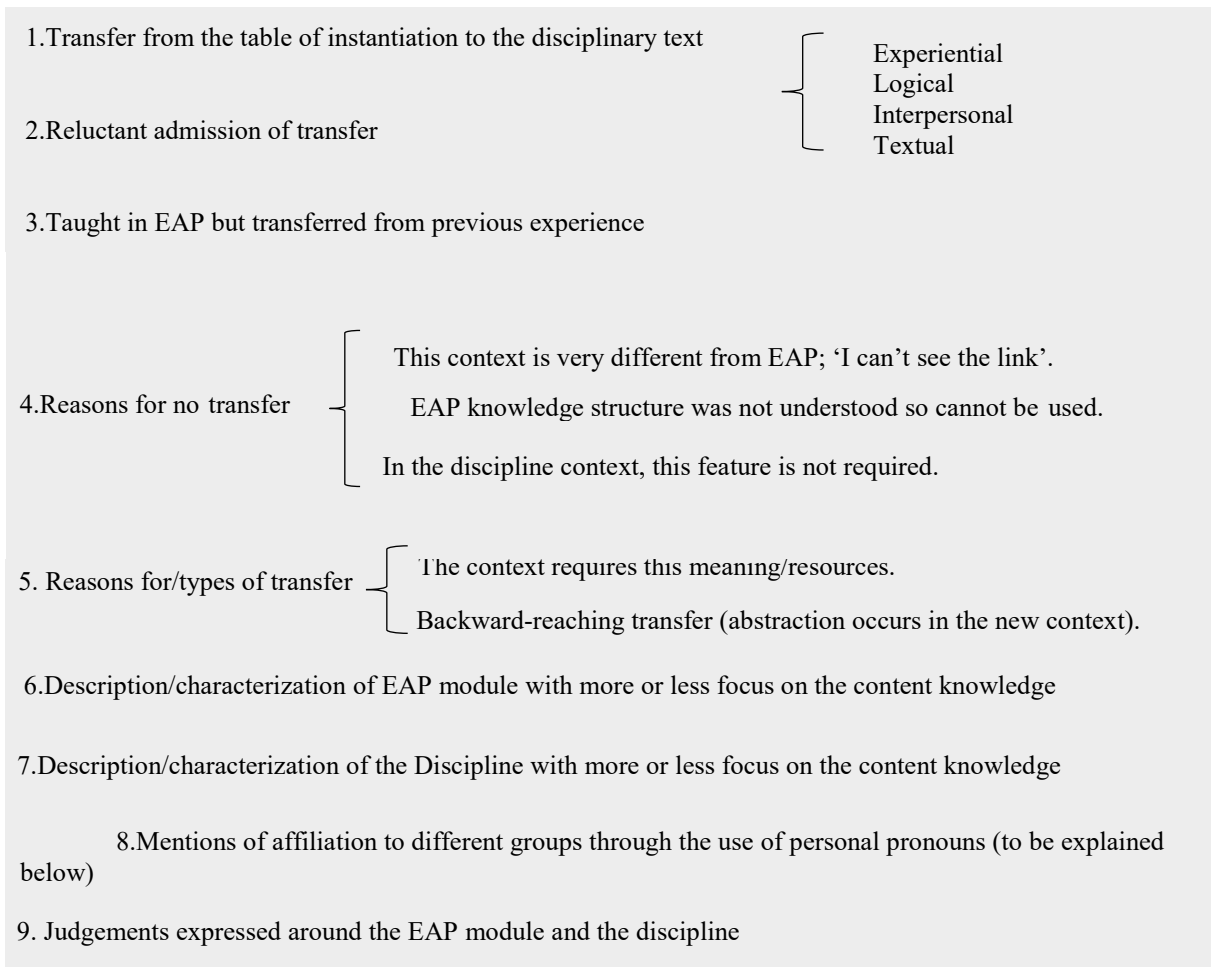
## **Interview analysis frameworks**

The interview data was first analysed for mentions of the KAL taught during the EAP module that was reported as being applied in the disciplinary context and in particular in the text discussed. It is important to note that the interview is a ‘talk around’ text format, and that when participants mention they used a specific linguistic feature (taught in EAP) in their disciplinary text, they are concurrently showing the feature in their text. Therefore, in this study, the interview data does not only surface ‘perceptions’ of transfer (although this can also happen when a student mentions a feature but is not able to recall where this was used), the interview data also surfaces textual evidence of transfer as participants point to relevant items in their disciplinary assignments.

Once the transfer of features was mapped for each participant, the researcher turned her attention to deeper indications and explanation for occurrences or lack of transfer. Successive waves of analysis were deployed, engaging different frameworks: Grounded Theory, and then Legitimation Code Theory and Affiliation because issues of identity, affiliation and characterisation of the discipline and the EAP module seemed meaningful to follow up. The process is described below.

In order to let the data speak for itself, the first foray into the transcripts was through a Grounded Theory approach. The main difference between qualitative content analysis and Grounded Theory lies in the theorizing of the categories gained through the initial content analysis (Charmaz, 2006). Both approaches start with a detailed *annotating of keywords* and phrases, and move on to *open coding* (where each unit of information is assigned a category). These two stages, according to Cho et al. (2014) represent qualitative content analysis and do not ‘focus on finding relationships among categories or theory building’ (p.5). Grounded Theory, on the other hand, involves taking several additional steps. Different Grounded Theory scholars have detailed the steps in various ways. For example, Oktay (2012) describes the first step as *substantive coding* (deriving codes that use the words or ideas from the respondents). This is followed by *axial coding* which Charmaz (2006) identifies as the major difference between Grounded Theory and qualitative content analysis. Axial coding consists in comparing the codes (relating/merging categories that are congruent). *Theoretical sampling* follows and involves testing and validating the categories through successive rounds of data collection and analysis. During axial coding and throughout the latest stages, Grounded Theory also engages ‘theoretical coding’ (Corbin & Strauss, 2008) which represents the process of theorizing the relations between the substantial codes. Here, the links can come from the analyst’s conceptual background.

Theoretical codes are generated, for example, when the researcher sees a respondent’s statement as an illustration of a theoretical concept (Oktay, 2012). In this study the concepts seen in the literature were echoed in the data several time, for example, the concept of far/near transfer appeared in participant’s mention of differences across the two contexts and so the category ‘*distance*’ as a reason for non-transfer was created. The axial coding system is shown in Figure 14. Each of the 9 items are discussed in the following paragraph.



**Figure 14** Coding system from axial coding of the interview data

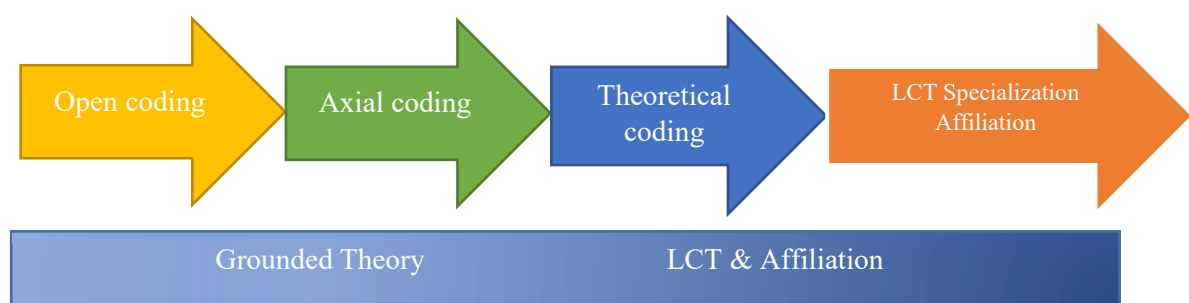
The first item in the axial coding is to simply record the elements of the table of instantiation which the participants are recalling and are pointing to in their disciplinary assignment. This, in the interview, would be indicated by a phrase such as:

*‘It’s just these are the things I remember, when I was writing this, it seemed useful. Sometimes as I wrote, and thought ‘How do I continue?’ Then I remembered the thematic progression.’ (Ben)*

The participant tells this phrase while pointing to the instance in the text.

Point 2 and 3 in Figure 14 indicate other ways students mentioned the elements of the table of instantiation, sometimes reluctantly admitting they were using them (or only realizing it during the interview), or other times clarifying they knew this from learning experiences anterior to the EAP module. Points 4 and 5 highlighted the ways students were explaining transfer (or lack of) of elements of the table of instantiation. Point 6 to 9 were devised because the reasons given by the participants who did not report any transfer seemed to warrant further investigation. As seen in the description of the participants, the group is very homogeneous so a difference in the way students perceive transfer from an identical EAP module to an identical (or very similar) context could not be explained simply by the reasons presented by the students (reasons which had to do with similarity of context, irrelevance of the features, as will be detailed in Chapter 4). As will be explained below, at the theoretical coding stage, the LCT dimension of Specialization and the concept of Affiliation (Gee, 2010;. Gee, 2000; Knight, 2010) were enacted to account for the differences in the way participants characterized their discipline and themselves as well as the EAP module. In Figure 14, these dimensions of the analysis are represented in items 6 and 7 (LCT Specialization) and items 8 and 9 (Affiliation). Each of these analytical lenses are further described below.

To conclude this overview of the approach to the analysis of the interview data, Figure 15 provides a visualization of the combination of the various analytical frameworks in this doctoral study. Open and axial coding occur as part of a Grounded Theory approach. In the last stage of the Grounded Theory, Theoretical coding, which in this thesis included LCT and SFL conceptual toolkits were deployed.



**Figure 15** From Grounded Theory to LCT and Affiliation

In their methodological chapter in *Knowledge Building*, Maton, Martin, and Matruglio (2016) outline the various ways LCT and SFL analytical frameworks have been jointly used and recommend a fuzzy, wide-angle initial stage to allow the empirical data to ‘speak in its own terms’ (p.103). This echoes the concern expressed in the Grounded Theory literature (Oktay, 2012) that data should be coded with as few expectations as possible in the initial



stages. Maton et al. (2016) write that the soft-focus and wide-angle approach allows a space of dialogue for initial insights to surface. In this doctoral research, the initial content analysis approach served the purpose of the soft-focus, wide-angle stage: it helped surface general insights about the problem (*what* is being transferred, *how* the students perceive this transfer). In Figure 15 above, this soft-focus approach took place with the open coding and the axial coding stages of the analysis. Another advantage of starting with a ‘wide-angle’ is that it may prevent the imposition of pre-defined theoretical categories on the data. For this, Oktay (2012) recommends staying very close to the data. This initial closeness to the data is what I believe Maton et al. (2016) also support when they advise not to race “into the vacuum represented by raw data to construct the problem-situation in [the theory’s] own image” (p.102). With the type of bottom-up wide angle view of the object of study, Maton et al. (2016) argue that one can “help avoid theory prematurely overwhelming data” (p.101). As Figure 15 shows, after the initial analytical stages, more focused analytical lenses were deployed, which are discussed in the next section.

### **Legitimation Code Theory and Specialization codes**

The reason why LCT Specialisation codes were deployed stems from the initial analysis of Yena’s interview which, in open and axial coding, showed contrasting references to her discipline module and to the EAP module. It is the participant’s specific characterisation of these two modules that pointed to LCT specialization as worth exploring. This illustrates the ‘bottom-up’ move from Grounded Theory to LCT analysis. The LCT analysis allowed for dispositions to be analysed in a theoretically principled manner.

Others have used Grounded Theory with LCT concepts before. In her study of Chinese students’ experiences studying online in an Australian university, Rainbow Chen (2010) came to LCT to tackle questions that were not adequately addressed by her acculturation framework analysis. Chen (2010) enacted LCT specialization codes to explore these students’ characterization of their experiences of that education to get insights into their educational dispositions. Through her study, Chen shows how LCT can relate different types of empirical data (for example, stronger epistemic relations may be realized in interviews, in texts or in teaching materials). In order to explicitly show the empirical realisation of these LCT concepts in various phenomenon, Chen created a translation device (Maton & Chen, 2016a, 2016b), an analytical tool which maps the realisations of these theoretical concepts in the empirical data. In a study of Business and Music literacy provisions, Weekes (2014) also exploited Specialization codes to shed light on teacher’s attitudes and beliefs about literacy teaching. She studied teachers’ orientations to knowers as well as knowledge to reveal potential code clashes which may impact the effective delivery of literacy pedagogy. While the participants in this thesis are students, their orientation to knowledge and knowers may

also impact their attitude to the EAP module, their discipline and transfer. Weekes faced different attitudes and reactions from disciplinary teachers when implementing a literacy intervention in their classes. To understand this better, she first analyzed the intervention in terms of Specialization, then she compared this with the orientation lecturers displayed in their interviews and characterizations of the intervention and the students. From this she drew code clashes or code matches. In this present study, the intervention is analyzed as a knowledge code because of its focus on linguistic knowledge for academic meaning-making. However, interview data revealed that participants were not all equally perceptive of this knowledge orientation and this became apparent in their ways of characterizing the EAP module and their disciplinary context.

In this study, specialization codes were used to highlight whether knower or knowledge orientation (as realized in the learner's characterization of the EAP module and their discipline module) related to the occurrence of transfer. This shed light on the dominant code orientation of learners and explained the potential clash between a knowledge-oriented literacy provision and their own orientations. Chapter 2 has described the Specialization dimension (see 2.1.2). In this study, the following modalities were used:

- *Knowledge codes* (ER+, SR -), where specialized knowledge, principles and procedures are emphasized as the basis of achievement, and the actor's attributes are downplayed. (ER+ stands for 'stronger epistemic relations', and SR- stands for 'weaker social relations'; as the values are relative, the comparative *stronger* and *weaker* is used).
- *Knower codes* (ER-, SR+) where specialized knowledge principles and procedures are downplayed as basis of achievement and where it is the knower's attributes (born, cultivated or social) which are emphasized. (ER- stands for 'weaker epistemic relations' while SR+ stands for 'stronger social relations').

A translation device was devised to map Specialization codes (see Table 5). Maton and Chen (2016b) highlight the highly iterative process of the analysis, the constant movements back and forth between data and theory to evolve a translation device which allows to link empirical data with the theoretical concept manifested for a particular object of study (Maton & Chen, 2016b). Chen's translation device is shown in Appendix 3. In Table 5, the column on the right presents examples for the empirical data, and the column in the middle concerns categories related to the way epistemic and social relations are realized in the students' discourse.

### EPISTEMIC RELATIONS (ER)

<b>ER +</b> Content knowledge (in the EAP and/or the disciplinary module) <b>is emphasized</b>	<b>Indicators</b>	<b>Examples from empirical data</b>
	Mention of specific syllabus content	<i>“applying pattern 2 of thematic progression” (Dr Strange)</i>
	Use of technical terms	<i>“colonies, solution concentration, protein, DNA, standard curve, relative mobility, linear relationship” (Yena)</i>
	Description of processes such as scientific processes in the discipline	<i>“In Science you have to explain how you derive...” (Yena)</i>
<b>ER -</b> Content knowledge (in the EAP and/or the disciplinary module) <b>is downplayed</b>	<b>Indicators</b>	<b>Examples from empirical data</b>
	Content knowledge is minimized or described reductively	<i>“In terms of grammar...” (Yena) (this will be explained in Chapter 4)</i>
	The knowledge is not seen as useful.	<i>“I don't need to do hedging and stuff.” (Jane)</i>
	Knowledge, if mentioned, does not contribute to achievement in the discipline.	<i>“it's more like generally [general knowledge, not from the EAP module], coz always writing essays as a child so unconsciously” (Yena)</i>

**Table 5** Translation device for Specialisation codes

Moreover, while learners characterized the EAP discipline and their own discipline in different ways, they also signaled a more or less strong affiliation to their discipline, they claimed more or less strongly a membership to a disciplinary community. Indicators include elements of ‘indexicality’. Antaki & Widdicombe (2008) for example indicate how pronouns are used to signal membership, and also non-verbal elements such as pauses or laughter, as

well as evaluative language. Much work has been done to analyze issues of identity in academic writing (Ivanic, 1998; Lillis, 2001), often highlighting the threatening nature of having to conform to the expected conventions (Hyland, 2012). In this study, it was self-mentions and their purpose in the interviews, rather than in the written texts, that were analysed and compared. Since a language user is often not aware of any of their linguistic choices in speaking (Polanyi, 1983; Zappavigna, 2013), the way these identity and value markers are used in the interviews, especially by participants who report contrasting transfer occurrences, yields interesting insights into the reasons why transfer is not occurring in the same way. Looking at interview data through a linguistic lens allows for semiotic evidence to be surfaced. According to Eggins and Slade (1997) we negotiate our identity through conversation, which is therefore ‘a critical linguistic site for the negotiation of such important dimensions of our social identity as gender, generational location, sexuality, social class membership, ethnicity, and subcultural and group affiliations’ (p. 6). To analyse the issue of identity, it can also be interesting to look at the data with a narrative analysis approach (Hyland, 2012), which involves interviewing participants to ‘collect data on how individuals explain and understand their lives; how they highlight some identities and marginalize others’ (Hyland, 2012, p.54). The mediated text analysis discussion is in fact an example of a narrative where students are retelling how they went about writing their disciplinary texts and so can be analysed as a site where identities are negotiated.

Finally, the concept of social affiliation was also used. Developed by Gee (2000; 2005) affiliation is seen as involving affinity space and affinity group. According to Gee, social affiliation is indicated in discourse by a focus on common goals, by solidary, shared bonds. For Knight (2010), ‘affiliation is a process that we negotiate through bonds, manifested by couplings in text’. Knight (2010), in her study of laughter in casual conversation, argues that we construct communities affiliation through couplings of ideational meanings and attitude. Affiliation is concerned with how we identify as members of a community. In conversation, this is built gradually as speakers negotiate things, experiences, ideas, or values of particular communities. In this study, students affiliate differently with the EAP module and their disciplinary community and this became apparent in the way they associated interpersonal (attitudinal) meanings with ideational meanings (their discipline, the EAP module or transfer). Bonds indicating affiliations were therefore also analysed. The coding system is shown in Table 6.

Coding for membership and affiliation		Example
	Use of personal pronouns <i>I</i> and <i>we</i> and determiners such as <i>our</i>	We don't use it in our discipline (Jane)
	Couplings/bonds	EAP module + useless burden (Dr Strange)

**Table 6** Coding system for Affiliation

### **3.3 Researcher's positionality: addressing methodological and ethical challenges**

The dual position of the researcher as the EAP module curriculum designer and the participants' EAP tutor presents both methodological and ethical challenges (Greene, 2014). The evaluative dimension of the project (the study evaluates the impact of the curriculum designed by the researcher) means that objectivity must be carefully ensured through the stages of data collection and analysis (Breen, 2007; Greene, 2014). This section discusses these challenges and the strategies deployed to avoid bias, enhance trustworthiness of the methodology and to ensure ethics are addressed. The section is organised around the issue of positionality of the researcher. Positionality refers to the position a researcher adopts in relation to a research situation, a position which is mediated through a range of variables including linguistic and cultural backgrounds, class, age, gender, etc (Banks, 1998). Merriam et al. (2001, p. 411) state that 'positionality is [...] determined by where one stands in relation to 'the other' and argues that 'these positions can shift' (p. 411). Positionality can be defined in relation to the topic, the participants and the research context and processes. I will address these three elements below and discuss ethics and trustworthiness.

My positionality with regards to the field of EAP is complex. First, I relate to the field as a student. Being a L2 English speaker, I am keenly aware of the difficulty of learning through a language that is not one's mother tongue, or, in the case of many EAP students in this study, not a first language. This perceived outsider position has been one of the most significant reasons for my knowledge-oriented approach to TEAP and a major motivation for this study. However, in this particular study, the area I investigate is a module which I wrote and so the dimension of evaluation of my work also positions me as an insider. Addressing this aspect of positionality starts with the broad social realist approach to the

research design. The methods described above prioritize knowledge in the intervention and tracking of knowledge items in the written and interview data. With a focus on knowledge about language (as will be described in the next section), the researcher can track the transfer of concrete elements of language taught in the EGAP module, which is verified both in written assignments and in interviews participants. The study design leaves little space for bias on the researcher's part.

My position in relation to the participants is also more complex than the insider/outsider dichotomy would suggest (Bell, 2005; Merriam et al., 2001). As a non-Singaporean, French national, EAP practitioner in Hong Kong higher education setting for 12 years, and Singapore for 5 years, I may be perceived as an outsider by the participants. This may be indicated in the data, for example when Igor says '*people like you*', which I interpreted as people who are oriented towards language, rather than a comment on ethnicity or nationality. While an outsider, I also share common characteristics with the participants, who, like me will be using English as a lingua franca in their profession. I am also familiar with the participants' educational background and tertiary education setting. As the participants' tutor for a whole semester, I also became acquainted with them and trust was developed over time (Guba, 1981).

Being the participants' EAP tutor of course raised issues of power. Sanjek (1993) has characterised the researcher's position as exploitative, and that of the researched as exploited. There is a power relation inherent to any research. My position as a Caucasian teacher of English also provides a potential privilege of access to the participants which I am aware of and tried to address through the collection of consent. I was particularly careful of not imposing any coercion on my EAP students. While it was not possible to avoid my dual role as a tutor and as a researcher since I wanted to ensure the EAP intervention was identical for all participants, consent was collected in a way to avoid any kind of coercion. All consent forms were collected by a third party and in the last lesson of the semester. This ensured that students did not experience their tutor's dual role during the semester, and when presented with the consent form and a short explanation of the project, they could not feel pressure to take part since the forms were not released to the researcher prior to the end of the semester and examination marking/moderating (the third party collected and kept the forms until then). This strategy ensured that I could be a tutor in class, and only take on the role of the researcher once participants were no longer my students. When participants were invited for an interview, they had the opportunity to withdraw or to just ignore my email. The 18 students who came for the interview were given reassurance that their genuine response was expected and encouraged. Nevertheless, I acknowledge that the interview on transfer may be experienced as an 'evaluation' of the module by participants and that this can sway responses. This is why the protocol did not

start with asking about the EAP module but rather asked about the disciplinary writing task. This is also why the analytical frameworks tracked concrete elements of knowledge in both interviews and disciplinary assignments and why further analysis was deployed on the interview data to explore the potential reasons for variation in occurrence of transfer.

These ethical considerations were discussed and designed with approval from two institutions ethical review boards of the Open University and of the National University of Singapore. Ethical clearance was obtained from both the Open University (Ref HREC/2015/2073/Monbec/1) and from the National University of Singapore (NUS-IRB Reference Code: A-16-167). See Appendix 5 for related documents including the Ethical Approval, the Information sheet provided to the students, and the consent form. All participants were provided a pseudonym. The list of participants and their pseudonyms was securely encrypted and kept in the researchers' desk computer in her office. All data was securely kept in a locked cabinet of the office (when hard copy) and in an encrypted folder on the researcher's computer.

My position in relation to the study, specifically my personal involvement in the module design posed a potential threat to objectivity (Drake, 2010). I started all interviews with a statement that genuine response was encouraged, that if anything negative was told about the module, this would be gratefully received as a way to improve the module. More importantly, I ensured that I was receptive to the non-transfer students. In fact, the reason why much space is allocated to the students who report minimal or no transfer is linked to trustworthiness. I not only acknowledged the 'negative cases' but also explored them in great detail because they provided rich insight into the obstacles to transfer and pointed the way towards possible solutions to improve the provision, which is my aim.

Strategies were put in place to ensure the reliability of the data and the trustworthiness of the results. The research design and triangulation of data included both textual evidence and participant' voice. Mixed methods also ensured that the data was analysed from various perspectives, consolidating the validity and credibility of the results. The subject lecturer's opinion of the text also ensured that the text was assessed by an expert. This was done either through an emailed annotated assignment or through a face to face interview. The subject lecturer's evaluation of the text provides confirmation that the student is achieving the required meaning.

In terms of data analysis, interrater reliability was ensured by asking a colleague to code two interviews. Oktay (2012) advises multiple coders tackling the same data to increase the trustworthiness of the analysis. I asked a colleague to cross-check my analysis of the participants' interviews, using the coding system devised. Jane's and Walter's interview

transcripts were coded. These two participants were chosen because I had coded them as exhibiting very different epistemic relations orientations. My colleague's coding was very similar: the main epistemic orientations were coded identically with most of the same data being highlighted as empirical evidence. After comparing and discussing our analysis, I felt confident that the coding system and the translation device were robust enough to highlight the main patterns in the data. Appendix 6 shows the analysis performed by my colleague, and shows that they echo closely my findings for the two participants.

### **3.4 Pedagogic intervention in the EAP module: making the invisible visible**

SFL/Genre pedagogy has since the 1980s been applied to and evaluated in a range of educational settings from primary, secondary school and the tertiary educational setting as well as in the adult education sector (Martin, 2009). SFL/Genre approaches are based on SF descriptions of discourse which they aim to make visible through specific teaching techniques to support students' literacy development. As seen in Chapter 1.4.2, Rothery, developed a teaching and learning pedagogy cycle (TLC) (Rothery, 1996) which has demonstrated success at improving literacy skills (see Rose, et. al., 2008, in particular, for a quantification of this improvement for disenfranchised adult learners in Australia). Briefly, the TLC involves scaffolded activities that guide the learner through analysis of the context, the stages and the language used in a model text (deconstruction), a group writing task of the same type of text with teacher's prompting and guidance (joint construction), and an independent writing task (independent construction) (Rothery, 1996).

Several social semiotic initiatives have shown how an increased attention to a functional KAL may benefit learners. Case studies have included nation-wide literacy programmes (Rose & Martin, 2012, university disciplinary literacy initiatives (Dreyfus et al., 2016 for the Hong Kong City University- based SLATE project; Drury & Jones, 2010 in the Australian WRiSE project), literacy projects for indigenous adults in Australia (Rose et al, 2008) as well as second language learning (Byrnes, 2009 for German tertiary programmes; Teruya, 2009 for Japanese as a L2) and English as an Additional Language programmes (see Coffin, 2010, for a compilation of SFL informed initiatives for language support in EAL contexts). Others have described the positive impact of an SFL/ genre pedagogy embedded in university content modules. Donohue (2012), for example, demonstrates how SFL applied in a Film Studies university module enables resources that realize 'film analysis' - rather than film description - to become visible, and usable, for the students. Specific aspects of the teaching and learning cycle have been researched and evaluated (Dreyfus & Macnaught, 2013, for example analyse joint construction in the tertiary setting).



Recently, an approach focusing on SFL linguistic knowledge awareness has been described by Coffin and Donohue (2014), who, in the Language as a Social Semiotic (LASS) approach to teaching and learning in higher education see teaching and learning processes as semiotically-mediated through language. One way to assist this semiotic mediation, they argue, is to bring semiotic resources to students' awareness. This includes teaching the language of decontextualisation which, Coffin and Donohue suggest, plays a key role in the way knowledge is constructed, recontextualised and evaluated in university settings. Semiotic resources are brought to students' attention through what they call 'metasemiotic strategies' which include text deconstruction and mediated text analysis discussion which in EAP may occur in tutor consultation (sometimes called conferencing) with students about their drafts. The LASS approach leans on the rich tradition of SFL academic discourse analysis which was described in Chapter 2 and highlights key linguistic resources in academic meaning-making which enable students to express the high levels of abstraction, judgment, evaluation and interpretation needed at university (Coffin & Donohue, 2014; Halliday, 2006). Drawing on Martin (2013), the LASS approach draws parallels between this movement between contextualised and decontextualised language and the semantic waves described in LCT (see Section 2.1) and advocates the necessity to support students in these linguistic shifts. It is interesting to note that the LASS approach goes beyond a focus on 'knowledge' (of language as a resource for disciplinary meaning-making) by also including aspects of the learner's attributes as essential elements to successful learning. The learner's attributes in LASS are not psychological however, unlike in the transfer literature surveyed in Chapter 1, but 'linguistic' through the concept of *semantic orientation* (Coffin & Donohue 2014, after Hasan, 2009), which was defined in Chapter 1 as the meaning-making predispositions individuals bring to a communication event through their backgrounds and previous meaning-making experiences and exposure (Coffin & Donohue, 2014).

### 3.4.1 Module context, assessment, outline and pedagogy

The EGAP module is an in-sessional, 1 semester (13 weeks/48 hours) academic writing course with a range of written assignments through the semester (Table 7). It is usually taken in Year 1. The cohort includes approximately 1500 students per academic year.

<b>Assessment</b>		<b>Week</b>
<b>Course Assessment 1: Problem-Solution Essay Draft 1</b>	20%	Week 7
<b>Course Assessment 2: Problem-Solution Essay Final (1000 words)</b>	30%	Week 13
<b>Course Assessment 3: Critical Reflection</b>	10%	Week 12
<b>Participation</b>	10%	Week 1-13
<b>Final Exam: Problem-Solution Essay</b>	30%	Week 14

**Table 7** Assessment structure and weighting

The assessment structure is inherited from a previous version of the module. Students are assessed on several drafts of a problem-solution essay. Draft 1 is submitted and assessed in Week 7; this is followed by peer review and consultations with the tutor; the final version is submitted in the last week of the semester. Students also write a critical reflection. Finally, students must sit a final exam which takes the form of source-based problem-solution essay.

The aim of the module is to equip students with knowledge and skills to analyse and respond appropriately to disciplinary specific context tasks. Alignment (Biggs, 1996) is ensured by making visible the KAL and skills in the materials, and the assessment rubrics.

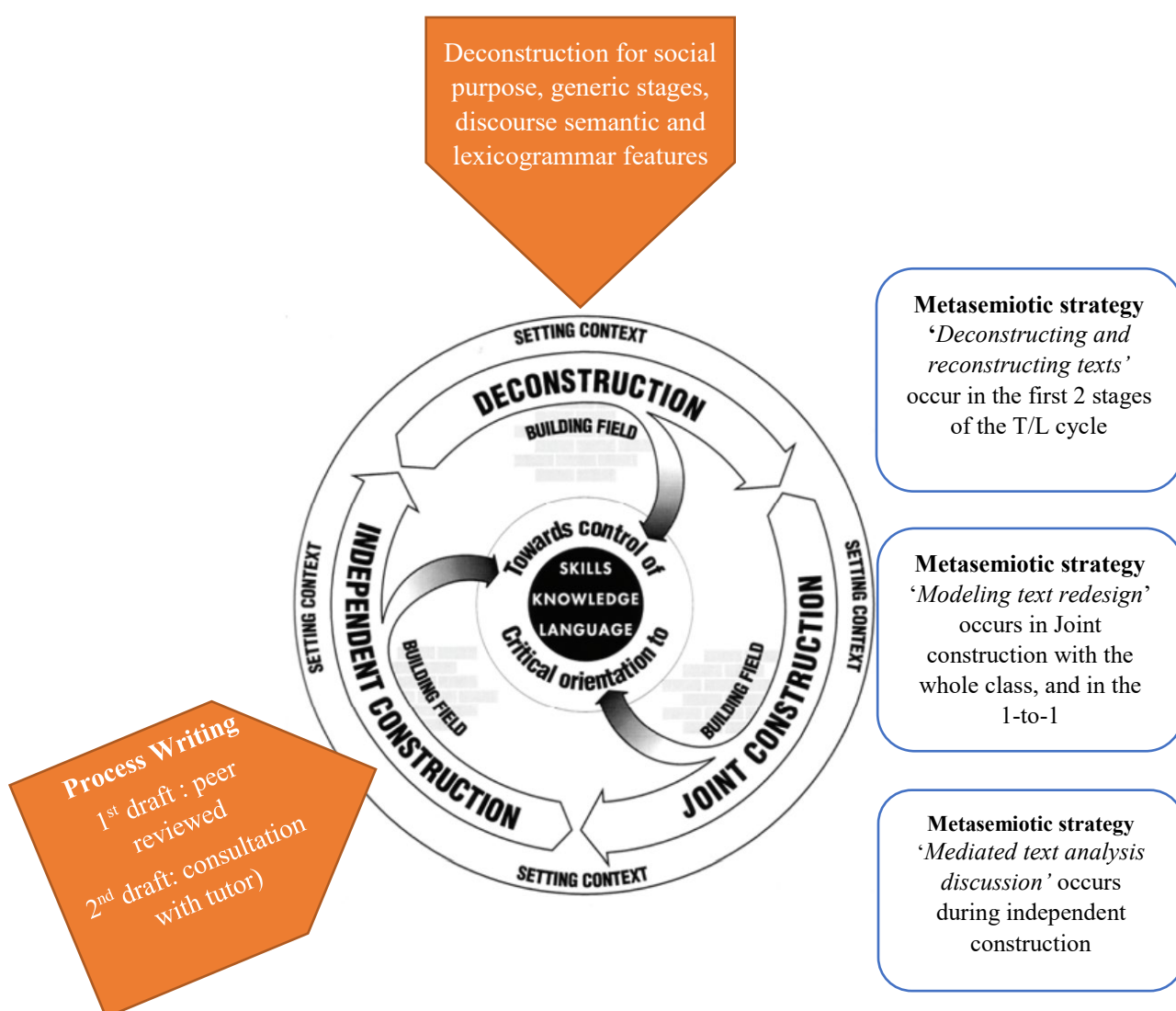
#### **Pedagogical approach**

The module is an SFL/Genre based module (Rose & Martin, 2012b). This pedagogy is characterised by a knowledge code, because knowledge of language and meaning-making is the focus of the teaching. Skills practice and process writing (multi draft writing activities) are part of the approach too, as shown in the TLC in Figure 16, but serve as a way for the student to develop confidence with this knowledge - a way to transit from knowing about language to knowing language.

The deconstruction stage is done several times throughout the semester, engaging the KAL shown in the table of instantiation (see below) on various academic genres. Texts used in the deconstruction stage include academic texts, samples of the target genres (Problem-

Solution essay), disciplinary texts brought by students, as well as students' texts. Students deconstruct texts in groups, and also prepare analysis of their disciplinary reading texts. Joint construction is done on segments of the EAP 'genres' (such as the introduction of an essay). The independent construction sees students write an essay following a process writing approach, which involves multi-drafting, peer review and conferencing with the tutor before a final draft is submitted. The concepts and metalanguage in the table of instantiation are used through this process to discuss writing and language at multi-strata and meta-functional levels.

The module detailed content is provided in the week-by-week syllabus in Appendix 7 The next section describes in detail the main element of the knowledge about language included in the EAP module.



**Figure 16** The TLC in the EAP module (adapted from Rothery & Stenglin, 1995)

### 3.4.2 Focus on knowledge about language in the EAP module: the table of instantiation

“The issue here is the instantiation of language systems in texts; that is, each text is an instance of the entire language system, and each language feature in a text is an instance of one of the options in the language system” (Martin & Rose, 2007b, p.3)

In the discussion on transfer (Chapter 1), it was noted that Salomon and Perkins (1989) supported an instantiation perspective: ‘for transfer, the abstraction must be genuinely comprehended, not just learned as a formula. In particular, the person must grasp the relationship between the decontextualized representation and the “raw” instances of which it is an abstraction’. Gardner’s common core instantiation approach, described in Chapter 1, is at the level of Genre. The common core instantiation described below includes the social purpose and genre families and also a number of the language systems that are drawn on in academic meaning-making. What this knowledge about language consists of is represented in the table of instantiation (Table 8 below). The table of instantiation is a pedagogical tool used by tutors and students. It is divided into four rows, one for each metafunction (textual, interpersonal, experiential and logical) and enables linguistic concepts to become visible, analyzed, discussed in class and used in writing. Within these rows, Discourse Semantic systems appear, along with examples of how these meanings may be realized in texts at the lexicogrammatical level. A social semiotic view of language learning proposes to teach language as a resource, and not as inventories (Matthiessen, 2006), and while the format of the table may appear to be a check list of isolated linguistic items, the systems and their realisations are not taught as a list of lexicogrammatical features, but rather as context-dependent resources for meaning-making. They are taught as part of toolkits that ‘express’<sup>7</sup> various key meanings in academic texts. The examples in italics point to realisations which are likely to differ in various disciplines, various genres, and within the same genre. For example, students are shown how APPRAISAL meanings are made differently and in different degree in various genres across disciplines, and within the same text (a lab report, for example may display APPRAISAL resources prominently in the discussion section because interpretation meanings are made).

The table is used as pedagogical tool in text analysis activities where students mine the text to find examples of the systems listed, developing an awareness of the various ways these meanings are made according to different contexts. Focus on individual systems also occurs where a text (or a section of a text) is deconstructed and analyzed for these specific

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<sup>7</sup> Realisation would be a more accurate SFL technical term, but ‘express’ works well in class.

meanings and more detail is given to the various lexicogrammatical features that realize them. These sessions are sometimes followed by revisions of the student's own drafts to self-evaluate their control over these resources. Finally, a crucial element is that the table is also used with disciplinary texts with students exploring the ways these resources are used in their disciplines. Following a genre instantiation approach, where students explore the types of genres they write (and read) in their disciplines, the resources in the table are used as an analytical tool to explore meaning making in specific disciplines. See Appendix 7 for a week-by-week module outline.

The table is used in the various stages of the teaching and learning cycle:

- The Deconstruction Stage: students mine texts for the realisations of these features and discuss their contribution (and other choices) to meaning.
- In the Joint Construction Stage, the tutor leans on these meanings to elicit from students. For example, to support the development of a new sentence, the tutor may call on the concept of thematic progression to elicit a suggestion from students.
- The Independent Construction Stage: the table is used for peer evaluation and self-evaluation within the process writing approach of draft revision. Concepts and metalanguage are systematically reinforced through feedback and during tutor-student consultation (Text Mediated Discussion, Coffin & Donohue, 2014).

**Table 8** The table of instantiation, a theoretical-driven pedagogical tool

<p>GENRE</p>	<p>Social Purpose/ Generic Stages</p>	<p>Linguistic systems and features (examples in blue).</p> <p><b>Toolkit #1 to organize a text: Textual cohesion</b> (overarching term provided to students<sup>8</sup>)            MacroTheme (Thesis statement) and MacroNew (conclusion)            HyperThemes (Topic Sentences) and Hypernew (concluding sentences)</p> <ul style="list-style-type: none"> <li>• General nouns <b>problems, causes effect, impact, reasons, issue...</b></li> <li>• Nominalisation</li> <li>• Referencing pronouns and other words <b>Shopping centres</b> → <b>they</b> → <b>such places</b></li> <li>• Conjunctions (linkers) <b>however, as a result, beyond...</b></li> </ul> <p><b>Cohesion at paragraph level:</b></p> <ul style="list-style-type: none"> <li>• Lexical chains <b>Singapore</b> → <b>the city-state</b> → <b>the red dot</b> → <b>the island-state</b></li> <li>• Reference and Substitutions <b>Shopping centres</b> → <b>they</b> → <b>such places</b></li> <li>• Lexical field/sets (related words): <b>computer components, printers, CPUs, memory chips</b></li> </ul> <p>Thematic progression <b>A</b> → <b>B</b>   <b>B</b> → <b>C</b>   <b>A</b> → <b>B</b>   <b>A</b> → <b>C</b>   <b>A</b> → <b>B</b>   <b>B</b>1 → <b>C</b>   <b>B</b>2 → <b>D</b></p>
		<p><b>Toolkit #2 to express logical links: Conjunction</b> (overarching term provided to students)  <b>Logical links between clauses</b> in complex sentences            Clause complex (sentences with more than one clause)            non-defining relative clause <b>The study, which explored...</b>            Time: <b>while, as, before, after, until, as soon as...</b>            Manner: <b>as</b>            Cause, condition, concession: <b>because, in order that, in case, if, unless, although, while, whereas</b>            Projection: <b>state, suggest, argue that...</b>            Expressing conjunction in the verbal group: ‘<b>can lead to</b>’ (in the example below)</p>
		<p><b>Toolkit #3 to express the subject matter</b>            Taxonomies (classification, composition)            Noun Group (headnouns are in bold) <b>Continued exposure</b> to such chemicals can lead to <b>reduced functioning</b> of the auto-immune system</p> <ul style="list-style-type: none"> <li>• <b>Modifiers:</b>              prepositional phrase <b>of</b> the auto-immune system              Adjective <b>insightful, debatable</b>              Defining relative clauses <b>The researchers who founded modern science had two merits</b></li> </ul> <p><b>Nominalisation</b> (often combined with prepositional phrase):            Verb → noun <b>to formulate</b> → <b>formulation</b>            Adjective → noun <b>complex</b> → <b>complexity</b></p>
		<p><b>Toolkit #4 to express evaluation and stance: Appraisal and Engagement</b>  <b>Hedging and Modality:</b>            Modal verbs: <b>may, might, could</b>            Adverbs: <b>perhaps, probably</b>            Quantifiers: <b>some</b>            Other mental and material verbs: <b>appear to + V/ seem to + V/ tend to + V</b>            Other expressions : <b>x is likely to + V/ there’s a tendency for x to + V</b></p> <ul style="list-style-type: none"> <li>• <b>Reporting Structures:</b> <b>The research report concludes</b> [that + SV]. <b>As Jones (2010) argues...</b> <b>According to Zhang (2009), ...</b></li> <li>• <b>Endorsing and Distancing:</b>              Evaluative reporting verbs: <b>claim, suggest, demonstrate...</b>              Intensifying/limiting adverbs: <b>clearly, unambiguously, strongly/somewhat, to a certain extent</b>              Concessive clauses: <b>although...while...</b></li> </ul>

<sup>8</sup> The common sense term ‘textual cohesion’ is used here to encompass both LG and DS systems, because students are familiar with the term cohesion.

The table was designed then to make visible common academic meaning making resources and then to highlight how these resources may be drawn on differently across specific disciplines and even within the same assignment. There were several versions of the table over time and the inclusion or exclusion of features followed both the curriculum developer's own evolving understanding of the theory and acquaintance with the SFL literature on academic discourse as well as her evaluation of what features mattered most to the students. Some important studies guided how the rows were populated. Textual resources in the first row of the table were drawn from Martin and Rose's (2007a) chapters on Identification and Periodicity, Ravelli's (2004) description of hyperthemes, Bloor and Bloor's overview of thematic progression (2003), Halliday and Hasan's description of lexico-grammatical cohesive resources (Halliday & Hasan, 1976, 2014). Interpersonal resources were gained from several studies or theoretical books such as Martin and White (2005), Coffin's (2006) description of evaluative meaning-making in History meaning-making, including endorsing and distancing resources, Hood's (2010) and Hao and Humphrey's (2009) description of evaluation in Biology. Learners' needs were key in these decisions.

It is hypothesized that this instantiation table contributes to making visible a body of knowledge about language which is transferrable across contexts. First it represents an overview of the 'language syllabus' of the module and is introduced at the beginning of the semester to provide students a comprehensive view of the systems they will explore in the module. The table (and the accompanying materials that focus on each of the systems or features) also provides the shared metalanguage that will mediate meaningful and comprehensive discussions about language and texts between peers and with the tutor. The metalanguage presented here is what has been gauged to be accessible to students in the EAP module. Where possible, adjustments are made to use terms students might be more familiar with (topic sentence is used alongside hyper-theme) (Marshall, 2006). If, as Martin has stated (2006, p.115), 'metalanguage is scaffolding that sticks around', then it is argued that these terms and the concepts they describe may be useful in future writing situations if students are able to recall them and their functions in various contexts. Finally, students' attention is consistently moved between systems and text, each text realizing the same systems in different ways. This is an iterative process, with these same areas of knowledge about language being reviewed and recycled several times over the semester, enabling a 'cumulative sense of knowledge' (Christie & Macken-Horarik, 2011, p.176).

This section has described the design of the in-session, standalone EAP module and the rationale for adopting an SFL/Genre model to enable better transfer to the discipline. It has described how SFL theory is used in this EAP module –through awareness building of the link between context, genre and grammar and a rich knowledge about grammatical

realisations being made visible to students through text analysis. Texts range from general academic readings to disciplinary-specific where students cast their knowledge to their own disciplinary contexts, thereby developing the student as an ethnographer approach (Currie, 1999; Johns, 2011) to one grounded in visible and systematic linguistic knowledge. Systems are investigated through multiple exposure/analysis tasks of their realisations in texts, emphasizing language as a system of choices, but choices that must be made *deliberately* when one ventures into a new communication situation (and when one does not make these choices intuitively). Students are presented with the various systems that have been highlighted in SFL/ genre and corpus research as significant and both their functions (linked back to their social purposes and genre) as well as their lexicogrammar realisations are explored and consciously applied in students' writing. It is hoped that this increase in focus on knowledge about language and meaning-making and constant move from systems to realisations, and from disciplinary readings to students' writing, will develop a linguistic awareness and a comprehensive set of tools that students can transfer to their discipline and other communication situations to make deliberate selections from the language. The next chapter explores the extent to which this transfer is occurring for the 12 participants in the study.





# Chapter 4: Results

The thesis aims to answer the following questions:

In what ways does an EAP curriculum informed by SFL impact transfer from an English for General Academic Purposes module to discipline modules?

1. In what ways can SFL and LCT as an overarching theoretical framework of knowledge inform teaching for transfer in an English for Academic Purposes module?
2. What evidence of transfer is there between an EAP module grounded in SFL and writing tasks in disciplinary modules?
3. What can explain any differences in perceptions of transfer or actual transfer amongst participants?

Question 1 will be addressed as part of the discussion chapter (Chapter 5) following a detailed response to question 2 and 3 in Chapter 4.

The first part of Chapter 4 focusses on Question 2 and organises the description of the results under two sub-sections.

*4.1 Overview of transfer operating from the EGAP module: texts and perceptions*

*4.2 Focus on transfer of features from the table of instantiation*

For each of these questions, both perceptions and textual evidence are provided, moving from an overview of all participants and of all language features (at generic, discourse semantic and lexicogrammatical levels), to more detailed vignettes of specific participants' texts and interview data.

The second half of Chapter 4 addresses Question 3 and subdivides into two main areas:

*4.3 Explaining a lack of transfer: the participant's perspective*

*4.4 Dispositions towards knowledge and affiliation*

A note on the use of EAP data: An overview of findings related to the EAP diagnostic writing task will be provided under each headings in 4.2 Focus on transfer of the features from the table of instantiation.

## 4.1 Overview of transfer operating from the EGAP module: texts and perceptions

This section will first take a wide angle, to survey the data for twelve participants and provide information on each of the features that were explicitly taught in the EAP module. The results from the interviews and the analysis of the disciplinary text show the extent to which these features are transferred by the students. Each disciplinary task is described in the appendix.

Of the twelve participants, nine communicated that they transferred a range of features from the table to their disciplinary writing (Table 9). Following the ‘talk around text’ interview protocol, when students mentioned a feature or a system, they also showed it precisely in their disciplinary text. As such, the evidence reported is not solely based on perceptions, but is also indicated by the participants in their texts (with more or less accuracy according to the feature) and confirmed in the text analysis. Participants also articulate the function of these feature and how they contribute to achieve the purpose of the overall text or the stage of the text, demonstrating what Myhill et al. (2018) called knowledge in action. Vignettes of this evidence are shown below. A more comprehensive analysis for each participant can be found in the appendices. This additional resource will be signalled throughout the result chapter.

Dr Strange	Yena	KALI	Ben	Reena	Lucy	Sobek	Julia	Walter	Igor	Paul	Jane
√	x	√	√	√	√	√	√	√	x	√	x

√=the student reports transfer from the EAP module to the disciplinary context

x= the student reports no or very minimal transfer from the EAP module to the disciplinary context

**Table 9** Transfer reported in interviews

While nine participants indicate they applied some of the EAP KAL syllabus in their disciplinary writing, three participants (Yena, Igor and Jane) describe themselves as having operated no or minimal transfer from the EAP module (see Table 10). However, these three participants do not necessarily show a lack of control of the systems; they simply do not perceive their disciplinary text as having benefited from the EGAP module content. This will be developed and explored in the chapter.

An overview of the overall results is provided in Table 10. The table of instantiation was divided into thirteen features and organized in the first column on the left. The participants are organized in the first row. A tick indicates that the specific feature of the table of instantiation was both mentioned in the interview and identified in the disciplinary text. A triangle ( $\Delta$ ) indicates that the feature was purposefully not used. A hyphen (-) indicates the student did not mention the feature or using the feature. Finally, a cross (x) indicates that the feature is used but was learned prior to the EAP module.

**Key to read table 10:**

✓: conscious transfer and textual evidence indicated by the participant.

$\Delta$ : deliberate non-transfer

- : no transfer (the student did not use or does not remember using consciously)

**X**: indicates that the feature is mentioned and shown in the disciplinary text,  
but has been learned from learning experience prior to EAP

**Table 10** Overview of transfer of features for each participant (as indicated in both the interview and the disciplinary text)

		Dr Strange	Yena	Kali	Ben	Reena	Lucy	Sobek	Julia	Walter	Igor	Paul	Jane	Total mention/12 participants
	Discipline	Maths	Life Science						Chemistry	Engineering				
	Features													
Textual	Introduction/macroTheme	-	-	-	-	-	-	√	-	-	-	-	-	1
	HyperThemes	-	-	√	-	√	-	-	-	√	-	-	-	3
	General nouns	-	-	-	√	-	-	√	-	-	-	-	-	2
	Referencing pronouns	-	-	-	-	√	-	-	-	-	-	-	-	1
	Lexical cohesion (chains)	-	-	-	-	-	-	-	√	-	-	-	-	1
	Thematic progression	√	X	√	√	-	-	√	-	√	-	√	-	6
Experiential	Noun groups	-	-	Δ	-	-	-	√	-	√	-	-	-	3
	Modifiers	-	-	-	-	-	-	-	-	√	-	-	-	1
	Nominalisation	-	-	-	-	-	-	-	-	-	-	-	-	0
Logical	Logical meaning relations	X	X	-	-	-	√	-	√	√	-	√	-	4
Interpersonal	Referencing/reporting structure	Δ	-	√	-	-	√	-	-	√	-	√	-	5
	Synthesizing with Distancing and endorsing	Δ	-	-	√	√	-	-	-	√	-	√	-	5
	Hedging	Δ	x	√	√	√	√	√	√	√	-	√	-	9
	Total feature-transfer/participant	4	0	5	4	4	3	5	3	8	0	5	0	

As shown in Table 10, the participants report transfer of a range of the thirteen features from the table of instantiation, from three features for Julia and Lucy, to eight features for Walter.

From this overview, it is interesting to note that transfer seems to operate in the four disciplines under study. While Jane reports no transfer on an Engineering lab report, Paul uses several of the features in an Engineering context. He mentions in particular interpersonal meanings as being necessary for the Engineering Lab report (this will be detailed in 4.2.3). Walter and Igor report drastically different transfer incidence on a two subsequent lab reports for the same Chemistry module. While Pure Maths may be characterized as a vastly different context, invoking far transfer, Dr Strange provides concrete examples of deliberate transfer from the system of PERIODICITY, especially thematic progression, showing that distance (understood here as contextual differences) may not be an insurmountable hindrance to transfer.

Participants report transfer of features to express textual, interpersonal and logical meanings. Experiential resources, however, (which include noun group and nominalization) are only very rarely mentioned. Some participants also report deliberate non-transfer. This means a student explains why, after careful analysis of the disciplinary assignment context, a feature was deliberately not used. The following section will describe these findings further.

## **4.2 Focus on transfer of features from the table of instantiation**

This section provides results for transfer operating across the four metafunctions in the instantiation table, as indicated by the participants in the interviews, and the disciplinary texts. The results in this section answer Question 2. *What evidence of transfer is there between an EAP module grounded in SFL and writing tasks in the disciplinary modules?*

It will be shown that, in the STEM disciplines lab reports and proof writing assignments, the meaning resources associated with textual, interpersonal and logical metafunctions are more likely candidates for deliberate transfer than experiential resources.

In this section, reference will be made to the findings of the EAP text analysis to provide a broad description of the students' control over these features in the EAP diagnostic written task. As this diagnostic task required a problem-solution type of generic essay, no direct comparison is made between the use of specific features in the EAP essay and that in the science assignment.

Transfer from the table of instantiation does not occur equally across discourse semantic systems and the features that realize them as shown in Table 11. The table shows the number of mention of deliberate use of a feature and any deliberate decisions by the participant to avoid a feature after careful analysis of the context. The column on the right provides a percentage of the number of participants who transferred the feature (as indicated in both the interview and the text).

Category		Number of participant mentioning this feature n=12	Percentage of participants who transfer this feature
<b>Textual meanings</b>	Introduction/macroTheme	1	8%
	Hyperthemes	3	25%
	General nouns	2	16%
	Referencing pronouns	1	8%
	Lexical cohesion (chains)	1	8%
	Thematic progression	6	50%
<b>Experiential meanings</b>			
	Noun groups	3	25%
	Modifiers	1	8%
	Nominalisation	0	-
<b>Logical meanings</b>			
	Logical meaning relations	4	33%
<b>Interpersonal meanings</b>			
	Referencing/reporting structure	6	50%
	Synthesizing with Distancing and endorsing	5	41%
	Hedging	9	75%

**Table 11** Transfer operating by metafunction and linguistic features

While features from all the four meaning systems are mentioned in the interview, the interpersonal meanings and the textual meanings are referred to the most. The three main elements of interpersonal meanings, reporting structure; distancing and endorsing; and modality are mentioned by 50%, 41% and 75% respectively. In the textual toolkit, thematic progression is reported by half of the participants while PERIODICITY elements such as hyperThemes are mentioned by 25% of the participants. In the ideational toolkit, while logical meanings resources are mentioned, experiential meanings in the form of noun groups, modifiers and nominalisations seem to be mentioned less as having been useful in the disciplinary writing task. This section explores these results in detail, drawing from participants' interviews and their disciplinary texts as well as the disciplinary informant where useful. The discourse semantic and lexicogrammar features are discussed using the four metafunctions as an organizing principle (Experiential and Logical resources; Textual resources; Interpersonal resources). Before this, we explore how participants transfer the concept of Genre staging as this is also part of the KAL teaching, and appears in the table of instantiation in the left hand-side column.

### **4.2.1 Genre staging**

During the EAP module, students were shown the way the social purpose of the text impacts on the stages the text is likely to follow. The EAP diagnostic data indicates that at the beginning of the EAP module, several of the participants were not aware of the expected stages the prompt required (a problem-solution essay). This is the case for Ben (Appendix 8.4), Reena (Appendix 8.5), Lucy (Appendix 8.6), and Jane (Appendix 8.12). The remaining participants write an EAP text which comprises the expected stages of the genre: the exposition of the problem and the recommendation for a solution.

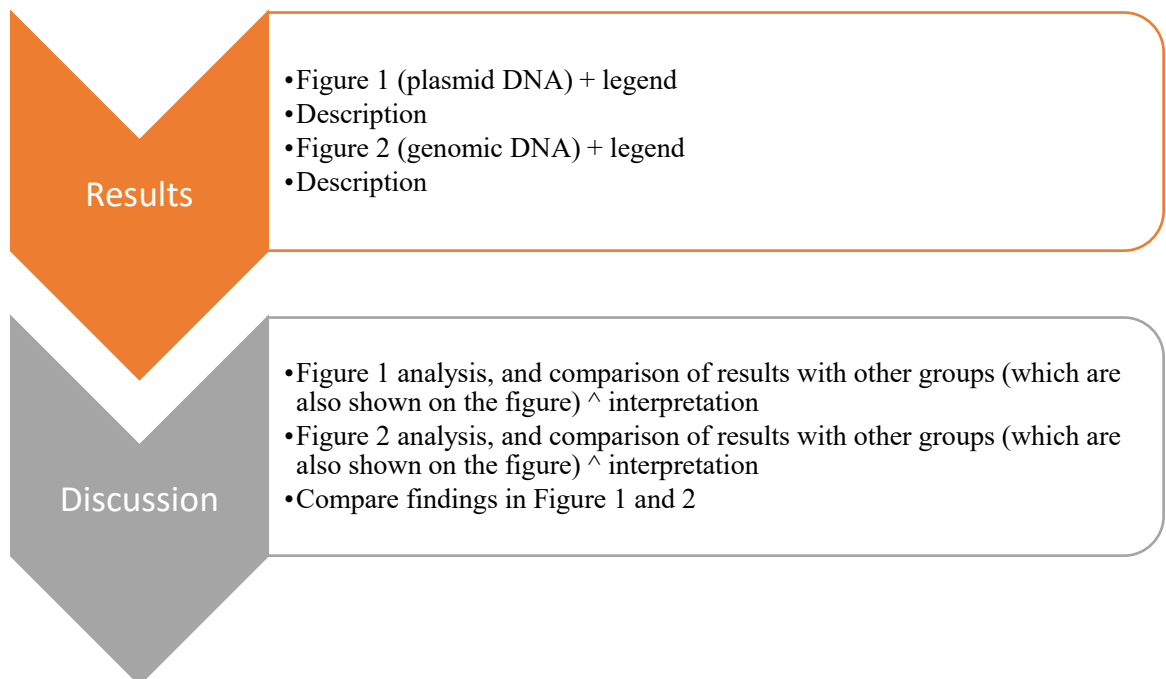
When discussing their disciplinary assignment during the interview, students were asked to describe what was expected from the task and how they staged the text. For most of the texts analyzed and discussed in the interviews, the stages were provided by the lecturers or teaching assistants (TA) and so participants did not have to make deliberate decisions about the text stages. Reena confirms this:

*Firstly our TA [...] told us roughly what we have to include inside, basically all these points, like describing the results would be mainly to describe what the figures, like what do we observe.*



As a result, the participants do not often talk about this element as a transfer element. Therefore, this area of KAL was not tabulated in the overview of transfer (in Table 10 and 11 above) but is addressed here shortly because despite the stages being provided by the lecturer or TA, some participants misunderstand the staging expectations. We look at the cases of Reena and Julia and their Life Science lab report to illustrate this point.

The text Reena and Julia discuss is a Year one Molecular Genetics lab report, for which students are required to write a result and a discussion section only (and not the introduction, methods, results, discussion). As the lecturer explained to the researcher, the results and discussion sections are where the ‘core of the science’, the content of the module is displayed. Like Nesi and Gardner (2012) observed in universities in the UK, where first and second year Life Science students tend to write reports based on identical experiments in order to acquire common core knowledge (p.136), this module lecturer focusses the students on a narrow particular area of knowledge – here the Electrophoresis of Plasmid DNA and Genomic DNA - through the experimental results and discussion. It is only in the later years that the students may design their own methodology to fit an independent experiment. The lecturer shared the expectations for this lab report in the interview (Figure 17):



**Figure 17** Lecturer's expectations for the lab report's content and stages

In the words of the lecturer, Reena's text is 'neat'. Indeed, Reena has staged the text very closely to the lecturer's expectation as can be seen in Extract 1 below where the hyperThemes for each paragraph are clearly linked to the expected stages.

<p>Key to colour coding in texts:</p> <p><b>Textual resources</b> are highlighted in yellow</p> <p><b>Experiential resources</b> are highlighted in pink</p> <p><b>Logical resources</b> are highlighted in blue</p> <p><b>Interpersonal resources</b> are highlighted in green</p>
---

<u>Lab report on Agarose Gel Electrophoresis of Plasmid DNA AND Genomic DNA (4 February 2016)</u>	comments
<b>Results:</b>	Heading indicating generic stage
<b>Paragraph 1:</b> From figure 1, after comparing the bands of plasmid DNA in my group's well (well 5) with the bands in well M containing the DNA markers, the sizes of the DNA bands of my group's plasmid DNA sample are 9416bp and 6557bp	Figure 1 description
<b>Paragraph 2:</b> Next, from figure 2, it shows that the well (well 17) that contain my group's 10-fold genomic DNA sample did not obtain any result and the possible reason behind this will be elaborated further under the discussion section.	Figure 2 description
<b>Discussion:</b>	Heading indicating generic stage
<b>Paragraph 1:</b> Firstly, from the results of the agarose gel electrophoresis of plasmid DNA that can be seen in figure 1, it shows that the plasmid DNA strands of 9416bp and 6557bp that my group got in well 5 contain nicked and closed circular DNA (Lin <i>et al.</i> , 2011). [...]	Analysis of Figure 1, comparison with other groups and interpretation.
<b>Paragraph 2:</b> Secondly, from the results of the gel electrophoresis of genomic DNA in 0.7% agarose gel solution, it shows that my group's "neat" sample of genomic DNA in well 16 contain mostly supercoiled and a few nicked DNA (Lin <i>et al.</i> , 2011). [...]	Analysis of Figure 2, comparison with other groups and interpretation.

<p><b>Paragraph 3:</b> However, unlike the other groups who did register bands for their 10-fold genomic DNA, my group did not obtain any results for our “10-fold” genomic DNA sample in well 17.</p>	<p>Comparison with other groups</p>
--	-------------------------------------

**Extract 1** Reena’s Life Science lab report

Reena’s text clearly provides the expected stages through the use of headings (*Results; Discussion*) and through the use of hyperThemes which guide the reader through the description and the comparison and contrast of the two sets of results. In contrast, on the exact same writing task, Julia receives a rather negative evaluation from her lecturer. The problem is that the lab report (see Extract 2) does not follow the expected stages that allow the student to compare and contrast the two experiments. In fact, Julia’s text is made of two separate mini reports, with the following stages:

Figure 1 ^ Subtitle ^ Results ^ Discussion ^Figure 2^ Results ^  
Discussion^ References

<u>Agarose Gel Electrophoresis Report</u>	
Results: Genomic DNA – 3 <sup>rd</sup> (Neat) and 4 <sup>th</sup> (Dilute)	Heading
Paragraph 1: <u>Observations:</u> For our neat sample of the genomic DNA in the 3 <sup>rd</sup> well, a DNA band of 9,416bp can be clearly observed and a DNA smear around the 2,027bp position can be faintly	Figure 1 is shown and described
seen Paragraph 2: <u>Discussion:</u> Gel electrophoresis (a) is <u>a technique to separate DNA base on their sizes</u> <u>charges</u>	Results for Figure 1 are discussed.
Results: Plasmid DNA – 3 <sup>rd</sup> (Neat)	Heading
Paragraph 3: <u>Observations:</u> No DNA bands can be <u>observed for our plasmid DNA in the 3<sup>rd</sup> well as the DNA had flow out during the process of loading the plasmid DNA into the well of the agarose gel</u>	Figure 2 is shown and described
<u>Discussion:</u> Similarly, the extracted plasmid DNA <u>used in this experiment contain DNA</u> <u>fragments of varying sizes</u>	Results for Figure 2 are discussed.

**Extract 2** Julia's Life Science lab report

As a result of this structure, Julia misses one crucial requirement of the task: she provides no comparison and treats each case in isolation. Indeed, the interview revealed a thorough misunderstanding of the function and the associated stages of the report as she saw no need to compare the two experiments and found that treating them together would be confusing for both herself and her reader. Linked with this misreading of the text's purpose, the text contains only one instance of hedging because there is not interpretation (this will be discussed in 4.2.3). This shows that Julia's learning about text generic features does not transfer to the

context of the discipline where she does not see the need for the report to be staged in a way that allows for comparison between the two cases.

### **4.2.2 Textual resources**

In the EAP diagnostic text, participants' control over the resources in the toolkit (Introduction/macroTheme, hyperTheme, referencing pronouns, general nouns, lexical cohesion, thematic progression) is uneven. Macro elements such as macroTheme and hyperThemes tend to be misplaced or not clear. For example, MacroThemes are sometimes placed in the second paragraph as is the case for Dr Strange, Yena and Ben (in Appendices 8.1, 8.3 and 8.4 respectively). HyperThemes tend to not link back to the macroTheme or to previous paragraphs (Ben, 8.4, Reena, 8.5). At paragraph level, participants' writing tends to be characterized by a lack of flow, with developing control over thematic development of the text (Lucy, in 8.6). Generally, cohesion at the paragraph level especially is an element of the table of instantiation which participants are still learning to control.

Textual resources figure prominently in participants' report of transfer and in their disciplinary texts. Cohesion features being 'transferrable' aligns with previous studies on transfer. James (2006), for example, found that 'organizing ideas' was transferred from an EAP module to an Engineering course. While James's study showed that students were better able to 'organize a text' after attending an EAP module, the present study, however, provides concrete details about which specific features in the taught cohesion toolkit seem to be transferred deliberately. Table 12 provides a reminder from Table 10 and indicates the features that were both stated by the participant in the interview and shown in the disciplinary assignment. The transfer of the different elements of the textual toolkit will be described further below.

	Dr Strange	Yena	Kali	Ben	Reena	Lucy	Sobek	Julia	Walter	Igor	Paul	Jane	Total
Introduction/ macroTheme	-	-	-	-	-	-	√	-	-	-	-	-	1
Hyperthemes	-	-	√	-	√	-	-	-	√	-	-	-	3
General nouns	-	-	-	√	-	-	√	-	-	-	-	-	2
Referencing pronouns	-	-	-	-	√	-	-	-	-	-	-	-	1
Lexical cohesion (chains)	-	-	-	-	-	-	-	√	-	-	-	-	1
Thematic progression	√	X	√	√	-	-	√	-	√	-	√	-	6

**Table 12** Transfer of Textual Resources

The macro structural element of macroTheme is only mentioned once, by Sobek. This is probably due to the genre the participants are discussing: the lab reports in lower undergraduate years does not focus on the introduction or the abstract, but rather on the results and discussions sections. Sobek is discussing a year two lab report and mentions the macroTheme when showing the abstract of the lab report (see Extract 3). He labels the sentences as shown in the abstract in brackets and in bold. On the same task, Yena also writes an abstract (Extract 4) which is slightly more positively received by the lecturer as shown below, but she does not link this to any transfer occurring from the EAP module.

As Lactate Dehydrogenase (LDH) has many roles in many processes in a lot of species metabolic pathways, it is a potential target for many drugs and therapies \*  
(**Background**). One of its subunits, which is LDHA, has a lot of influences in those pathways (**Narrowing down on the enzyme under study**). Hence, molecular cloning was used to multiply the LDHA gene and subsequently the gene can be expressed for many studies (**Methods**). In the molecular cloning, a lot of verification steps was done employing several biochemical techniques (**Methods**). However, a single base substitution mutation is found and it is hypothesized that the mutation can cause the gene to express non-functional proteins (**Results and discussion**).

\*This is highlighted by the student as the macroTheme

Stages of the abstract are indicated in brackets and in bold.

### Extract 3 Sobek's Life Science lab report

Sobek comments on his abstract that he is '*explaining what is the aim and why it is important*' (underlined above). The lecturer comments on the abstract as follows, showing that despite following an IMRD structure as taught in the EAP module, the abstract does not achieve its intended aim:

*'Overall this abstract is too general and does not pinpoint what exactly was covered in the experiments and the specific findings.'*

According to her lecturer, Yena produces an abstract (see Extract 4) that is '*more specific than [Sobek's], but the actual experiment findings is still not explained*'. Yena, however, does not recall the EAP tutorial on macroTheme, which included the disciplinary specific deconstruction of a Life Science lab report abstract.

Lactate dehydrogenase (LDH) is an enzyme that is involved in the anaerobic glycolysis pathway and usually serves as a biomarker in cancer studies to help detect cancer (Miao et al., 2003) since higher levels of LDH are typically found in cancer cells (**Background and purpose**) . In **this study**\*, mouse fibroblast cells containing LDHA are reverse transcribed and amplified for insertion into pET11a plasmid vectors, which are then transformed into E.coli DH5 $\alpha$  cells (**Methods**). Transformation was successful (**Results**). The cloned recombinant pET11a plasmid is then sequenced to check for mutations (**Methods**). 2 true mutations have been identified. 2 true mutations which result in a different amino acid being encoded for at base pair position 241 and 643 changes primary sequence of amino acids, thus affects the secondary and tertiary protein structure, of which future work in expressing a functional LDH protein could be affected (**Results and discussion**).

\* 'this' deictic + general noun is highlighted in yellow to be discussed below.

#### Extract 4 Yena's Life Science lab report

HyperThemes are mentioned by Kali, Reena and Walter, who report consciously thinking about forming hyperThemes in their disciplinary assignments. Extract 1 showed that Reena's hyperThemes were effective in developing the stages of the genre and matched the expectations of the lecturer. Walter who discusses a Chemistry lab report (Extract 5) on the isolation of Chlorophyll and B-Carotene from a plant leaves experiment, for which he was awarded an A+ said he was deliberate in his construction of hyperThemes '*You have to bring the key point*'. In Extract 5, the hyperThemes are shown with the key idea underlined and the textual resources highlighted (general nouns are in yellow, and will be described in more detail below).



### **I. Aim**

- To extract  $\beta$ -carotene and chlorophyll from plant leaves.
- To separate and isolate  $\beta$ -carotene and chlorophyll through common chromatography.
- To qualitatively analyze the isolated  $\beta$ -carotene and chlorophyll through thin layer chromatography (TLC) and UV-visible spectroscopy.

### **II. Results and Discussion**

Hypertheme 1: By inspecting the chemical structures of the various components extracted from plant leaves, an ascending order of compounds in terms of their relative polarities can be made as shown in Figure 1.

[...]

Hypertheme 2: The TLC results reinforce the effectiveness of column chromatography, as the least polar component is expected to be eluted first, which is in this case, is  $\beta$ -carotene, with non-polar hexane as eluent.

[...]

Hypertheme 3: S3 contains chlorophyll-b, pheophytin-a and pheophytin-b.

[...]

Hypertheme 4: There are reasons for not finding chlorophyll-a in S3.

### **III. Conclusion**

$\beta$ -carotene and chlorophyll were successfully extracted.

**Extract 5** Walter's Chemistry report: hyperthemes

Kali wrote an Inquiry-based individual writing assignment titled '*Bioinformatic Characterisation of Sequence*'. This assignment took place early on in a Year Two semester 1 core Life Science Module. An original assignment type, in the words of the professor who set it and evaluated Kali's paper, the assignment provides a DNA sequence for which students must search databases and deploy detective-like skills to deduct the type of compound that the sequence codes. The professor is

interested in seeing a hypothesis being emitted, and the process the student engages in to prove it, including the dead-ends and mistakes. Kali's extract below shows her use of hyperThemes and other cohesive resources such as general nouns to manage the flow of information across the text. The use of these features is described in the column on the right.

<p><b>Methods and results</b></p> <p>In an attempt to characterise the given sequence, the sequence was subjected to the Blast suite of programs (Altschul et al., 1997) and the different profile based <b>approaches</b>. The <b>thought process</b> behind each approach, the <b>process</b> involved and the <b>interpretation</b> of the results are discussed as follows.</p>	<p>Kali uses general nouns to point forward to different sections of the text.</p>
<p><b>Discussion</b></p> <p>After subjecting the given sequence to <b>various bioinformatics tool</b>, some major <b>features</b> about the sequence can be characterized.</p>	<p>This hyperTheme fulfils the double function Ravelli (2004) described: <i>various bioinformatics tool</i> looks back to the previous segment. <i>features</i> points forward.</p>

**Extract 6** Kali's Chemistry lab report: hyperthemes

Like Kali, Reena's use of hyperTheme and cohesive resources such as general nouns, internal conjunction and referencing pronoun (all highlighted in the Extract below) seems to be effective: the reader of this lab report is left in no doubt as to

what the purpose of each paragraph is and the remainder of the paragraphs (shown for paragraph 3 in Extract 7) clearly develops the theme announced.

<p><u>Lab report on Agarose Gel Electrophoresis of Plasmid DNA AND Genomic DNA (4 February 2016)</u></p>	<p>comments</p>
<p><b>Results:</b></p>	
<p><b>Paragraph 1:</b> From figure 1, after comparing the bands of plasmid DNA in my group’s well (well 5) with the bands in well M containing the DNA markers, the sizes of the DNA bands of my group’s plasmid DNA sample are 9416bp and 6557bp.</p>	
<p><b>Paragraph 2:</b> Next, from figure 2, it shows that the well (well 17) that contain my group’s 10-fold genomic DNA sample did not obtain any result and the possible reason behind this will be elaborated further under the discussion section.</p>	<p>Clear link to next paragraph (use of general noun ‘reason’)</p>
<p><b>Discussion:</b>  <b>Paragraph 1:</b> Firstly, from the results of the agarose gel electrophoresis of plasmid DNA that can be seen in figure 1, it shows that the plasmid DNA strands of 9416bp and 6557bp that my group got in well 5 contain nicked and closed circular DNA (Lin <i>et al.</i>, 2011).          [...]</p>	
<p><b>Paragraph 2:</b> Secondly, from the results of the gel electrophoresis of genomic DNA in 0.7% agarose gel solution, it shows that my group’s “neat” sample of genomic DNA in well 16 contain mostly supercoiled and a few nicked DNA (Lin <i>et al.</i>, 2011).          [...]</p>	
<p>Paragraph 3: However, unlike the other groups who did register bands for their 10-fold genomic DNA, my group did not obtain any results for our “10-fold” genomic DNA sample in well 17. This could be because my group’s genomic DNA could have registered a low concentration or could have some contamination when it is extracted from <i>Escherichia coli</i> (<i>E. coli</i>) in the previous practical (Dube, 2007). [...]. These DNA bands indicate that the DNA strands of the 10-fold genomic DNA are mostly supercoiled. These results are similar to that of the “neat” sample of the genomic DNA that my group and other groups obtained.</p>	<p>This: deictic to refer back</p> <p>These + DNA bands: deictic to refer back  <i>These results:</i> a deictic and a general noun to refer back.</p>

**Extract 7** Reena's Life Science lab report: hyperThemes and cohesive devices

This textual evidence of transfer from the EAP module is reflected in the interview, when Reena indicates that the EAP module:

*Actually taught me how to organize my paragraph, so I actually use that skill over here. (Reena)*

Lexicogrammatical elements of the cohesion toolkit are mentioned by Ben, Sobek, Reena and Julia who have used and point to in their texts the following: general nouns, referencing/deictic pronouns and lexical chains. In Reena's extract above, we can note the use of *firstly*, *secondly* and *however* as internal cohesive features and in the paragraph, the use of deictic pronouns sometimes used with a general noun (*these results*) in thematic position to refer to the NEW from the previous sentence. While Kali (Extract 6 above) did not explicitly mention her use of general nouns as a cohesive device, her control over this resource is shown in the extract. It could be that when she mentioned hyperTheme as having been transferred, she included the lexicogrammatical resources that were taught to write effective hyperthemes. The text shows that she used general nouns in a very deliberate way to exploit what Ravelli (2004) has called their retrospective and prospective function. General nouns are in fact only mentioned by Ben and Sobek. Sobek pointed to '*roles*', '*processes*' and '*techniques*' in his abstract (see Extract 3). As seen in Reena's and Kali's texts, general nouns are often used in the texts (*results*; *the possible reason*), if not verbalized by the participants. The same seems to be true for referencing pronouns which are mentioned only by Reena but are frequently used in the participants' texts. For example, Ben mentions he used general nouns and determiners to refer back: '*I thought about the 'this' to refer back*' (Ben).

Julia is the only participant who mentions lexical chains as a deliberately used resource. She said she '*didn't want to repeat the same words every time*' and pointed to two prepositions rather than nouns: '*along the agarose gel*' being rephrased to '*across the agarose gel*'. This lack of mention of lexical chains is perhaps explained by the perceived lack of relevance of this type of feature for the lab report genre where lexical entities tend to be technical and provide little opportunity for the use of synonyms. Taxonomies of entities occur through the lab reports, creating chains of cohesion, but this is not noted by the participants, when they discuss cohesion or when they discuss experiential meanings (as will be seen in 4.2.4).

Another textual cohesion resource taught in the EAP module is thematic progression. This stands out as one of the EAP KAL items which several students consciously deployed when writing their disciplinary assignment. In fact, 50% of the participants mentioned this resource. Dr Strange, Sobek, Kali, Ben and Paul report they applied thematic progression deliberately, sometimes in complement of features such as general nouns. Most of the participants showed in their text where they had deliberately organized the flow of information using the concepts of thematic progression. Kali's disciplinary text (see Extract 8 below) taken from her Bioinformatic Characterisation of Sequence report was analyzed for thematic progression because she reported deliberate use of this item to improve what she knew was a weakness in her writing (this was shown in the EAP module as the area she needed to develop the most).

In the samples provided below, the themes are analysed (Extract 8) following Eggins' (2004, p.356) analytical approach and annotation conventions.

The unit of analysis is the independent clause. As discussed briefly in 2.2.2, Theme includes the subject of the independent clause. Dependent clauses preceding the independent clause are analyzed as marked Theme and indicated in bold.

Theme is underlined, and to differentiate between textual, interpersonal and topical theme, they are annotated as follows: Textual Theme is in *italics*; Interpersonal Theme is in CAPITALS; Topical Theme is in **bold**.

**Blastx** compares the translated nucleotide sequence with the protein database. **The initial Blastx search performed with default parameters excluding the models** result in 2 hits in frame 1. **Both the hits** are bacterial protein, carboxymethylenebutenolidase of SAR86 cluster (g-proteobacteria), and covering 77% of the query sequence with a score of 36.6. **When Emboss Water local alignment (Rice et al., 2000) was performed with the top hit and the query sequence, a score of 87.5** was obtained. *This* indicates a possible similarity between the bacteria and the query sequence. **The bacterial protein** has an abhydrolase super family domain hit (Figure 2). **IT IS POSSIBLE that the query sequence also** has an association with this domain. **When the same blastx search was performed with a higher expect threshold,**

**the number of hits** distributed increased. *However, **the new hits*** might be false positives due to their large E value.

**Extract 8** Kali's Life Science lab report:themes

The student uses a range of thematic progression patterns that create a smooth and logical flow in the explanatory paragraph (the progression is shown in Table 13 below).

	Themes	Rhemes	Thematic pattern/comments
S1	<u>Blastx</u>	compares the translated nucleotide sequence with the protein database.	From S1 to S2= linear
S2	<u>The initial Blastx search performed with default parameters excluding the models</u>	result in 2 hits in frame 1.	S2 to S3=zigzag
S3	<u>Both the hits</u>	are bacterial protein, carboxymethylenebutenolidase of SAR86 cluster (g-proteobacteria), and covering 77% of the query sequence with a score of 36.6.	S3 to S4 = zigzag
S4	<u>When Emboss Water local alignment (Rice et al, 2000) was performed with the top hit and the query sequence, a score of 87.5</u>	was obtained.	S4 to S5=linear
S5	<u>This</u>	indicates a possible similarity between the bacteria and the query sequence.	S5 to S6 and S7= fan
S6	<u>The bacterial protein</u>	has an abhydrolase super family domain hit (Figure 2)	
S7	<u>IT IS POSSIBLE that the query sequence also</u>	has an association with this domain.	
S8	<u><b>When the same blastx search was performed with a higher expect threshold, the number of hits</b></u>	distributed increased.	S8: The textual theme links to the hyperTheme (Blastx)
S9	<u>However, the new hits</u>	might be false positives due to their large E value.	S8 to S9= linear

Table 13 Thematic progression analysis of Kali's paragraph

Walter said he was conscious of flow and applied the concept of thematic progression but was not able to point to concrete examples of this in his text, perhaps due to the time lapse between the writing of the text and the interview.

Ben also commented on thematic progression:

*'It's just these are the things I remember, when I was writing this, it seemed useful. Sometimes as I wrote, and thought 'How do I continue?' Then I remembered the thematic progression.'*

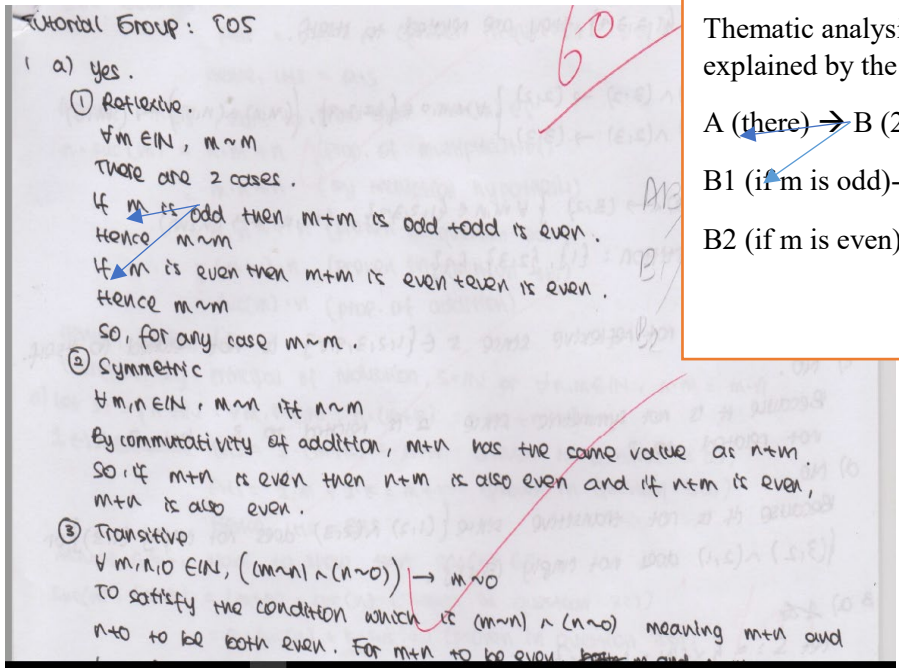
Ben indicates he is operating backward reaching transfer. It also shows an instance of knowledge about language supporting the process of writing. Ben illustrates here what, as mentioned in Chapter 2, O'Donnell (2013) calls dynamic knowledge. Thematic progression is deliberately engaged in the process of writing to support the extension of the text. Knowledge of thematic progression enables Ben to find an answer to his question 'How do I continue?'

Dr Strange (a pseudonym which was jointly decided by the student and the researcher and which illustrates the participant's ability to travel across different semiotic universes) is an undergraduate, Year one, Pure Maths student. A Bahasa Indonesia mother tongue speaker, Dr Strange was schooled in Indonesia with Bahasa Indonesia as the medium of instruction (MI) and English taught as a foreign language. He attended an English MI high school in Indonesia before starting his undergraduate studies in Singapore. He reports an orientation towards Science and Maths and a general dislike for Literature or Language based subjects. In the EAP module, this student performed well. Dr Strange is discussed in more detail below because this is a participant who illustrates the possibility of an element of textual resources, thematic progression, taught in EAP transferring to the very distant context of Maths proof writing.

The interview and the disciplinary text show that Dr Strange has abstracted the concept of thematic progression from the EAP module and applied it, with successful result, to his proof writing (question 1 and 2 are shown below in Extract 9). The 60 in red ink represents a perfect score awarded by the lecturer.



**Dr Strange Proof Writing- Question 1:**



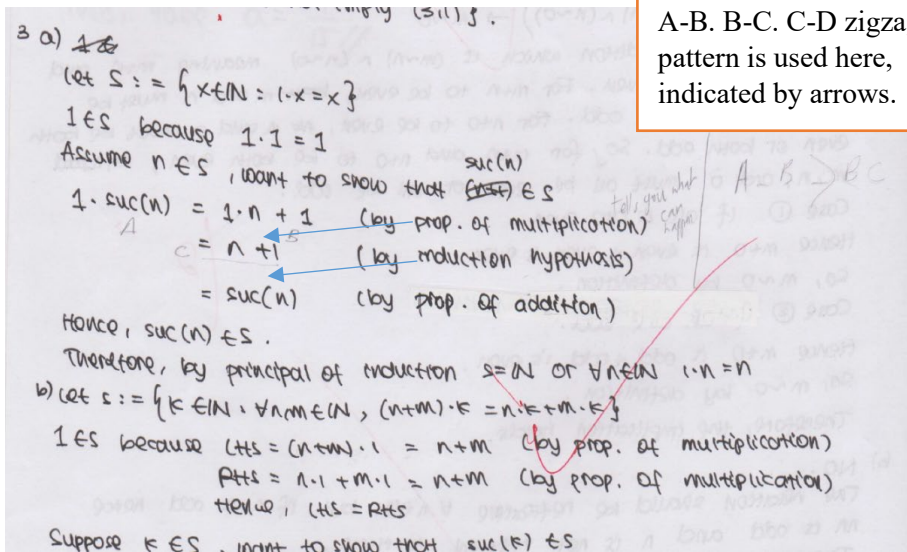
Thematic analysis (as explained by the student)

A (there)  $\rightarrow$  B (2 cases)

B1 (if  $m$  is odd)  $\rightarrow$  C (then...)

B2 (if  $m$  is even)  $\rightarrow$  D (then..)

**Question 3:**



A-B. B-C. C-D zigzag pattern is used here, indicated by arrows.

**Extract 9** Dr Strange's Math proof writing task

In the interview, Dr Strange focuses directly on what in EAP was useful and explains how this helps in the proof. He explains how he applied two thematic progression patterns seen in the EAP module. The proof above is labelled following the student's explanation.

*Dr Strange: For question 1, I first mentioned there are two cases, and then I jump to first case and then the second case. This one is like A, and then B1, B2*

[Indicating Question 3]: *This one is A, and this one is B. I need to make sure there is no gap between B and C and it is explainable here [shows the information in brackets]. The information tells you why this can happen from here (it is closing the gap between A and B and C).* [Here, the student refers to the ‘zigzag pattern’ which places in thematic position the previous rheme].

The sample progression shown below (Figure 18) shows how the student has understood the thematic pattern concept as relevant to the progression of his proof exercise. ‘By prop. of multiplication’, and then ‘by induction hypothesis’ are the elements that he added to complete the rheme of each statement so they would link to the next theme (which, like often in Maths proofing is ellipted).

Theme	Rheme	Thematic progression
1.suc (n)	= 1.n + 1 (by prop. of multiplication)	
(ellipted theme)	= n+1 (by induction hypothesis)	zigzag
(ellipted theme)	=suc <sup>9</sup> (n) (by prop. of addition)	zigzag

**Figure 18** Sample thematic progression in Maths proof writing

As was the case for Ben above, Dr Strange also explains a process of backward transfer, an instance of mindful abstraction which is triggered in the new context.

*I think it's more like at the time when I need to do this homework. I realised I mean it's transferrable. So it's not like when I heard about it that I directly remember [planned to use it in Maths proofing].*

This student, then, is able to see a connection that only a few linguists are aware of: that thematic progression is key to mathematical discourse and that the left side of an equation usually functions as Theme, with the right side functioning as Rheme (Doran, 2016; O'Halloran, 2005), as was shown in Chapter 2, section 2.2.2 Disciplinary specificity (Maths).

<sup>9</sup> 'suc' stands for successor.

### 4.2.3 Interpersonal resources

Science writing can be perceived as skirting any evaluative meanings or personal opinions, an objective and impersonal register. Research reviewed in Chapter 2 has shown how in fact science is often persuasive and engages a range of evaluative meanings, albeit often implicitly. It was also seen that evaluative meanings become more prominent in the later years of undergraduate studies when students are not only required to display understanding of the core knowledge of their discipline, but also have to critique it and create it. The EAP module made several resources visible to the students, especially those that may constitute a new way of writing for these students transitioning from the high school writing culture to the university more challenging contexts. Using sources to develop a text, engaging stance and distancing or endorsing features, and making tentative meanings (hedging) were all shown as essential to academic writing.

The diagnostic EAP text showed that participants' interpersonal repertoire is transitioning from a high school type of essay to academic writing at tertiary level. Many participants do not know how to include external sources, and express their stance on these. Many participants are unaware of the need to acknowledge the sources they cite. Dr Strange and Walter, for example, do not use any citations although they use the source texts for information. This developing control over interpersonal resources is also shown in the tone adopted, specifically, the use of emotional, judgemental and even moralizing language (see Walter's reference to Biblical scriptures in Appendix 8.9). Emotional language is used ('*absurd*' in Kali's text, Appendix 8.3) or judgmental claims ('*it seemed that it had never occurred to us*' Yena, Appendix 8.2) are made without any evidence provided. In fact, several participants use evaluative resources which are more indicative of a hortatory genre than an academic essay. Igor, for example, ends his essay on deforestation with the persuasive appeal to the reader: '*after all we only have one Earth to live in and it will be a tragedy for us – the most intelligent life form on the planet – to run the planet into ruins* (Igor, Appendix 8.10). Finally, the uneven use of hedging in the EAP texts indicates that students' repertoire is still not sufficient to create the tentative meanings required at university (see Lucy, Appendix 8.6; Sokek in 8.7; Paul in 8.11, Jane, in 8.12). Participants tend to use *will* instead of a hedging modal or expression, therefore not achieving the intended tentative meaning.

Findings in the analysis of the disciplinary texts and the interviews indicate that most participants have benefited from an explicit teaching of interpersonal resources and seen some relevance for their STEM contexts (see Table 14). Dr Strange mentions all the

features and explains why, in the context of Maths proof writing, these are not needed, showing evidence of positive transfer in the sense that he is able to analyse his context and make deliberate decisions to avoid certain resources. Reporting structures, distancing and endorsing are mentioned by 5 participants. Hedging is the item the most mentioned by participants, with 75%. In fact, only Igor and Jane, two of the participants who report nearly no transfer, explain that they did not use hedging (as will be shown later, they did). Yena reports using hedging but clarifies that she did not learn about this during the EAP module but prior. This will be developed in 4.3.

	Dr Strange	Yena	Kali	Ben	Reena	Lucy	Sobek	Julia	Walter	Igor	Paul	Jane	Total
Referencing/reporting structure	Δ	-	√	-	-	√	-	-	√	-	√	-	5
Synthesizing with Distancing and endorsing	Δ	-	-	√	√	-	-	-	√	-	√	-	5
Hedging	Δ	x	√	√	√	√	√	√	√	-	√	-	9

**Table 14** Transfer of Interpersonal Resources

## Hedging

Hedging is mentioned by nine participants as being used deliberately in their disciplinary assignment. Dr Strange is able to recognise hedging is not relevant in the proof writing context. Being able to recognise what should not be transferred is, arguably, as important as transferring what can. When prompted with the table to see whether other features were useful, Dr Strange remembered the features that express tentative meanings but explained:

*Yeah [I remember], but no, I don't think so because everything needs to be proven, that's the exercise.*

Most participants point to a wide range of hedging expressions in their texts and clearly associate this with the need for the meanings these express. Lucy's extract is shown below (Extract 10) with the hedges highlighted in green. The bolded phrases indicate reporting and endorsing resources and are discussed below.

For the “neat” sample of genomic DNA in lane 8 from Figure 1, the thick band found at 23,130 base pair row **indicates** a high concentration of DNA fragments of that particular length. **Perhaps** if the gel was run for a longer time, there **might** be a thinner band or more spread out bands of DNA molecules as larger DNA molecules require more time to move through the agarose gel. The region of fragments found to be smaller than or equal to 2,027 base pair **can be seen** as a smear, **possibly due** to contamination of RNA molecules in the undiluted sample of genomic DNA. **This is supported by Oswald (2007) who reported** that RNA runs “as a low molecular weight smear”. As RNA molecules are smaller in size compared to DNA molecules (**Alberts et al., 2002**), it means they are lighter in terms of molecular weight thus they are able to move through the microscopic pores in the 0.7% gel at a faster rate than the DNA fragments. Hence, RNA **could** have been extracted from the *E.coli* along with the genomic DNA, during Practical 1.

**Extract 10** Lucy's Life Science lab report: interpersonal resources

Lucy makes use of a wide range of features to express tentative meanings. These are required in this section of the lab report where she is interpreting the experiment results and explaining an unexpected result (*‘possibly due to contamination’*).

Walter also expresses a range of tentative meanings to explain why the results were not as he expected (Extract 11).

However, other labelled peaks in the spectra of S3 **suggest** the presence of more absorbing components such as pheotphytin-a and pheophytin-b. [...] There are reasons for not finding chlorophyll-a in S3. Blunders **include** not levelling the silica gel column properly, as this **may** cause chlorophyll-a to be eluted slower than expected, causing the eluted S3 liquid to contain less of it. Also, there **could** be insufficient amounts of S3 to be concentrated for TLC. This resulted in a very diluted spot, and chlorophyll-a was not seen.

**Extract 11** Walter's Chemistry lab report: interpersonal resources

Walter expressed tentative meanings through processes (*suggest* and *include*) and modal verbs (*may* and *could*) to discuss his results and the potential reasons for unexpected results.

Participants were consistently able to explain the context that prompted this deliberate choice of feature, as shown in the few participants' quotes below:

*“we don’t fully confirm that this thing exists, rather we like to match things with other literature, so we match our data with the lit and so we can suggest that our data is credible” (Walter)*

*“Like it suggests, you can’t say IT IS coz I’m also not sure, whether my interpretation is correct.” (Lucy)*

The exchange between the researcher and Kali shows how she was able to link the context to the discourse semantic and lexicogrammatical realisations needed in the context:

*Kali: “I cannot claim that [the sequence] codes a bacteria because it is just a data base search so this is why we use hedging. The tutor said you can’t conclude: ‘My sequence codes FOR’...the maximum we can say is that it is similar.*

*Researcher: OK, this the tutor told you*

*Kali: Yes he did not talk about hedging but only said we cannot make these claims.*

In her text (see Extract 8 above for the whole paragraph), Kali clearly shows a shift in modality between the first two sentences and the interpretation that follows. She used the following hedging devices:

This **indicates** a **possible**; **It is possible** that; However, the new hits **might** be false positives

These findings seem to indicate that when equipped with the knowledge of tentative, conjectural meaning-making resources, participants are able to recognize the need in the lab report to deploy the resources that realize these meanings. Hedging then seems to be recognized as required to express tentative meanings. The transfer operating for this particular feature also reflects the accessibility of this particular item of knowledge about language. As shown at the beginning of this section, several of the participants show little awareness of the need for this feature in academic writing as they start the EAP module. This will be re-visited in the Discussion Chapter.

However, Jane does not report any transfer of hedging, which she explains is not necessary. Nevertheless, her text, an Engineering lab report, makes tentative meanings, in particular the evaluation of the best lamp for energy conservation. In the extract below, she also shows a wide range of evaluative meanings to answer the question. Nevertheless, as will be explained later, Jane does not report requiring the EAP knowledge.

(e) Evaluate the best lamp that will reduce the energy consumption LED Lamps. Luminous efficacy is a measure of how well a light source produces visible light. LED having one of the highest luminous efficiency thus use the least energy compared to other lamps at same brightness. Although Gas Discharge lamps are also one of the most efficient, they emit coarsed light (non-white) for example, yellow light, which **may** not be ideal for use at homes.

**Extract 12** Jane's Electrical Engineering lab report

The same phenomenon is observed with Igor who does not report the need for these types of meanings but who still uses hedging resources in his text. Both Igor and Jane show developing control over these features in their EAP texts, so while hedging occurs, it does not occur in every instances where the meaning was required. This may also indicate that the participants are not conscious of the EAP module's impact.

Referencing and reporting structures as well as distancing and endorsing features received 5 mentions each. Kali, Lucy, Walter and Paul all mention using reporting structures to integrate citations into their texts. Again Dr Strange accurately reports the lack of need for such features in the proof writing exercise. When comparing with the EAP texts, this indicates a clear development in the students' repertoire.

In her lab report, Lucy uses a range of in-text citation types and supports her claims by aligning the literature to her findings (see bolded phrases in Extract 10 above). For example, she uses the endorsing phrase: 'This is supported by Oswald (2007) who reported' to support her interpretation of one of the results (itself hedged with *possibly due*).

Lucy also shows deliberate decision-making between information and author-prominent citations, explaining that an author-prominent citation is useful to support her interpretation. Without naming the distancing/endorsing features explicitly, she in fact is using them:

*Most of them I put them at the end, apart from this one "This is supported by"...I want to show that my interpretation [is correct]. (Lucy)*

The stance features of endorsing and distancing are mentioned by five participants who are aware of the context that requires these meanings. Text analysis, however, does not reveal an extensive use of these. Ben's lab report, for example, does not contain any because there are no citations in the text.

## 4.2.4 Experiential resources

The experiential resources taught in the EAP module concerned the use of complex and extended noun groups, and nominalisation in order to support students' transitions from a congruent to an incongruent grammar, enabling abstract entities to be analysed and discussed. The analysis of the EAP texts showed that several participants' grammar relied on congruent form, indicated by a low number of nominalised forms, simple, short noun groups, and the general focus on 'people doing things' rather than on abstract entities being discussed. This is the case of Dr Strange (Appendix 8.1), Ben (Appendix 8.4), Reena (Appendix 8.5), Sobek (Appendix 8.7), Paul (Appendix 8.11). In particular, Jane's EAP text (Appendix 8.12), shows a great reliance on 'people' as a subject in many sentences ('*People now buy*'; '*if people could*') and the reliance on personal pronouns ('*we all need to realise*'). Yena, Kali and Julia and to a lesser extent Walter, on the contrary, produce an EAP text which is fairly abstract, where technical entities and several examples of nominalisations indicate the use of incongruent grammar to allow for the phenomenon of deforestation to be discussed.

During the interviews, there was a clear indication that the features related to experiential meanings were not perceived as transferred (see Table 15 below). Only two students mentioned developing noun groups deliberately with Walter being the only student who mentioned a type of modifier. No students mention nominalization as a tool for either textual or experiential meanings.

	Dr Strange	Yena	Kali	Ben	Reena	Lucy	Sobek	Julia	Walter	Igor	Paul	Jane	Total
Noun groups	-	-	-	-	-	-	√	-	√	-	-	-	3
Modifiers	-	-	-	-	-	-	-	-	√	-	-	-	1
Nominalisation	-	-	-	-	-	-	-	-	-	-	-	-	0

**Table 15** Transfer of features to express experiential meanings

Kali, for example, who otherwise transferred from the cohesion and the appraisal toolkit, commented that she did not deliberately use her knowledge of noun groups and modifiers because this was not needed. In her lab report, she said she wrote only '*simple technical groups*'.

Researcher: *Did you think about noun groups? Are they dense and long? Did you pay attention to that when writing?*

Kali: *Yes I remember but usually it was just simple technical groups.*



This is interesting because when analyzing her disciplinary text, there are several instances of dense noun groups. For example (with the headnoun underlined and bolded):

The initial Blastx **search** performed with default parameters excluding the models

An abhydrolase super family domain **hit**

When the researcher pointed these to Kali, however, she explained that these constitute technical set phrases which are learnt as such, without requiring conscious breaking down of the constituents. To the non-expert reader (the researcher in this instance), only *Blastx* and *abhydrolase* may be seen as technical, while the other terms such as *parameter*, and *family* as well as *domain* may fall within the dual meaning terms (which are prevalent in Chemistry as seen in Chapter 2 and so may be in Biology as well). For the student (and the disciplinary expert), these terms may in fact carry the same level of technicality because their meaning is specific to this particular context.

Most participants, when probed about the noun group features, said they did not use them, had forgotten, found this too complicated, or simply used them, like Kali, without any deliberate thought. *'I guess it is very implicit'*, said Igor.

Walter was the only one who referred to paying attention to: *'Which-clauses to put extra information to describe components and more components'*. He did not however remember more about the toolkit for noun groups and modifiers.

Ben, who transfers several features from the table of instantiation, says he did not use any of the noun group and nominalization knowledge *'Because it's tougher. Cannot just think about it, it does not just come'*. This indicates that while the other features in the table of instantiation were accessible, the features that express experiential meanings appeared more difficult, more abstract to Ben.

Sobek described a lab report for which he paid attention to building noun groups such as *'concentration of the enzyme'*. This student, a Bahasa Indonesia mother tongue speaker, was very positive during the interview that the EAP module content was highly transferrable. The noun groups he uses are highlighted in Extract 13. The paragraph starts with a definition (using the relational process *is*). Sobek then categorizes the enzyme, creating a taxonomy: *LDH has two most common types of subunits, which is LDHA and LDHB*. Sobek is the only student who showed some awareness of this aspect of the use of noun groups. In the interview, he did not mention taxonomies, but he showed the noun

groups highlighted below saying he tried to build them logically around the headnoun. The headnouns are in bold and the nominalizations are in italics.

*Sometimes I use a lot of noun groups...for example [pointing to his text] concentration of the enzyme; the survival of in-treatment patients with several types of cancer.*' (Sobek)

**Lactate Dehydrogenase** (LDH) is an **enzyme** that is found throughout many species (Markert et al., 1975). **This enzyme** works in **anaerobic metabolic pathway** where **this enzyme** converts the final product of glycolysis, pyruvate, into lactate and oxidizing **NADH into NAD<sup>+</sup>**, thus regenerating NAD<sup>+</sup> for another glycolysis pathway (Reece et al., 2012; Valvona et al., 2016). To function properly, **this enzyme** formed a tetramer (Drent et al., 1996; Valvona et al., 2016). LDH has **two most common types of subunits**, which is LDHA and LDHB, where any **combinations** of subunits can form **an intact enzyme** and LDH in different tissues have **different types of subunits combination that act as isoenzymes** (Markert et al., 1975; Drent et al., 1996; Cobben et al., 1997).

**Extract 13** Sobek's Life Science lab report: noun groups and nominalisation

Sobek is the only student who explains he builds these technical noun groups deliberately, using for example nominalizations followed by a prepositional phrases of + noun, as in *concentration of the enzyme*.

Lucy presents interesting findings in relation to experiential meanings. From a relatively simple EAP text with noun groups that rarely went beyond one or two modifiers (Appendix 8.6), to her disciplinary lab report, Lucy demonstrated an increasingly confident control over the resources of decontextualized, abstract meaning-making. In the example below, the noun groups are highlighted and are described. The headnouns are in bold and the nominalizations are in italics.

However, for <b>the diluted sample</b> [of genomic DNA] [in lane 9] [ from Figure 1]
(article + adjective + <b>headnoun</b> + three prepositional phrases)
<b>the lack</b> [of an observable result] could be explained by
(article+ <b>nominalized headnoun</b> + of-prepositional phrase)
the <b>sample</b> [not being prepared properly [due to improper techniques]] while carrying out the 10-fold <b>dilution</b> ,
(article + <b>headnoun</b> + non-finite defining relative clause + prepositional phrase)

leading to insufficient <b>concentration</b> of the genomic DNA being loaded onto the gel (adjective+nominalized headnoun+of-prepositional phrase+non-finite defining relative clause).
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**Extract 14** Lucy's Life Science lab report: noun groups and nominalisation

However, in the interview, Lucy did not remember building noun groups consciously: '*I think it is easier to unconsciously write these noun groups, because it could be confusing*', but she also reflected: '*I realize that I don't need to think about it [consciously looking at the noun groups I use] ...but I think if I did now, I might find errors [or subject-verb agreement, for example].*'

The lack of perceived transfer operating for the features which develop experiential meanings represents a significant finding in this study. The potential reasons will be discussed in the next chapter.

## 4.2.5 Logical resources

The analysis of the EAP texts revealed an uneven control over the resources that express logical meaning. Most participants have control over syntax, although Ben, Sobek, Walter, and Igor do not always construct clause complexes accurately. However, there are indications of some problems with specific adjuncts being used wrongly. Reena (Appendix 8.5) for example uses the causal hypotactic clause starting with 'as' unclearly. The use of 'as' implies a causal relation which is not confirmed by the propositions in the two clauses linked and this impedes the logical development of the text. Lucy (Appendix 8.6) shows the same problematic use of 'as'. Walter's use of external conjunction does not enable him to express a very clear cause-effect meaning (Appendix 8.9). Paul's use of 'while' does not allow him to express his intended logical meaning relation either (Appendix 8.11). Generally, therefore, many participants have a developing control over the resources and tend to have difficulties expressing the subtle logical meanings required in academic writing. However, some participants such as Dr Strange (Appendix 8.1), Yena (Appendix 8.12) and Yena (Appendix 8.2) use rather sophisticated resources confidently, for example processes such as '*trigger*' or '*cause*' to express logical relations.

During the interview, resources that realize logical meanings are mentioned as having transferred by four participants (see Table 16).

	Dr Strange	Yena	Kali	Ben	Reena	Lucy	Sobek	Julia	Walter	Igor	Paul	Jane	Total mention
Logical meaning relations	X	X	-	-	-	√	-	√	√	-	√	-	4

**Table 16** Transfer of logical resources

Dr Strange and Yena point to them but clarify that they were in fact transferred from learning experiences prior to the EAP module:

*Dr Strange:...* To restate my argument. [...] I use a lot of hence and therefore.

*Researcher:* so this [using logical linkers such as therefore, hence and because] is something you picked up just from reading Maths exercises?

*Dr Strange:* Yes.

Walter in the lab report for which he was awarded an A+ was praised by the lecturer for providing ‘good correlation’. This ability to convey a clear reasoning sequence leans on a range of resources, including thematic progression, which the student manages very well, but is also partially demonstrated by the student’s use of conjunction, highlighted in and annotated in Extract 15. One of the logical link is expressed in the verbal group (preventing).

S3 contains chlorophyll-b, pheophytin-a and pheophytin-b. From Table 1, the  $\lambda_{\max}$  for chlorophyll-b, matches to its literature value of 453nm. **However**, other labelled peaks in the spectra of S3 suggest the presence of more absorbing components such as pheophytin-a and pheophytin-b. **For example**, a peak of 407nm, which confirms the presence of pheophytin-a with a literature values of 408nm, ‘overshadows’ the absorption peaks of chlorophyll-a, **preventing (causal relation in the verb clause)** its peaks to be explicitly shown in the spectra and become shoulders at 430nm instead. **With that said**, chlorophyll-a was not found in S3 column in the TLC of figure 2. **Thus**, with that result from along with the uncertain presence of chlorophyll-a from Table 3, S3 does not contains chlorophyll-a. **Hence**, S3 only contains chlorophyll-b, pheohtytin-a and pheohtytin-b from the spectra, **further** confirming the results obtained in the TLC of Figure 2.

**Extract 15** Walter’s Life Science lab report: logical resources

Walter guides the reader through his logical explanation with a range of resources including conjunctive adjuncts such as ‘*however*’, and ‘*hence*’, as well as verbal clauses expressing the causal relation (‘*preventing its peak...*’).

Paul, an Engineering student, in Year 2, from Myanmar, points to conjunctive adjuncts that ‘*connect two sentences and develop his explanation*’.

The blue graph represents the 1<sup>st</sup> order lowpass filter and the red graph represents the 2<sup>nd</sup> order lowpass filter. Both graphs have the same cut-off frequency (159.0mHz) which is the frequency at which the magnitude value reduces to 0.707 of its maximum value. **However**, from the figure, it can be seen that higher order lowpass filter which is in red has sharper rolls off than lower order lowpass filter. **Therefore**, the higher order lowpass filter can reject more unwanted signals than lower order lowpass filter.

**Extract 16** Paul's Engineering report: logical resources

In Extract 16, Paul shows a simple but effective range of logical resources such as ‘*however*’ to highlight the contrasting/unexpected result, which leads to a concluding interpretation signaled by ‘*therefore*’.

Julia points to concessive clauses which she used ‘*for the contrast*’.

Supercoiled DNA is highly compact and experience less restriction along the agarose gel **while** nicked open circular DNA is larger and experience greater restriction across the pores of the agarose gel.

**Extract 17** Julia's Life Science lab report: logical resources

Julia’s use of ‘*while*’ in Extract 17 above allows her to effectively combine and contrast two sets of DNA conformations (shapes).

This section has shown that visibility of a body of linguistic knowledge for academic meaning-making in an EAP module does lead to transfer, in particular of textual and interpersonal, as well as logical meaning resources. When reporting transfer, participants link this to the disciplinary context and the need for such resource to make the required meaning. For example, interpersonal resources were explicitly linked to the need to make tentative meanings. Textual resources were linked to the need to make the information flow across the whole text, the paragraphs and sentences. Two participants also note that

thematic progression is applied through a process of backward transfer which is activated by a concrete need in the process of writing the disciplinary text. The results also show that experiential metafunction resources do not seem to transfer in the same deliberate way. When transfer is not reported, the textual evidence may indicate that the student's repertoire is actually deployed effectively if not verbalized. This is taken up in the discussion chapter.

### **4.3 Explaining the absence of transfer**

The lack of transfer of specific features, such as experiential features, is, as seen above, often explained through the difficulty of the knowledge item '*Because it's tougher*' or because it is '*implicit*'. These two explanations are significant because they are given by participants who otherwise demonstrate transfer as occurring in their writing tasks. Therefore, these students are able to see connections for some of the KAL resources, but less so for others. These elements of difficulty or cognitive load and of implicitness of the KAL concerned will be discussed in the discussion as they relate to the nature of the element of KAL, and of the disciplinary context - in other words attributes of the knowledge. This section now turns to the reasons given by the three participants who reported no transfer, focusing on the attribute of the knowers.

For Igor, Yena and Jane, the three participants who report virtually no transfer, this is attributed to one main factor: the lack of connection between the two contexts. One concern is about the difference in contexts which results in a lack of connection being made between the EAP module taught KAL and the needs in the discipline. This lack of relevance is also sometimes further developed to integrate a characterization of EAP writing and content knowledge as complex and superfluous, while scientific writing is described as simple, thereby explaining how the bulk of the EAP knowledge is deemed irrelevant.

#### **4.3.1 Difference in contexts**

The three students who report virtually no transfer at all explain that the EAP and the disciplinary contexts are too different to justify any transfer.

*'For me I have trouble bridging it across. Maybe it is because the styles of writing is different and initially when I wrote, I don't look out. For you when you critically analyze a text, you will notice...but I don't know about it, but as I learn it in the EAP module, now I find it a bit hard to make the link. Maybe in an EAP passage I can spot, but when you bring over to another text, then it is a bit hard to look. Then sometimes when brain stops writing, I end up writing like I usually do.'* (Igor)

The student seems to point that some people (like the researcher/lecturer) can notice knowledge about language when they read texts, but he can only recognize elements of EAP KAL in a similar text that the ones written in the EAP module. Igor also expresses his doubts over the feasibility of the EAP module ever being useful for a science student:

*'It doesn't sound so realistic. Because EAP module was mostly for FASS type of writing, and for us sciences we actually write another way to write. We should split the class. Scientific students should be taught scientific writing.'* (Igor)

The student is right that the writing tasks and texts may align more with those assigned in 'FASS' (Faculty of Arts and Social Sciences). However, these tasks only serve as the 'terrain' where the writing skills and the KAL is applied to provide students some practice with this knowledge. In the syllabus, attention is given to decreasing the semantic gravity of these taught items by relating them to the ways the disciplines may use them. Yet, this approach is not effective in Igor's case.

Like Igor, Jane, an Engineering student, describes the impression of disconnect:

*"Coz this is like an Engineering module, and that was from a language mod so I don't really connect them together, they're separated."*

Some students refer to this difficulty to make connections even though they do report some degree of transfer. Julia, for example explains she finds it difficult to see a connection with science texts:

*"I think I am using it [EAP module content] in my SP 1501[a writing module] because it seems the texts are like nearer, more similar. For the science, the lab report, it's like different and I can't find the link."*

The writing tasks in the EAP module and in their discipline are different in subject matter and genres, but most participants in the study seem to be able to go beyond these differences to see the relevance of the toolkits in a different context. Most participants have transferred the key element of the EAP module which is the ability to think about language in terms of contextual variation. As previously noted, Igor is commenting on a lab report which is very similar to Walter's (a subsequent lab report in the same Chemistry module). Walter does not seem to let the difference in genre get in the way of any transfer operating. For the three participants who do not report any transfer, however, the EAP knowledge seems to be, in LCT terms, flatlining at the stronger end of semantic gravity (Maton, 2016). Their EAP knowledge is tied to the EAP module, its type of texts (the essay, or 'FASS types of texts'). Very little or no connection is made across contexts which might trigger transfer.

### **4.3.2 Characterisation of writing in sciences as 'straightforward'**

Participants who describe scientific writing as different, often qualify it as 'straightforward', contrasting it with the EAP module context which becomes charged with evaluations such as 'complicated, extravagant, unnecessary'.

Igor, for example, explained that none of the EAP module was useful because '*in Science we just don't write like that*'. To him, none of the academic meaning-making toolkits in the table of instantiation are relevant because in the EAP context, they were used in what he calls a 'FASS text', a genre and a topic which are more aligned to the Arts or Social Sciences.

To the question whether at any point when writing her Engineering lab report, the EAP module content knowledge came useful, Jane also put this into clear terms, describing writing in Engineering as 'basic':

Researcher: "*Did you use any of these elements in your writing?*"

Jane: "*No I don't think so, it's [Engineering lab report] quite basic, it's just answering the questions, I don't really need citations, don't need to do hedging and stuff, it's quite straightforward.*" (Jane is one of the only students who does not report transfer of hedging, and yet uses hedging in her text).



Yena, the third of the ‘non-transfer’ participants, mentions several times that scientific writing is different to writing in the EAP module. She stresses that in science, writing is about “*numbers*”, about “*significance*”, and “*process*”. She implies in her description of her lab report that this constitutes a very different setting to the EAP module.

The three participants share the same opinion of the EAP module lacking relevance. An analysis of their EAP and disciplinary texts and the comment from the subject lecturer paints a different picture. While Yena writes a fairly good disciplinary text according to her lecturer, Igor and Jane do not seem to fare equally well. Extracts from the three participants’ disciplinary texts are briefly analyzed below.

Yena is a Year 2 Life Science student. A Singaporean, she has been schooled in English Medium schools throughout her life. In the EAP module, Yena performed very well (above 75% for most assignments). Her disciplinary text, a lab report (written for a Year Two module ‘Laboratory Techniques in Life Sciences’) meets expectations. The lecturer commends Yena for ‘*earn[ing] about mid-70s (average mark) for this report. There are inconsistencies in some concepts and this report clearly needs better editing in terms of spelling and typos, but the discussion is reasonably solid and the results are presented relatively well*’. The following excerpt is analyzed for experiential, logical, interpersonal and textual meanings to show that Yena seems able to engage the resources seen during the EAP module.

<p><b>4.1 Quality of RNA and DNA quantitated from Nanodrop</b></p> <p><u>Making use of UV absorbance ratios, quantitation of our samples using Nanodrop tells us the purity and concentration of our samples, which is crucial in helping us to identify which sample should be used before proceeding with</u></p>	<p><b>Textual meanings:</b> The heading and the hyperTheme indicate the purpose of this segment: to compare the quantitation between the two samples. The purpose is also clearly shown in the hyperTheme: A range of internal conjunction.</p>
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<p>further experiments. The A260/280 ratio is used to determine the purity of our samples. A RNA and DNA sample is said to be pure if it falls within the A260/280 ratio of 1.8-2.0 and 1.6-1.8 respectively. However, if the RNA or DNA sample quantitated falls below or above the optimal range of purity, this could suggest that contaminants such as ethanol and proteins are present in the sample. With regards to the quality of RNA samples isolated, RNA isolation was successful because RNA sample 1 and 2 are within the expected A260/280 ratio. Although A260/280 ratio of RNA sample 2 was slightly below expected ratio, high concentration of RNA was present in it. RT-PCR products were also pure. However, concentration of RT-PCR products produced is significantly lower than the concentration of total RNA isolated. This is because total RNA contains mRNA, tRNA and rRNA. Since mRNA constitutes 1-5% of the total concentration of RNA, during reverse transcription, where only mRNA is required (template) to form RT-PCR products, it is reasonable to observe a lower concentration due to the removal of tRNA and rRNA.</p>	<p><b>Experiential meanings:</b> Noun groups are highlighted in pink with nominalizations in italics most of which are established technical terms, or dead metaphors. The technical entities are expressed with a range of technical noun groups and technical terms.</p> <p><b>Logical meanings:</b> Conjunctions are highlighted in blue; there is a clear effort to clarify the logical progression between the concepts.</p> <p><b>Interpersonal meanings:</b> Instances of hedging are highlighted in green. Yena uses a range appropriately to explain the results.</p>
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**Extract 18** Yena's Life Science lab report: experiential, logical, interpersonal and textual meanings

Yena's paragraph above is praised by the lecturer for providing a 'good explanation about quantitation differences between the first and second experiments'. The resources deployed by Yena to achieve this clarity of explanation noted by the lecturer include an effective use of hyperTheme, textual cohesion created through an effective thematic progression, and a range of conjunctions to support the logical development of the explanation. Finally, the interpretative dimension of the explanation is realised through a

range of hedging devices. All of these resources were taught explicitly in the EAP module, to achieve precisely these meanings. Yena’s interview data is analysed below in 4.4.2.

Jane’s text was a lab report from an Electrical Engineering Year One core module. Although this takes the name of a ‘lab report’, the assignment type is in fact a list of short-answers following very specific guiding questions such as:

1. List the electrical appliances used in your home.
2. Plot the power used by individual appliances during the day.
3. Which loads contribute for the most energy consumption? Why?
4. How can heating and cooling needs in the home be made more energy efficient?
5. Suggest a plan of use and types of appliance that reduces energy consumption

The Engineering lecturer did not provide feedback on participant Jane’s answers. From an analysis of the summary (Extract 19) which acted as an abstract in the report, it seems that Jane does not yet have confident control over accuracy rules (such as syntax, and punctuation), nor does she display a great range of the table of instantiation features. The circumstantial dependent clause pattern ‘By studying x, we found Y’, and ‘Based on our findings, we found Z’ comes across as repetitive. More importantly, this structure allows for the writer to use the personal pronoun ‘we’ as topical theme in most of the sentences.

<p>Summary:</p> <p>By estimating the operation time and power consumption of the various electrical appliance at home, we can determine the energy needs of our home. Based on our findings, we found that the air condition contributed for the most energy consumption as it has the longest operation time, we have also identified ways to reduce our energy consumption. By studying the luminous efficiency of the various lamps in the market, we found that LED lamps are the best lamps that will reduce energy consumption. By studying the usage pattern of the heating and</p>	<p><b>Textual meanings</b> The hyperTheme sets the purpose of the text. The flow does not seem to be well managed, with a lack of progression from one sentence to the next. Topical theme ‘we’ keeps the grammar congruent. ‘Ways’ is the only general noun used to point forward.</p> <p><b>Experiential meanings</b> None of the noun groups are particularly dense or complex. They may very well be sufficient for this report.</p> <p><b>Logical meanings</b> One instance of a concession clause. Dependent ‘By’ clauses to express a method.</p>
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<p>cooling appliance at home, we found that heating appliances although have shorter operation time, it requires high power consumption due to the long continuous usage, A block diagram is also included to explain how our system gets energy.</p>	<p><b>Interpersonal meanings</b> No hedging or heteroglossic features are used in the summary (but occur in the rest of Jane's report as will be shown below)</p>
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**Extract 19** Jane's Electrical Engineering lab report: experiential, logical, interpersonal and textual meanings

The key element in the analysis of Jane's repertoire is that her grammar is very congruent, as shown in the theme analysis (see Appendix 8.12) which shows that all topical themes are the participant (the group of students). This produces a thematic pattern that focuses on the student/the group of student, rather than on the research processes or findings, which is not typical of academic register. While it is difficult to judge whether this is acceptable for this particular text without the lecturer's opinion, it remains that, as Derewianka (2003), and Halliday (2006) have argued, this congruency indicates that Jane's repertoire is still in the process of shifting from common sense to uncommonsense.

As for Igor, the lecturer assigned a B+ to his Chemistry lab report. In the context of this university a B+ does not indicate a strong performance. It was not possible to access more information about the lab report as the student did not wish to share more. An analysis of the text showed that the discussion and results were not clearly differentiated. There were no headings to clearly label the stages of the text. As can be seen in the Extract 20 below, the student seems to be using the logical meaning relations, as well as interpersonal features adequately but the coherence of the text is difficult to follow. It is important to note that the text below is analyzed from outside of the discipline, and much of the lack of coherence experienced when reading may come from the lack of knowledge of the field. However, as stated above, the grade awarded, and the comments made by the students do not indicate a very successful performance.

The results and discussions appear in the same, long, paragraph (580 words) of which 273 are shown below. During the interview, Igor struggled to talk about the information flow and to differentiate between results and discussion.

<b><u>Results and Discussions</u></b>	
<p>Upon extracting the crude CuI from drying the diethyl ether, the purity of the CuI appears to be rather high as its appearance is a white powdery solid as per the literature description of CuI. From the calculations, the limiting reagent in the synthesis of CuI is CuSO<sub>4</sub>.5H<sub>2</sub>O (refer to appendix) and the crude product percentage yield has been calculated at 114.38%, this value is valid as the product obtained is not pure CuI but crude CuI, so is highly probable that the crude product contains trace amount of impurities which in turn gives a yield of more than 100%. Comparing the calibration graphs obtained from 2 sets of standard solutions, namely CPZ 1-4 and Cu 1-4, Cu1-4 will provide more unreliable values as the absorbance values of all four concentrations are very close to zero, hence it is susceptible to random errors such as the background noise of the instrument which results in (logical relation in the verbal group) small fluctuations in the absorbance readings, however this fluctuation will contribute (logical relation in the verbal group) greatly to the random error as the value of absorbance is very small (~0) hence resulting in an unreliable calibration graph. The graph of CPZ 1-4 on the other hand has high, distinct peaks of absorbance; the higher values of absorbance will in turn reduce the uncertainty in the readings due to fluctuations, giving rise to more reliable results. The molar absorptivity of CPZ-S at 600nm is calculated to be 1.6157x10<sup>4</sup> L mol<sup>-1</sup></p>	<p><b>Textual meanings</b> Beyond the heading, there is no clear hyperTheme; The first sentence develops one aspect of the results so it is intended to act as a hypertheme. The flow of information is not easy to follow.</p> <p><b>Experiential meanings</b> There are several technical groups and some nominalisations.</p>
	<p><b>Logical meanings</b> In conjunction with the use of tenses and the syntactic errors, some logical meanings/conjunctions are obscuring the intended meaning. For example: see the chain of cause and effect set up with the blue highlights, where the reader may have difficulty following. All sentences are clause complexes, most of which are inaccurate</p>
	<p><b>Interpersonal meanings</b> Some hedging, and limiters seem ill-placed in the result section. The first sentence for example reports findings, so the use of 'appear to be' or 'rather' seem redundant. Modality is problematic with the use of the present simple tenses and auxiliary 'will' making it difficult for the reader to understand what is</p>

cm-1 while that of Cu-NH <sub>3</sub> at 640nm is -45.39 L mol <sup>-1</sup> cm <sup>-1</sup> . Actual Cu-CPZ molar absorptivity at 600nm is 1.6 x10 <sup>4</sup> L mol <sup>-1</sup> cm <sup>-1</sup> and that of Cu-NH <sub>3</sub> at 640nm is 77 L mol <sup>-1</sup> cm <sup>-1</sup> . [...]	presented as factual and what is an interpretation of the results.
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**Extract 20** Igor's Chemistry lab report: experiential, logical, interpersonal and textual meanings

Igor's text can be compared with another, more successful lab report, such as Walter's. One striking difference between the two texts, is the difference in meaning clarity. Walter in the first example below, writes sentences that are very typical of scientific discourse as described by Halliday (2006):

1. However, other labelled peaks in the spectra of S3 suggest the presence of more absorbing components such as pheotphytin-a ad pheophytin-b.

Walter's sentence consists of clause simplex composed of a conjunction, a technical noun group followed by a verb that carries an interpersonal meaning (suggest), itself followed by another technical noun group.

In contrast, Igor writes a clause complex involving a circumstantial clause (*upon extracting...*), a short main clause with a verb carrying a hedging meaning and a limiter with an imprecise indication of measure '*rather high*', which is then followed by a causal hypotactic clause. For a student who insists that Scientific writing is simple and straightforward, he actually uses a range of expressions (*'upon': 'as per'*) and makes syntactic choices that recall a more convoluted, and even narrative style.

2. Upon extracting the crude CuI from drying the diethyl ether, the purity of the CuI appears to be rather high as its appearance is a white powdery solid as per the literature description of CuI .

The disciplinary assignment analysis for the three students Yena, Igor and Jane and when available, the evaluation of a discipline expert, seem to indicate that perception of transfer is not necessarily related to performance. Yena (Extract 18) produces a text which is satisfactory for her lecturer. The lecturer comments solely on content, and when dealing with 'language', writes that the preference for the Methods section is to use the passive voice and past tense. This is very important of course as subject lecturers themselves may view language as unimportant until it interferes with the meaning-making experience they

are sharing with the students through the text. The level of tolerance may be very different across lecturers (as was found in Street & Lea, 1989).

Igor and Jane, however, present different texts. Igor produces a B+ report (according to the student) which indicates a performance which is not very highly evaluated by the lecturer. Text analysis reveals that Igor's text seems to adopt a register that is somewhat different from the description of scientific discourse seen in Chapter 2, and different from Walter's A+ lab report. This shows that Igor's linguistic representation (in particular his management of interpersonal and logical meanings) may not be completely successful at delivering highly valued content to the lecturer. Igor was reluctant to divulge the subject lecturer's feedback on the text, and so this data is not available beyond the letter grade. Jane's text shows that she may struggle over control of several features expected in scientific register and in her case, the lack of relevance perceived for the EAP KAL, may also reflect a lack of ability to analyze her disciplinary context to produce a text that meets the requirements. These two students' evolving repertoires, as exemplified in these two texts, do not seem yet to enable them fully to make the valued uncommonsense meanings typical of scientific discourse. How this relates to the ability to transfer will be discussed in Chapter 5.

### **4.3.3 Conclusion**

Confirming James (2010)'s findings, the perception of context similarity and difference seems to be an important factor in whether transfer occurs. Dr Strange is able to abstract elements of textual meanings and use them in Maths proofing, a context which is arguably very far from the EAP module context. Igor and Walter perceive their disciplinary contexts in different ways, with Igor making no connections, while Walter is able to use most of the EAP KAL toolkits. This confirms that it is perception of similarity which is important and not actual similarity. The literature reviewed in Chapter 1 explains this difference in perception though the concept of 'motivation' (James, 2012). However, in view of such a homogeneous group of participants, who have successfully secured a place at a leading University in Asia, motivation seems at best an ill- defined explanation. All participants in this study can be described as 'motivated' students. The grounded theory analysis of the interview transcripts revealed that students seemed to characterize their discipline, the EAP module and transfer, as well as themselves as members of a community quite differently according to whether they reported transfer or

not. The results of the analysis of dispositions to knowledge and of affiliation indications are reported in 4.4.

## **4.4 Dispositions to knowledge and affiliation**

During the analysis of the interview data, it became apparent that participants were not only communicating the extent to which they had operated any transfer and their explanation for it. They were also expressing deeply held values and dispositions. This was seen in the way they were describing the EAP module and their own disciplines. As explained in the methodology chapter, an LCT Specialization analysis was conducted to explore the participants' dispositions to knowledge in both their discipline and the EAP module. To do this, and drawing on Maton and Chen's (2016b) as well as Weekes' (2014) approaches, the realisations of epistemic relations were charted as follows (the translation device is provided in Chapter 3, section 3.2.4):

- Strong Epistemic relations (ER+) are realized as an emphasis on the content knowledge or the specialized knowledge needed. In the data, this was indicated through the use of technical terms, and the description of the processes (of the scientific activities in the discipline, for example) as well as positive evaluations of knowledge and ways of doing things.
- Weak epistemic relations (ER-) are realized as a lack of recognition of knowledge or a depreciating of the knowledge content. In the data, this was indicated by a lack of reference to concrete knowledge from the discipline, or negative evaluations of knowledge and ways of doing things.

It is important to note that, as Maton & Chen (2016a) state, the focus is on the participant's educational disposition, as realized in their description of the situation (the EAP module, the disciplinary text and transfer) and do not necessarily reflect an objective reality. Nevertheless, a disposition analysis of the interview data (and the EAP reflective task where relevant) shows a clear contrast between students who report transfer (even if limited) and those who report none. As will be seen, this contrast goes beyond the ability to name content knowledge from the EAP module, but encompasses the way students describe the EAP module, their own discipline and the way they express values about them.



#### 4.4.1 EAP characterised as a knowledge code discipline

Participants who report transfer tend to characterise the EAP module as a knowledge code, or at least they tend to have perceived the boosting of the epistemic relations in the module. This is predictable since one way to measure transfer in this study is to both make KAL visible and to track whether students are consciously using this knowledge in their disciplinary text and talking about it in the interview.

In his reflection task (see annotated Extract 21 below), Dr Strange emphasizes knowledge content for his discipline: the problem stated (the difficulty of writing proof) is explained in terms of lack of knowledge: *I did not know to apply my thoughts into words that would be understandable by the readers*. He exhibits a knowledge code orientation to his discipline.

In Dr Strange's characterisation of the EAP module, however, there is a shift from a weak epistemic relation characterisation to a strengthening in epistemic relation. The EAP module is first characterised as 'useless'; 'I considered it as a burden'. However, after the critical incident (marked by 'Things start changing'), the student's characterisation turns to a knowledge code orientation. It is telling that the first mention of EAP after this incident mentions 'course materials being taught [to] us' and a specific knowledge item, all indications of strengthening epistemic relations. This ER+ characterization continues throughout the reflection with explicit reference to content knowledge in the EAP module. Dr Strange's characterisation of the EAP curriculum therefore shifts to a knowledge oriented depiction, which is in sharp contrast to the second participant, Yena, as will be shown below.

<p>During the first weeks of university life, I started doing my assignments which only consist of computations and proofs (ER+). I had hard times completing it especially when I was asked to do proofs, because I did not know (ER+) to apply my thoughts into words that would be understandable by the readers.</p> <p>Meanwhile, the thought that [EAP module] was useless clang (ER-) and I always considered it as a burden.</p>	<p>Problem: Student struggles to write proofs. Focus is on skills and knowledge: ER+</p> <p>EAP module (ES1103) is considered useless, a burden: ER-.</p>
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<p><b><u>Things start changing</u></b> when I saw there is something applicable that I could derive from learning English. During Week 5, [EAP module] course materials (ER+) taught us that there were 3 main thematic progression patterns. This particular material turned out to be the answer of how to do proofs (ER+). I was satisfied because I was able to find out the implication of writing in Maths even if during the [EAP module] discussion, all things related with Maths were considered as far transfers.</p> <p>Lately, writing proofs are made easier for me by applying pattern 2 of thematic progression (ER+) because it would avoid gaps between steps (ER+) and bring the readers to understand the proofs better. In fact, I received better grades for my late proofing homework compared to the first ones.</p>	<p>(Incidentally, the student's feelings are also emphasized: SR+)</p> <p><b><u>Critical incident:</u></b> In the EAP module, student learns about thematic progression patterns to develop cohesive information flow. Sees relevance for 'how to do proofs' and sees the implication for 'writing in Maths'.</p> <p>Concrete example of use of patterns 2 (participant means A-&gt;B B-&gt;C/zigzag pattern) in proof exercise. (ER+)</p> <p>Result is better grades, problem seems to be addressed.</p>
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Extract 21 Dr Strange's EAP reflection: epistemic relations

Similar findings in other participants who reported transfer confirm this pattern (ER+ in yellow, ER- in blue)

Walter, highlights

*'the same thing that I learned from EAP last semester, first you have to bring the key point, then explanation, then references or citations and figures, especially.'*

In fact, the participant uses the phrases *I learned from the EAP module* (3 times), and another two times with a concrete item of knowledge from the EAP module: synthesis and cohesiveness. The student also uses the expressions *I used or I put into practice* 5 times with an item of the EAP module. Kali acknowledges several elements of knowledge from the EAP syllabus and states that '*Before EAP I had no idea, so this helps*'

Other participants' expressions that characterize EAP as a knowledge code include: '*I check the thematic progression when I proofread*' (Sobek); '*in EAP I learned how to compare and contrast*' (Paul).

This shows that students who seem to have benefitted from the EAP curriculum were first able to recognize the strengthened epistemic relations.

#### 4.4.2 EAP characterised as a knower code discipline

The three participants who report virtually no transfer present a drastically different characterization of the EAP module and of their own discipline. They employ various strategies that downplay the EAP module, mis-represent its content or dismiss its relevance and other types of characterizations that boost the technicality and knowledge of their own discipline while downplaying the EAP module's.

Yena, for example uses a rich scientific vocabulary to explain the content of her lab report: '*colonies, solution concentration, protein, DNA, standard curve, relative mobility, linear relationship*'. Yena consistently emphasizes strong epistemic relations when talking about her disciplinary module, and in particular the assignment (lab report) being discussed. A large part of the interview focuses on scientific knowledge and scientific processes as shown when she begins talking about her lab report (indications of ER+ are highlighted in yellow) and which she progressively opposes to the EAP module, which is shown in her question to the researcher: '*Is it really scientific?*'.

*Because this was actually we have to describe why is this protein important? So, must be as scientific as possible, so we actually use many scientific terms, [...] you have to talk about the protein itself, so and then of course, there are some steps in the methods, right, that you're required to synthesise the protein, [...] in science, they will ask you about the number, why you need 3, why you need 2, what's the significance.*

*That's why the red ones, the black ones is mutation, then you have to explain why this mutation takes place and then does this mutation have further implication in protein folding, that's now the discussion. Is it really scientific? (ER+ for the discipline)*

*I think it is unconsciously [structure] because in Science you have to explain how you derive stuff*

*We have to describe the nitty gritty (ER+ for the discipline)*

Yena's characterisation of the EAP module, on the other hand is completely different. She first highlights the lack of any perceived knowledge in the EAP module and the lack of usefulness of the EAP module. When prompted to recognize several hedging instances in the discussion segment of her lab report, Yena does not see this being transferred from the EAP module but from further back in her childhood. This is despite the fact that modality, and the language of interpretation is taught in the EAP module:

*“mmm, it's more like generally [not from the EAP module], coz always writing essays as a child so unconsciously you think you'd better not make assumptions, so I put it [hedging] here”.*

Yena also states that she learned a lot by consulting 'senior reports and then we compare what is being written, what is not written and then we just mix and match'. However, when asked what she looks for in the seniors' reports, she says: *I don't read [the senior reports] for the grammar, I just go and get the gist for the content.*

Yena associates the EAP module to 'grammar' by which she means grammatical complexity, and formal accuracy:

*In terms of the grammar, I don't really remember using it here, it's very scientific so there's not so much [hesitates]. We just use short sentences.*

In the EAP module, the term 'grammar' is not mentioned. The functional grammar elements represented in the table of instantiation are referred to in class as 'knowledge about academic language', or 'the four toolkits' of academic writing. Therefore the researcher interprets Yena's mention of 'grammar' as representative of a weak epistemic relation characterization where knowledge is downplayed and misrepresented. This last instance also shows how much of a distance Yena seems to see between the epistemic orientations of the two contexts. After describing her lab report and her discipline emphasizing strong epistemic relations, she marks an abrupt contrast with the EAP module 'Here, it's scientific'.

Despite the strong focus on and the visibility of the knowledge about language and meaning-making in the EAP module curriculum, pedagogy and assessment, it seems that Yena did not notice. When Yena characterises the EAP module as teaching 'grammar', the researcher/tutor does not recognise the EAP module which was delivered. Maton & Chen (2016a) explain that the way actors experience a context is always mediated by their dispositions: 'they see the context through their own codes' (p.13). In the study, the

Chinese students whose dispositions were knowledge oriented perceived the Australian online learning environment (knower oriented) as lacking knowledge content: ‘They teach us nothing’ explains Vivian (Maton & Chen 2016a, p.14). Moreover, the knower-code (stronger social relations) was not recognized as legitimate, and thus, was not actively addressed by the knowledge-oriented students.

In the current context, the EAP module seems to have been experienced by Yena as lacking any knowledge (what she means by grammar seems to refer to superfluous complexity). It feels like it is politeness alone that prevents her from exclaiming too: ‘The EAP module taught me nothing!’

In the same way, Igor downplays the EAP content knowledge. He even shows a degree of discomfort when discussing it as indicated by the giggles:

*Researcher: When you wrote this, how much of the ESI103 knowledge came useful? What did you connect to if anything?*

*Igor: [giggles]*

The participant also shows that he sees EAP taught content as superfluous:

*As for the lab reports I would say I did not consciously engage much of the EAP knowledge as it would **slow down my writing**, and also to follow the guide questions given from my lab professor, I would try to answer the guide questions directly so as to **minimise ambiguity** and not sounding **like beating about the bush (ER- for EAP)**.*

For Igor, engaging the EAP knowledge would impede his writing, which relates to the difficulty of the student to make conscious, deliberate choices. He also characterizes EAP knowledge as ‘*beating about the bush*’, but as was seen in the extract from his writing, his style is actually quite convoluted and unclear, and so he may have benefited from using some toolkits more deliberately to adjust his register to the context.

The only concession to any knowledge in the EAP module, is ‘grammar’:

*I finish the writing but it's just the grammar is a bit bad.*

The participant uses precise language to describe the stages of the text (Introduction, methods and procedures, results and discussion), but this is attributed to the Chemistry professor and the lab report guidelines. He also uses a range of technical terms and explains the procedure of centrifuge rather than paper filter for small particles.

coz I have to extract **the crude product** so this is the **crude percentage**  
which...either way we have to give a reasoning

Finally, the participant also seems to characterize the members of the EAP community. When offered to have his essay on Einstein and Relativity commented on, his response indicates his positioning away from people who are oriented to language as perhaps not cognitively capable of handling the vertical and dense knowledge structures exhibited in the Sciences.

*"I will send it but there may be some parts that are difficult to understand."*

*"it's difficult to explain"*

*"That's just some Chemistry lingo"*

This can be put into perspective with the rest of the data for Igor, and other quotes such as the following:

*For **me I** have trouble bridging it across. [...] For **you** when **you** critically analyse a text, **you** will notice...*

There is a clear indication that this student is experiencing a code clash: while he sees himself as a knowledge-oriented person, member of vertical knowledge community, he also describes himself as unable to function in a language-based module which he characterizes as having a knower-oriented code. Through his opposition of each type of knowers in the quote above, he seems to characterize the two fields as incompatible. This code clash remains despite the intended knowledge orientation of the EAP intervention.

Jane, the last of the three participants who report minimal transfer, starts with insisting on the simplicity of the lab report she was asked to write:

*It's just a summary of what we did*

*It's just basically my.. what we observed during ...while conducting the experiment, what we observed and the summary of our data*

So, while Jane is not emphasising her discipline are knowledge oriented, just like Igor, she downplays the need to pay attention to language, in doing so ignoring that the EAP content included writing about methods and results. She shows a conception of language in Engineering as simple.

*I'm doing an Engineering mod now so I'll think more about the methods and science part, not of the language.*

*Yes my focus is on results, **it's not the language** (ER- for EAP)*

*No I don't think so, it's [Engineering lab report] quite basic, it's just answering the questions, I don't really need citations, don't need to do hedging and stuff, it's quite straightforward."*

EAP knowledge is called 'hedging and stuff' and described as irrelevant, and yet from Jane's text, the need to use the EAP KAL to produce an academic text that shows appropriate level of abstraction may have been helpful.

There are similarities between Yena, Igor and Jane in the way they seem to experience a code clash: for them a language module is not supposed to provide verticality, and so they experience the curriculum as knower-code oriented. And while Yena seems to have acquired an ability to write lab reports according to the lecturer's expectations, Igor and Jane do not seem to have. The fact that both Igor and Jane were reluctant to divulge more of the lecturer's evaluation is perhaps telling. However, there is no doubt that these three students are motivated. They attended the EAP module and completed the assignments. It is a deeper disposition that may have prevented them from actually recognizing knowledge and making it useful. The different ways these three participants expressed their alignments with certain communities also became salient during the analysis. This is reported below.

#### **4.4.4 Affiliation**

In the interviews, participants also affiliated more or less strongly to their discipline and claimed membership to different communities. In the discourse, indication of affiliation to the disciplinary group or the undergraduate student group were shown through the use of self-mention in the form of personal pronouns, *I* or *we*. Following Antaki and Widdicombe (2008) who showed how personal pronouns are deployed to indicate membership, the interview data was first coded using self-mention (*I* or *we*) and the purpose of these mentions (Hyland, 2012). Then, bonds indicating community affiliation through couplings of ideational meanings and attitude (see Knight, 2010) were investigated.

The use of self-mention and their purpose in the interview were quantified and analysed. All participants use the self-mention *I*, especially when talking about their writing processes and choices (see the second row in Table 17 below).

When talking about the procedures of the lab experiment and the requirements of the task, most students switched to a group affiliation, *we*. Only Dr Strange and Paul do not use *we*, possibly because the task they describe is individual (a proof writing exercise and a lab report based on an individual experiment). Most other participants conduct part of the experiment in groups and then write the report individually, and so the use of *we* may also refer to the element of group work. These group mentions, however, occur overwhelmingly with instances of modulation resources which mediate degrees of obligation: *we have to; we're supposed to; we are asked to; we need to...* In Table 17 below, the fourth row shows the degree to which this is used. For example, Walter's nine group mentions are all associated with modal items that carry meanings of obligation. In these many instances, participants affiliate with the group of undergraduate students who are becoming acculturated to their discipline community through guidelines which are imposed on them. Confirming this interpretation, the mention of experts, such as professors, lecturers, teaching assistants also often occurs with commands, such as '*they ask, they say we can...; they tell us, they want us to*'. For Year One science students, there is nothing surprising in this positioning on the edge of the disciplinary community, as legitimate participants in the periphery, who will increasingly become confident in their ownership of the discourse and the practices of the scientific community.

There is one type of self-mention, however, which stands out. One use of the group marker '*we*' only occurs for the three participants who did not report transfer, and who, as seen above, characterised the EAP module as ER-. In the table below, it is called *We (authoritative)* because while it represents a group affiliation, it also takes an authoritative stance: this '*we*' talks for the whole disciplinary community, not for the undergraduate student group. Strikingly, this specific use of *we* only concerns the three students, Yena, Igor and Jane who reported no or very minimal transfer from the EAP module. These instances are further discussed below.



	Walter	Kali	Sobek	Paul	Dr Strange	Ben	Reena	Lucy	Julia	Yena	Igor	Jane
I	42	15.8	22	39	21	22.5	21	23	27.2	15.3	20.2	18
We (student group)	9	15.8	1.5	0	0	3.6	11.8	5	15.3	19.7	9	10.3
Use of obligation modality item	9	2.4	0.7	0	0	0	5.4	0.6	0	0	2.2	0
We (authoritative)	0	0	0	0	0	0	0	0	0	0.34	0.9	3.7

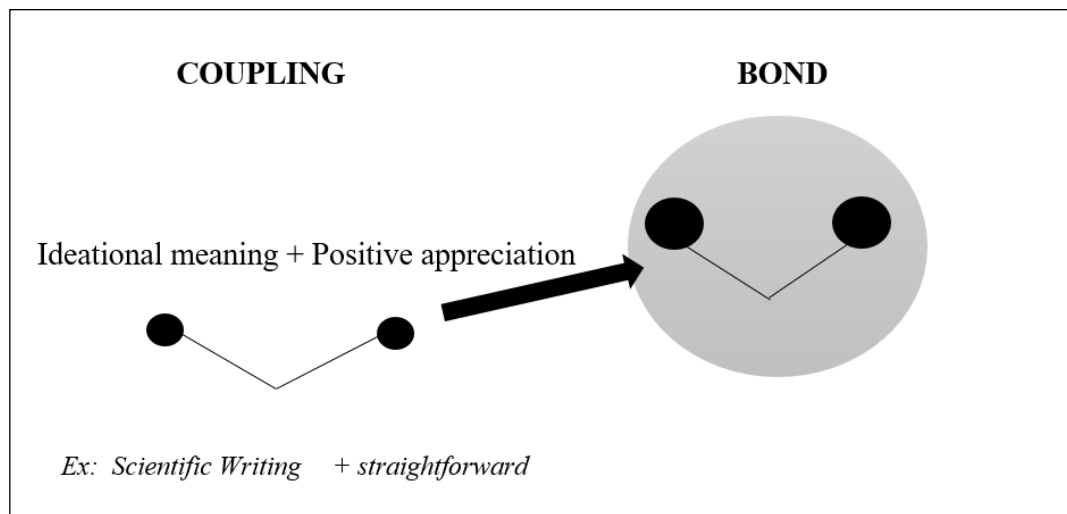
**Table 17** Frequency and type of self-mention and group affiliation in the interviews (per 1,000 words)

Yena uses the authoritative *we* once, Igor uses it twice and Jane four times (for Jane, because the function of ‘you’ in one of the instances is identical to ‘we’, it was counted in the same category):

1. **we** don't use it in our discipline (Jane)
2. In Engineering **we** don't really use it until we are in final year (Jane)
3. **we** don't get to use the skills that we learn in EAP (Jane)
4. In Engineering, **you** don't write too much (Jane)
5. **we** actually write another way to write (Igor)
6. in Science **we** just don't write like that (Igor)
7. **We** just use short sentences (Yena)

This use of *we* (Authoritative) has a different function. It is used to justify the lack of transfer of the EAP knowledge. It projects a different affiliation. These students are not just members of the undergraduate group, at the edge of the community, they also affiliate with a more authoritative disciplinary community, one that can set the norms. While other participants' use of ‘we’ was surrounded with indication of external powerful and legitimate knowers, this ‘we’ is emphasized by the use of the present simple tense and the circumstantial groups (underlined) which sets their discipline apart: *in Science*, *in Engineering*, *in our discipline*. From a social identity theory perspective, the participants are confirming to ingroup norms (Jackson & Hogg, 2015): ‘We’ as members of the scientific/ Engineering/ disciplinary community do things a certain way. These norms are then used to justify the way these participants write.

This difference in affiliation also involves the strategy of ‘coupling’ which consists in associating values with ideational meanings (as shown in Figure 19). For Knight (2010), couplings are what we see in the text while bonds are the social semiotic units that mediate affiliation - what we construe with our choices of couplings. In the example provided in Figure 19, the participant is not only describing what she thinks scientific writing is like, she is also negotiating her position as a member of the scientific writing community with whom she shares the positive value expressed in ‘*straightforward*’. As seen above, she is also distancing herself from the EAP discipline and community.



**Figure 19** Attitude + Ideation coupling as one affiliation strategy (adapted from Knight, 2010, p. 203)

The participants couple positive or negative attitude (affect, judgement or appreciation) meanings with the following experiential meanings: scientific writing; EAP writing. Examples of couplings concerning the EAP module and its community include positive and negative evaluations:

*Engineering lab report + quite basic (positive evaluation)*

*EAP KAL knowledge + slow down my writing (negative evaluation)*

*EAP module + useless burden (negative evaluation)*

*EAP content knowledge + answer (positive evaluation)*

*Acquiring KAL + helpful (positive evaluation)*

Following Knight (2010), the bonds created can then be linked to personal bond networks, and to ideological networks. Because bonds have been associated with membership categorization analysis (Housley & Fitzgerald, 2009), they reveal an additional way some participants are disposed towards transferring knowledge across disciplinary boundaries. Transformation is possible, as is shown by Dr Strange who shifts from his initial dismissal of the EAP module (as ‘*a burden*’) to an endorsement (‘*the*

*answer*'). It is crucial to note, that the reason why this student was 'drawn in' was the epistemic orientation of the module, which he was able to perceive despite his original conception.

The fact that the three participants who do not operate transfer indicate a strong sense of belonging to their disciplinary group can be seen as positive for the student. However, as year one students, they are only beginning to become accustomed to the discourse and practices of their discipline and so many of the assertions above, while not completely untrue, are problematic. The bonds they express are also indicative of a very strong boundary perceived between disciplines. Their assertive, and perhaps premature, view of their disciplinary values and conventions may in fact prevent them from seeing the potential cumulative learning opportunity in the EAP module and other contexts. This will be discussed in the next chapter.

## **4.5 Conclusion**

This chapter has described the ways the SFL EAP module has impacted the transfer that occurs to a range of disciplinary writing tasks. It was seen that a majority of the twelve participants (nine) reported some degree of transfer, with only three reporting none or very little of the EAP content knowledge being consciously applied or relevant in their disciplinary writing. It has also been shown that the four main toolkits of the table of instantiation do not transfer equally well. While textual, interpersonal and logical meanings seem to be perceived by students as relevant to their disciplinary contexts, hardly any elements of the experiential metafunction were mentioned in the interviews as transferred in the disciplinary texts. The chapter also showed that the reasons for non-transfer are related to the difficulty of the item, or more often to the perceived distance of the contexts. A closer analysis of the interview data for indications of knowledge or knower characterisations of the EAP module and the discipline indicated a difference between students who report transfer and those who do not. The last group tends to minimise epistemic relations when discussing the EAP module. Students who report transfer, on the other hand, provide a knowledge code characterisation of both the EAP and the disciplinary contexts. Furthermore, an analysis of the group affiliation expressed in the interviews showed that while all participants showed an affiliation to the group 'undergraduate science student', only three students also showed an affiliation to the group 'authoritative disciplinary community/expert knower', which they used to justify their lack of transfer from the EAP module. These results are discussed in Chapter 5.

# Chapter 5: Discussion

In this thesis I set out to answer the following questions:

In what ways does an EAP curriculum informed by SFL impact transfer from an English for General Academic Purposes module to discipline modules?

1. In what ways can SFL and LCT as an overarching theoretical framework of knowledge inform teaching for transfer in an English for Academic Purposes module?
2. What evidence of transfer is there between an EAP module grounded in SFL and writing tasks in the disciplinary modules?
3. What can explain any differences in perceptions of transfer or actual transfer amongst participants?

The chapter first answers sub question 1. Then, the chapter discusses the evidence of transfer and why the linguistic resources transferred differently (5.2). Differences observed between participants are then addressed in 5.3.

## **5.1 An SFL/LCT approach to teaching for transfer**

In the literature overviewed in Chapter 1, much of the lack of transfer observed is attributed to the perceived lack of relevance of the EAP module (Benzie, 2011; Driscoll, 2009; James, 2012; Ong, 2014; Spack, 1997). This is taken to confirm the claim that transfer is better or only achieved through a discipline-specific provisions of EAP. This thesis shows that studies that downplay the potential for an EGAP to serve the students in their discipline are in fact not paying enough attention to their syllabus. The syllabus content has the potential to completely transform the way students perceive relevance, report transfer and concretely engage the EAP knowledge in their disciplinary context. The study aligns with several others that have attempted to bring a visible, explicit knowledge about language and meaning-making to students' awareness (Coffin & Donohue, 2014; Donohue, 2012; Dreyfus et al., 2016), and confirms that a systemic functional linguistic/genre approach to academic literacy teaching enables a large

majority of learners to experience a sense of cumulative learning and of portable learning across vastly different contexts.

The social semiotic approach to EAP described in this study contributes to transfer in several ways: a social realist perspective on knowledge in the EAP curriculum allows it to become a key element in the research into transfer; the instantiation approach enables curriculum considerations to go beyond the ESAP vs EGAP dichotomy. Finally, the visible functional KAL shown in this thesis constitutes a systematic and theoretically-driven way to develop students' repertoire in ways that may benefit their academic writing performance.

In Chapter 1 (section 1.2), the various metaphors regarding transfer were reviewed. Tuomi-Grohn & Engestrom (2003) discussed *boundary crossing* and *learning as becoming*. For others, transfer was likened to a *transformation* (Greeno, Smith & Moore, 1993) whereby learners become 'attuned to the affordances' of the learning contexts. Lave and Wenger (1991) considered transfer as a movement from a legitimate peripheral participation towards the centre of the community. Many of these conceptualisations rejected an objectivist view of knowledge where a set of isolated items might be transported and applied from one context to the next. This study has taken a social realist approach where knowledge and its underlying properties are taken into account. It has been argued that an explicit and visible functional KAL can be used to support the boundary crossing and can scaffold the movement from the periphery towards more central positions in the community.

The SFL/Genre approach to EAP curriculum also provides a means to go beyond the traditional EGAP vs ESAP dichotomy. This is done through the premise of SFL theory that language is linked to context, and through the concept of instantiation which can be exploited to reveal how language is purposefully used at genre, semantic and grammatical levels in various disciplinary contexts. Rather than looking at the EGAP provision as a site where only general writing items can be taught, a social semiotic approach, and a theoretically-informed pedagogical tool such as the table of instantiation provide an effective way to teach towards the disciplinary discourse. The instantiation approach allows for mindful abstractions to be made across contexts. The majority of the participants show that once knowledge about language in academic meaning-making is made visible to them through the table of instantiation, they tend to use it in a thoughtful and deliberate manner in their own disciplinary contexts. Even in very different semiotic environments such as Math proof writing, the example of Dr Strange shows that it is

possible to deliberately the resources of thematic progression patterns to support cohesion. The results provide evidence that a social semiotic approach to EAP curriculum constitutes a promising approach for EGAP provisions. The SFL-informed KAL allows for students to conceptualise their language repertoire as a resource to select from according to the meaning they intend to convey. When, for example, participants state that they cannot fully confirm their experiment results, or that there may be other reasons for the phenomenon they are describing, and that they consciously link this context requirement to the resource of hedging devices, they are showing deliberate decision making and selection from their evolving repertoire linked to their analysis of the specific context. In this way, the findings in this thesis refute the claim that explicit teaching of knowledge about language is unnecessary (Dias et al., 1999). This shift towards deliberate selection from the repertoire after consideration of the context may not apply to all language systems nor be successful with all students (see below), but nevertheless shows a tangible and significant outcome of the approach presented here.

The SFL-informed syllabus also has the potential to systematically impact learners' repertoire. The results have shown that presenting knowledge at the genre, discourse semantic and grammatical strata supports students' transformation: their repertoire is expanded and transformed as the values and discourse characteristics become visible to them. The rich metalanguage that participants bring to the interview support Martin's hypothesis that metalanguage is scaffolding that sticks around (2006, p.115). It is also students' empowerment that may be achieved. When participants show an ability to understand the role language plays in their discipline and in their own academic success, the purpose of SFL/Genre pedagogy as a subversive pedagogy, one that equips students with the tools to become critical, to unpack the codes of achievement, in order to level the playing field, may be attained. The participants in this study all failed an English writing placement test, showing that they started their degree programme with a literacy disadvantage, a crucial one from a socio-semiotic perspective. Sobek, for example, a diligent and extremely dedicated Indonesian student faced significant struggles in the English medium of instruction environment. The analysis of his text and his interview showed that he was deliberately, even painstakingly applying his newly gained understanding of academic discourse to his lab report. This approach may in this way offer a way to impact learner's semantic orientation by providing concrete and usable tools to shift one's register from common-sense to uncommonsense, allowing students to engage in the discourses of power and success.

Finally, the strengthening of epistemic relations achieved through the introduction of the functional KAL may also introduce an element of verticality which benefits some

learners accustomed to learning environments and disciplines that are knowledge-oriented. It might be the case that the participants in this study, all science students, showed a good degree of transfer because the EGAP syllabus presented, structured and made visible knowledge in ways that matched their personal orientation to knowledge.

Much can still be done to develop the approach. The table of instantiation, which, in its successive versions has attempted to reflect the theory and make it accessible and easily usable by students and EAP tutors alike, could take other shapes. This thesis has argued, however, that the table of instantiation's purpose - to equip learners with awareness of the way language builds our world, our experiences and orchestrate the power relations within it - should be part of any language curriculum concerned with transfer.

## **5.2 Transfer from the table of instantiation**

As detailed in the result chapter, a majority of participants, 9 out of the 12 selected, were able to make choices from their expanding academic repertoire according to the meanings they were required to express in their disciplinary assignment. This is shown by the way many participants are able to clearly explain the reasons why they deployed a specific linguistic resource, demonstrating knowledge of and about language. The results also highlighted that experiential, textual, logical and interpersonal resources transferred differently. This section explores the possible reasons why resources that realize experiential meanings were less transferred than interpersonal, textual and logical resources.

The results have suggested that the resources taught to realise experiential meanings do not transfer as easily as the other features taught in the EAP module. Participants say the notions of the noun group, taxonomies and nominalisation are difficult to understand (Ben). This is a possible explanation, but other elements of the table seem equally abstract and yet are still transferred by several participants. It was observed that the majority of students did not pay deliberate attention as they formed the technical noun groups to express the core knowledge of their discipline, or stated they used this knowledge implicitly. The reason therefore is not that the context did not require it, but rather that they are not conscious of the linguistic elements that realise these meanings. Kali, for example, assumed these groups to be simple and technical, while Lucy preferred this knowledge to remain unconscious in case the awareness may lead to confusion.

Text analysis revealed that participants use technical noun groups and that this is required by their disciplines. The lack of transfer therefore may indicate that experiential features are further away from consciousness, less amenable to being made visible, than textual, logical and interpersonal ones. There are several potential explanations for this.

In his paper on lexis, Rose (2016) conceptualises consciousness as different types of semiotic activities such as ‘viewing, recognising, becoming aware and processing’, which he calls ‘semiotic labour’, the degree of effort it takes to become aware and to process of a certain feature (p.1). Learners in the EAP module were taught to view, recognise and become aware of the resources to express experiential meanings, but it seems that they did not process this particular knowledge about academic meaning-making. Resources for experiential meanings seem to require more semiotic labour than interpersonal or textual ones. This could be because students associate these elements in their texts to the discipline subject matter and therefore view linguistic analysis of the constituents as superfluous. The technical terms connect to a constellation of meanings and procedures, a density of meaning that buries the knowledge about language deeply. In contrast, the researcher (or the linguist) may see this KAL because the disciplinary knowledge eludes her. While SFL theory divides language into equally important metafunctions - Painter (2004, p. 138) writes that ‘interpersonal and ideational functions, or metafunctions, have equal status in the developed language’-, experiential resources may be much more deeply buried, and also more difficult to research as they demand expertise in the field as well as in the linguistic theory

Another, related, reason is that experiential meanings are squarely in the realm of the disciplinary subject knowledge and so may not be, for the participants, contenders for the EGAP syllabus. Students acquire the technical terms and vocabulary of their discipline as they engage with readings and lectures. The experiential realm is the core of the disciplinary subject. While it is possible, as was shown in the results, for learners to distinguish textual, interpersonal and logical meanings in the disciplinary discourse, it may be more challenging to do the same for experiential meanings because the linguistic features - traces on the surface of the text - are hidden in the expressions of the disciplinary field. Halliday’s insight that language conveys more than the field’s meaning allows to separate several ‘layers’ of knowledge about meaning-making, all of which are traceable in texts. Logical meanings are traced through the use of clause complexing, and CONJUNCTION. Textual meanings can be seen through formatting, headings, general nouns and deictic pronouns as well as macroTheme, hyperTheme, macrNnew and hyperNew.



Interpersonal meanings are also visible on the surface of the text in the form of modality markers such as hedgers and heteroglossic resources. These resources can be highlighted from the removed position of the EGAP module more easily than the experiential resources which demand a more intimate understanding of the field. This is despite the prominence of experiential features in Halliday's work on scientific discourse.

The researcher has also considered the possibility that the materials used to teach this toolkit were less effective than the rest. The results show that perhaps too much focus was given on lexicogrammatical features of experiential resources. The focus of teaching was on ways to build abstract entities through noun groups and nominalizations. This was partially to address students' needs to shift their register from a congruent grammar to less commonsense grammar. Perhaps less attention was given to the ways entities within phases of texts create scientific taxonomies through the lexicogrammatical realization of the noun group, although simple taxonomic relations were taught (such as class and part/whole). While disciplinary texts were analyzed for discourse semantic and lexicogrammar features to express logical, textual and interpersonal meanings, they were perhaps less effectively exploited for the discourse semantic level system of IDEATION. This lower focus may be explained by the more challenging nature of this aspect of language for the EGAP practitioner to include in the syllabus but could be addressed in future iterations of the module to assess whether impact on transfer may be more positive.

While transfer of experiential meaning-making resources was generally not achieved by the twelve participants, textual resources, on the other hand, were frequently mentioned and pointed to in the disciplinary texts. This was especially true of thematic progression. First, thematic progression is a new item of knowledge, not taught in prior writing/English classes which may help students retain it. Thematic progression is also a 'dynamic' element of the writing process (to combat the blank page). This may be an item that fosters backward-reaching transfer (as students write, the connection back to the EAP is triggered). For example, Ben says '*What do I write next?*' which triggered his memory of the thematic progressions features. For O'Donnell (2013), it is key to teach texts as process rather than final product. O'Donnell argues for a process approach that integrates the KAL that SFL research has revealed into the teaching of writing. Thematic progression is a great candidate for this type of teaching as it represents linguistic knowledge tied to the very tangible processes of writing, the struggle to develop a text from sentence to sentence. Logical relations were used and mentioned although perhaps less directly linked to the EAP module. As much of the teaching of logical relations centred around clause complexing and logical meanings expressed through conjunctive adjuncts or through grammatical metaphor, it

could be that students were fairly familiar with most of these resources from previous schooling experience.

Interpersonal meanings were also transferred and clearly linked to the contextual need for tentative meanings, in the case of hedging. The first reason is that this a relatively simple element of KAL to process, and it has relatively few instantiations (compared with the noun group, for example). Another explanation may stem from the different status of the metafunctions when linked to ontogenetic development. Interpersonal meanings have been shown to be the main drive of language development in childhood (Halliday, 1993; Painter, 2004). Painter (2004) argues children develop language through interpersonal meanings first. Year One students at university are arguably in a new developmental stage of their discourse repertoire, and it could be that this developmental trajectory is driven by the need to make new interpersonal meanings, which could explain why the interpersonal meaning resources are so readily taken up. These resources provide a way in the new world of academic meaning-making and its requirements for an expanded interpersonal resources repertoire to address the multi-voiced arguments and the implicit evaluation and persuasion, in the same way they provide a way into language for children.

A valuable aspect of this study is that it has provided a detailed description of an EGAP intervention, including an SFL-informed knowledge about language at lexicogrammar and discourse semantic levels. This enables a more precise discussion as to what element of language transfers to disciplinary contexts. Much of the table of instantiation was used by students in their disciplinary context. It has been shown that the resources selected for the instantiation table are useful in the range of disciplines under study (albeit less so for Maths). The lack of uptake of the experiential features may be due to a lack of perceived need for them by students who process these meanings at a more subconscious level. However, the pedagogical focus may also be at fault. More can be done in the teaching of experiential meanings, in particular at the discourse semantic level. Using samples of taxonomic relations to analyze a range of disciplinary texts would raise awareness of the ways experiential meanings are built in the disciplines.

## **5.3 Individual orientations to knowledge, dispositions and affiliation**

This last section turns to the differences observed between participants. Although the participants who reported minimal or no transfer represent only 3 of the 12 participants, the cases are worth exploring because of the significant implications for EAP teaching. In his study of transfer from EAP modules, James (2006) found that perception of task similarity can explain lack of transfer. The results in 4.3.1 have confirmed that with this study's participants too, perception of task similarity, which is associated with relevance of the EAP KAL, is key. However, the results have also shown that distance is not a barrier to transfer as demonstrated most indisputably by Dr Strange. Igor and Jane, on the other hand, exemplify the concept of distance perception as a hurdle for transfer when they ignore the many choices they could make under the impression that scientific writing is simple and therefore does not involve making choices or decisions. As Driscoll and Wells (2012) have argued, when students do not see value, they fail to transfer. This, as was seen in Chapter 1 (section 1.3), was linked to learner dispositions in the First Year Composition literature (Driscoll, 2009; Driscoll & Wells, 2012). Chapter 1 argued that this perspective on dispositions placed too much of the onus on students with none of the studies willing to turn a critical eye on the relevance of their writing curriculum and no enquiry as to why students' dispositions may vary. For James (2012), psychological factors such as motivation explain the lack of transfer and the lack of ability to see relevance. In the present study, the 3 students who do not transfer fail to see the value of the EAP curriculum, and also show a lack of motivation to transfer from the EGAP module, but without denying these two aspects are real, this thesis argues that there are deeper underlying factors that cause these various value perceptions and levels of motivation which are crucial to investigate if any change is to be achieved. The results show that a difficulty to transfer may be a result of a much deeper-seated pre-disposition to knowledge structures in language modules which prevents even increased verticality to be beneficial.

Participants' specialization characterisation of the EAP module as knower and their scientific discipline as knowledge oriented, and their construal of group membership, indicate that individual orientation to knowledge/knower codes and individual affiliation may be playing an important role in learners' transfer potential. Hager and Hodkinson (2009) observed that prior experiences, dispositions and capital influenced the way learners transferred to the workplace and that dispositions and capital are integral to a

person's learning and transfer capacity. With the homogeneous group of participants in this study, this seems to be confirmed. Participants otherwise similar in terms of educational, linguistic and cultural backgrounds characterised the EAP module in completely different ways. Students who report no transfer describe knowledge about language as being superfluous, extravagant, and unnecessary. Along with the language of the discipline these participants describe, it is also the whole disciplinary knowledge structures which they seem to refer to, with description of the simplicity of the way science works. For these students, it could be that revealing the complexities of language is uncomfortable as this does not fit their assumption and leads to what Roberts (1968) has called a sense of dislocation between the environment and their sense of self and understanding of the world. Science students' orientation to scientific knowledge structure may in some cases occur in parallel with a lack of comfort with knowledge structures in the English curriculum at school for example, which is often knower-oriented (Christie & Macken-Horarik, 2011). The results have shown that for 9 participants, this potential code clash can be bridged by strengthening the epistemic relations in the EGAP module. In his reflection task, Dr Strange illustrates how strengthened epistemic relations can support a student's perspective shift on a language-based module:

Things start changing (*from a conception of EGAP as a useless burden*) when I saw there is something applicable that I could derive from learning English. During Week 5, [EAP module] **course materials** (ER+) **taught us** that there were **3 main thematic progression patterns**. This particular material turned out to be the answer of how to do proofs (ER+)

However, bringing in verticality to address these orientations may not always be sufficient to counteract a deeply ingrained perception of language as a knower-code, both esoteric and mystifying. In Chen's study (Chen, 2010) dispositions were investigated through a sociological lens, shifting the onus from the student's motivation or willingness to their orientation to knowledge structures within a learning situation. In this thesis, when transfer does not occur, the student has generally not spotted the strengthened epistemic relations, the stronger focus on KAL in the EAP module, even though these are made visible throughout the module and even though their disposition towards their own discipline may be knowledge-oriented. Driscoll and Wells (2012) would call this disruptive dispositions; these learners do not see value in the EAP module and therefore are failing to see connections. While most of the participants are perceptive of the knowledge deployed in the EAP curriculum, the three 'non-transfer' students are unaware

of it. By analyzing the issue of transfer through Specialisation codes, the study suggests educational outcomes from the EAP module may be improved if these students' dispositions are addressed more explicitly and effectively.

Different dispositions were also revealed in the results through the students' affiliations to their disciplinary community. The participants who mostly affiliate with the group 'undergraduate scientific students', the group on the periphery of the community, seem to be better able to notice and make use of knowledge wherever it is presented (in a language-based or non-language-based module). They do seem not perceive strong boundaries across disciplines. The three participants who, on the other hand, did not transfer any knowledge from the EAP module seem to be affiliating with their disciplinary groups as legitimate experts, and present themselves as having 'insider' and authoritative status, which in their undergraduate programme's first year seems problematic. In this process they also characterize the researcher as an outsider, clearly othering EAP. The participants who report transfer, on the other hand, seem to have no resistance to affiliate with the knowledge in the EAP module. The boundaries across disciplines for these students seem less unsurmountable.

Another element to discuss is the concept of repertoire and semantic orientation. Sobek, Jane and Igor are examples of the role semantic orientation may play in transfer. Sobek's text analysis showed a very deliberate attempt to apply everything learned in EAP, a very conscious effort to develop his repertoire. Being a non-English speaker, it may be the case that developing one's English repertoire is a familiar, expected and accepted concept for the student. Jane, on the other hand, seems to be oriented to a congruent grammar, which admittedly may not always be a problem in a Year One Engineering module, but which may hinder the student's ability to engage with abstract concepts and to create the valued texts of Engineering in higher years of her degree. As Jane, and Igor, were schooled in English medium of instruction throughout their childhood, perhaps their repertoire is viewed as sufficient and in no need of expansion. Several strategies may address this. For example, the fact that the table of instantiation represents realisations of simple and straightforward expression can be emphasized. More samples from the discipline, and especially from disciplinary experts the learners are familiar with (their professors' publications for example) may be usefully exploited to show these systems and features in action more effectively.

# Chapter 6: Conclusion

This study was born from a wish to develop an EGAP module which may address students' varied needs more effectively than a traditional skills-based approach. As shown in Chapter 1, section 1.3, transfer from EGAP modules is an elusive goal and the rare research into transfer from EGAP modules tends to be pessimistic. This thesis has delved into the issue of transfer by analysing the dilemma facing EGAP provisions, and by devising and evaluating the impact of an SFL/LCT approach to address disciplinary specificity in the EGAP module. In doing so, the thesis then proposes a new EGAP common core model which bridges the traditional general vs specific dichotomy. This is done mostly through the SFL-informed table of instantiation as a pedagogical tool which by the same token maps a core linguistic knowledge base for the EAP practitioner. Findings detailed in Chapter 4 and discussed in Chapter 5 show that an SFL/genre pedagogy can support transfer from the EGAP module into disciplinary writing tasks. The majority of participants deployed the EGAP module language resources in their disciplinary contexts. Participants did this by analysing the disciplinary writing context and by making deliberate decisions to use appropriate resources for the meanings required. This was particularly the case with interpersonal and textual meanings, which seemed to prompt backward reaching transfer, where the new disciplinary context triggers the connection back to the EGAP module content. When discussing these decisions during the interviews, the participants also showed metalinguistic awareness through their use of a range of the metalinguistic terms used in the EGAP module. Despite the majority of participants benefitting from a more visible, coherent and explicit functional language syllabus, the findings also highlighted that learners' dispositions and issues of affiliation have a significant impact on the occurrence of transfer. Beyond the innovative curriculum design, this thesis also combined a range of qualitative methods of analysis such as elements of SFL and of LCT, which enabled the emergence of a rich and multi-layered understanding of transfer from the EGAP module.

This chapter examines the implications of the study, first for the EAP field, specifically curriculum design, and then for educational research methodology, in particular into transfer. The chapter then highlights the limitations of the present study and proposes future directions for research as well as strategies for implementation of the approach, before concluding with reflective thoughts on the EdD learning journey.

## **6.1 Implications for EAP curriculum design: a new common core model for EGAP**

The main contribution of this thesis has been to revisit the issue of transfer from an EGAP module in order to develop a model which may address the EGAP dilemma (discussed in chapter 1 section 1.4.1). The route towards that goal led me to address what I have argued is ‘knowledge blindness’ (Maton, 2014) in EAP practice, specifically a lack of attention to functional knowledge about language and knowledge about disciplinary specificity in EGAP curriculum design. In Chapter 1, I argued that this knowledge blindness was confirmed in the way EAP transfer research has very rarely taken curriculum knowledge into account when exploring transfer processes. More specifically, section 1.3 highlighted that research into transfer from EAP programmes has tended to ignore the EAP module curriculum as a potential impactful factor in the occurrence of transfer. The thesis has shown that designing for transfer can be helped with LCT dimensions of Specialisation (to analyse the values and foci in the educational practices to reveal potential obstacles to transfer) and Semantics (to unpack the different types of knowledge and the level of contextualization). While these tools have been applied in a range of fields to address transfer, or cumulative learning, this thesis shows that EAP can be similarly enhanced by engaging these tools to think through the specific problems of the field.

Bringing knowledge to the fore in the study of transfer was done by detailing an SFL-informed body of knowledge about language (described in Chapter 2, section 2.2) likely to be common in various academic disciplines. Chapter 3 then described how this theoretical knowledge was recontextualised into a pedagogical tool, the table of instantiation, which aims to develop students’ awareness of language as a context-tied resource from which to draw deliberately according to specific disciplinary contexts. The LCT concept of semantic waves was also used to conceptualise how various degrees of context dependency may be presented and practised by students to foster transfer. The study clearly showed that transfer is supported by explicit functional knowledge of linguistic resources, both at a general level, and at the level of potential realisations in the specific disciplines. Participants showed that learning functional knowledge about language developed their repertoire and their metalinguistic awareness. One key implication for EAP curriculum design therefore is that the SFL knowledge-oriented curriculum and genre pedagogy described here constitute a new EGAP common core model

which goes beyond the general versus specific dichotomy by providing a systematic way to address disciplinary specificity in the EGAP module.

Beyond questioning the traditional general versus specific dichotomy, this new model has the potential to impact the field significantly as it provides EAP practitioners with a precise curriculum including a detailed SFL informed language syllabus for the EGAP to adopt in (and adapt to) their own contexts. In this way, a key contribution of the thesis is the development of the EAP knowledge base for TEAP. This thesis maps what precisely the SFL informed knowledge about language (which is cited as being part of the EAP practitioner knowledge base by Ding and Bruce, 2017) may be. This functional knowledge about language shown in the table of instantiation was found to be relevant to the range of disciplines in this study. Text analysis showed that the toolkits are deployed in the four disciplines' assignments (including Maths to a certain degree) with some variation which were discussed in chapter 5, section 5.2. This thesis therefore supports the notion that the knowledge about language base for EAP practitioners should include functional linguistics resources to support students' repertoire development in meaning-making at text, paragraph and sentence level, and for ideational, interpersonal and textual meanings.

This has implication beyond the EGAP field. Although the table was designed for an EGAP module, the same idea could be useful in EAP modules embedded into the disciplines where the table could be more precisely populated with the resources needed in the discipline. Any subject curriculum could in fact include a tool like the table of instantiation to equip learners with knowledge about the way language builds our world, our experience and orchestrates the power relations within it. The same table concept could be deployed at secondary and primary levels too to support academic literacy development. Learners would then lean on a coherent and cumulative knowledge about language, enabled through a precise and consistent metalanguage, to develop their repertoire as they progress through the years of schooling and tertiary education. A tool like the table of instantiation has the potential to be used across disciplines as a common language to enable discussions about academic meaning-making and to enable subject lecturers to deal with academic literacy in more systematic and theory-informed ways.

The thesis has also shown that the table of instantiation is a robust and versatile pedagogical tool, usable by large groups of students, and by large teams of EAP tutors. Although this was not a focus of the thesis, the approach described here is well-received by the students who consistently comment on the module being 'relevant' to their disciplinary context. This



module is taught to over 1500 students each year and delivered by a team of approximately 20 EAP tutors. Introducing an SFL/Genre approach to EAP can be challenging, but whatever reluctance encountered at the various levels of management or teaching staff can be overcome when students report a positive perception and that the impact in their writing can be evidenced. The approach has been found to be achievable through careful planning and practitioner support. However, adopting this approach requires knowledge and training. This is discussed in the limitations and future directions in 6.3.

Finally, the findings on student dispositions also have important implications for the EAP field. Dispositions in the EAP transfer literature are often associated with issues of motivation (James, 2012) but this raises more questions than it answers. The thesis explored the concept of dispositions in relation to transfer with particular attention to issues of affiliation to the student's home discipline and orientation to knowledge structure in various disciplines. The results indicate that these issues may have an impact on the occurrence of transfer. Students who expressed a strong affiliation to their discipline, and characterised the EGAP module as weak in epistemic orientation reported very little transfer from the EGAP module. It would be useful to emphasize that the table of instantiation concerns academic meaning-making, and that its resources enable, to quote the three 'non-transfer' participants, *straightforward, simple* writing. More generally, implications concern the need for EGAP students to be guided to explore and understand their own orientation to language at the beginning of the semester. For broader educational settings, exploring learner disposition using a framework like LCT may also be useful in addressing educational challenges.

A main contribution of this thesis therefore has been the development of an SFL/LCT informed EGAP common core curriculum that has been shown to be effective in fostering transfer. Another key contribution is the dimension of the learner's dispositions has been shown to play an important role in the occurrence of transfer, even when the common core curriculum is in place.

## **6.2 Implications for educational research into transfer**

Research into transfer is a very important aspect of educational research. Yet, transfer is a contentious term, underpinned by a range of theoretical understandings, not all of which are always clear in transfer studies design. For example, in the EAP transfer literature, it was found that transfer is often studied at perception level and does not include textual evidence of transfer nor a precise body of knowledge to be tracked in written or oral text (although a few exceptions were noted in Chapter 1). Furthermore, student perceptions are often analysed solely for indication of relevance of the module and for the student's mention of transfer occurrence. The present study used an innovative methodology in two aspects. First, it combined data which allowed for both the participant's voice and the textual evidence to be explored. Secondly, it enacted complementary analytical frameworks: SFL, in particular Affiliation, and LCT Specialisation. The implications of both elements are discussed below.

The social realist approach to transfer research described in this thesis has allowed for a comprehensive picture to emerge. Transfer was shown to be a debated term in Chapter 1 and in Chapter 3, which highlights a dichotomy between an objective and a subjective view of knowledge. From a social realist stance, the thesis argued, this is a false dichotomy (Maton, 2014; Maton & Moore, 2010). Social realism is an approach to educational research which aims to address 'the false dichotomy between, on the one hand, the belief that knowledge must be decontextualized, value-free, detached and 'objective', and on the other hand, the idea that knowledge is socially constructed' (Maton & Moore, 2010 p.1). Adopting a social realist approach means bridging this dichotomy by recognizing knowledge as both ontologically real and also as a social phenomenon. As was noted in the methodology, ethnographic approaches can capture rich insights into the social context, the students' literacy practices and their perspectives on the practices which give rise to the text (Gardner, 2012; Lillis, 2008). Textual analysis, on the other hand, can track linguistic evidence, creating a powerful explanatory combination and potentially addressing the shortage of such multi-perspective approach in the current EAP transfer literature.

In this study, a mixed-qualitative method approach was adopted with a dual focus on the students' voice and perceptions (tracked in interviews) and on textual evidence of transfer (tracked in written assignments). To reflect this multi-perspectival approach, the data included student interviews around texts, written assignments, and expert informant input. The implication is that research into transfer should encompass a precise body of knowledge

measured in texts and in interviews, and students' perception through interviews to provide a comprehensive view of the transfer phenomenon.

The study also combined analytical frameworks in an innovative way. It enacted aspects of two complementary frameworks, systemic functional linguistics and Legitimation Code Theory. The thesis showed an innovative analytical method as it moved from a content analysis of the interview data to the deployment of SFL and LCT Specialisation to explore salient issues in the data (namely different characterisation of the EAP module and of transfer as well as issues of affiliation). Legitimation Code Theory, specifically Specialisation, in combination with aspects of systemic functional linguistics such as Affiliation make it possible to account for different orientations to knowledge structures. These orientations, it was argued, may explain students' uneven engagement with the EGAP module more usefully than the concept of motivation often used in the EAP transfer literature. The interview data was analysed in a way which built from the initial content analysis and deployed the framework most likely to shed light on the responses. In much of the EAP transfer literature surveyed in this thesis, analysis of the interview data tends to stop at the content analysis stage and highlight students' self-report of transfer or lack of transfer and perceived reasons (mostly to do with a lack of relevance). The implications are that theoretical frameworks such as LCT or SFL enable a qualitative analysis that has useful explanatory power. This could be used effectively with a range of student interviews in educational research.

Engaging both SFL and LCT frameworks in a complementary way enabled a comprehensive picture to emerge that encompasses both textual evidence of transfer as well as learners' dispositions and affiliations. This thesis therefore adds to the growing number of studies which enact systemic functional linguistics and Legitimation Code Theory to understand and address a particular educational problem. The research methodology used in this thesis can be usefully applied to general applied linguistics and broader educational research concerned with issues such as student dispositions, motivation, and learning styles. SFL and LCT in these aspects may provide very useful insights.

## **6.3 Limitations and future research directions**

A limitation of this study is that, due to the large pool of participants, the comprehensiveness of the linguistic analysis had to be somewhat reduced. However, the number of participants was necessary to provide an informative view over transfer processes to varied disciplines. It was also felt that a wide view over the data set, with selected detailed analysis to demonstrate the participants' use (or lack) of linguistic resources was more likely to answer the research questions. It is also believed that an emic perspective, prioritizing the students' voice would ensure more valid insights into the phenomenon of transfer than a purely etic perspective might achieve. Nevertheless, further research may usefully re-visit the data to produce more detailed comparative analysis for individual students. Along with a more comprehensive input from disciplinary experts, this might provide rich insights into disciplinary meaning-making.

Another limitation is the uneven distribution of participants in the disciplines, which explains why the discussion did not attempt to make comparisons across the disciplines. Further research may focus on one discipline only or reach out to the social sciences and humanities disciplines to explore whether the table of instantiation features transfer in the same way. EAP practitioners and researchers may be inspired to develop the table further to suit their particular context, and this may result in different versions of the table that suit specific disciplinary discourse characteristics.

The scope of this study was also wide in terms of the KAL tracked. The study therefore necessarily provided only an overview of the way these features transferred, although it did highlight some significant differences in particular in the way experiential features were not transferred. In the LASS approach, Coffin and Donohue (2014) cite the Open University Pro Vice-Chancellor: 'Most of us take language for granted—it's a transparent medium in which we swim' (p.255). This reflects language in general but may be particularly true for experiential meanings. Further research might explore reasons for this, and may point to some strategies to increase the transfer of these features.

The findings show the benefits of this approach for students. Yet, a potential limitation of this approach is that the knowledge involved may be challenging for EAP practitioners, and so implementing this with a large group of tutors may be difficult. In the context of the study, the tutors were provided support through lesson demonstrations using the instantiation table, reading recommendations and extensive tutors' notes comprising answers to text analysis,

summaries of the literature as well as a detailed rationale for the activities. However, for this approach to have a broader impact on the TEAP community, it should be developed into teaching materials that can be readily interpreted by students and teachers who may not have prior knowledge of Systemic Functional Linguistics.

Future initiatives might therefore develop this approach into standalone pedagogical materials and extensive notes to support the first-time user. However, broadening the knowledge base of EAP practitioners to include knowledge about SFL should also become a systematic element in teacher training programmes. Along with developing their subject knowledge and their pedagogical knowledge, teacher trainees (in any subject) should be taught functional knowledge about language so they can support the development of their students' academic literacy skills, including knowledge about the way language constructs the discipline. Beyond immediate benefits on educational achievement, teaching a coherent and cumulative knowledge about language throughout learner's whole schooling and tertiary education might equip them with tools to better understand and react to the ways language is used to exert influence in our societies.

I hope the research described here will inspire EGAP practitioners in their practice, in their research and as they train others.

## **6.4 Reflection: cumulative learning for the Edd researcher**

As a doctoral researcher based in the classroom, this journey has been one of cumulative learning. This journey was motivated by a frustration with the knowledge blindness I encountered in my professional experience. As an EAP practitioner in the Hong Kong higher education context, I taught academic English modules to students who struggled with their programme in an EMI environment after being schooled in Cantonese MI schools. The skills-based tools in place to help them seemed ill-designed at best, irresponsible at worst. The doctorate has been a process that has explained my intuitions through my engagement with systemic functional linguistics and Legitimation Code Theory. This has been a very meaningful and empowering experience. The table of instantiation looked very different years ago when I first started using SFL in my EAP practice. The table has achieved its aims of making visible some functional knowledge about language in the EGAP module, and might be adapted to many different educational contexts for the same purpose. I have also found that

going back to the stronger end of the semantic gravity wave, addressing the concrete and context-tied needs of the students I interact with, has been giving meaning to the engagement with the weaker gravity realms. In this way, my engagement with SFL theory is consistent with its purpose to be applicable, dedicated to solving problems and to empower its users.



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# Appendices

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## 1 Discipline Module Description

### Engineering Modules:

- **Engineering Principles and Practice II (Year 1 module)**

This is part 2 of a 2-module package that introduces Year 1 engineering students to what engineers do and to the engineer's thought process. These modules are Engineering Principles and Practice (EPP) I and II. EPP II will focus on the engineering principle of how systems are energized and controlled and the engineering practice of how they are designed, built and valued. The main assumption here is that most modern engineering systems are powered electrically. They convert some raw form of energy such as fuel (petrol, diesel) or battery (electrochemically stored energy), through a process of energy conversion into electrical energy. Hence energy sources and energy conversion, electrical energy distribution, electrical energy utilization through conversion into various functions, measurement of functions through their performance parameters will form the backbone of this module.

- **Signals & Communications Design (Year 2 module)**

This module introduces students to the design of analog communication systems through a series of experiments. Students will study the signal processing in filtering, modulating and the design of antenna in lectures. Students will design the components of an analog communication system in the experiments based on the lectures. An antenna will be designed by students. This module exposes students to analog signal processing, modulation and antenna design.

### Chemistry Module: Experiments in Chemistry I

CM1191 is a module designed for chemistry majors and comprises several laboratory experiments on selected topics of basic chemistry principles and theoretical contents primarily selected from the modules CM1111, CM1121 and CM1131.

By conducting a series of experiments, students could strengthen their understanding of basic organic, inorganic, and physical chemistry. Upon completion of the module, students are expected to have gained some expertise in essential laboratory skills, as well as perform basic skills on data processing and written reports. The overall training in CM1191 should provide students with a good foundation to do experiments at Levels 2000 and 3000 and basic research initiatives such as in UROPS

### Math Module: Fundamental Concepts of Mathematics

This module introduces the language, notions, and methods upon which a sound education in mathematics at the university level is built. Students are exposed to the language of mathematical logic, the idea of rigorous mathematical proofs and fundamental mathematical concepts such as sets, relations and functions. Major topics: Elementary logic, mathematical statements, set operations, relations and functions, equivalence relations, elementary number theory.

## Life Science modules:

- **Molecular Genetics (Year 1 module):**

The course will cover topics on (i) the patterns of inheritance, (ii) the discovery of genetic material, (iii) the molecular properties of genes, and (iv) genetic analysis of individuals and populations. This will include an indepth understanding of Mendelian patterns of inheritance and variations that could occur due to multiple alleles, lethal genes, chromosomal variations, linkage, gene interaction and other genetic phenomena. Emphasis is placed on the understanding of the underlying molecular and biochemical basis of inheritance. Quantitative and population genetics will also be discussed with the emphasis of understanding the processes and forces in nature that promote genetic changes. Modern and current topics on molecular methods and new genetic technologies plus model organisms will also be introduced.

- **Laboratory Techniques in Life Sciences (Year 1 module)**

This module introduces the theory and practical applications of techniques used in molecular biology and protein biochemistry. The students are expected to be familiar with the theoretical and practical aspects of the following laboratory techniques in Life Sciences: (a) RNA isolation, reverse transcription and polymerase chain reaction (PCR); (b) Construction of recombinant DNA molecules using ligation and transformation; (c) Isolation of DNA molecules and characterization by restriction digestion and agarose gel electrophoresis; (d) DNA sequencing; (e) Expression of recombinant protein; (f) Affinity chromatography; (g) SDS polyacrylamide gel electrophoresis; and (h) Western blotting and immunodetection.

- **Physics for Life Sciences (Year 1 module)**

This module provides a comprehensive and basic physics training within a single semester for first-year students from life sciences. It will cover mechanics, thermodynamics, electromagnetism, optics plus a few topics in atomic and nuclear physics. The specific contents have been chosen according to their relevance to life sciences as well as their importance in the conceptual framework of general physics.

- **Introductory bioinformatics (Year 2 module)**

Students will be introduced to the concepts, tools and techniques of bioinformatics, a field of immense importance for understanding molecular evolution, individualised medicine, and data-intensive biology. The module includes a conceptual framework for modern bioinformatics, an introduction to key bioinformatics topics such as databases and software, sequence analysis, pairwise alignment, multiple sequence alignment, sequence database searches, and profile-based methods, molecular phylogenetics, visualisation and basic homology modelling of molecular structure, pathway analysis and personal genomics. Concepts emphasised in the lectures are complemented by hands-on inquiry using bioinformatics tools in the practical sessions. Students will achieve highly valued skills as biological researchers with basic competence in computational and bioinformatics techniques, with an option to learn more advanced skills in upper level modules.

## 2. Interview Protocol

Interviews took between 25 to 40 minutes, depending on the participants' time and keenness to talk about their discipline assignment and the EAP module. Interviews were recorded so they could be transcribed and coded using the software MAXQD12.

1. What were you asked to do for this assignment?
2. How did you go about writing this assignment?
3. How did you structure the text? Why?
4. What is the purpose of this paragraph/this sentence/group?
5. Is there anything from the EAP module which you remember using when you write this? Where in the text? Why did you use this here?

After these questions were answered, the table of instantiation was shown to the participants to ensure that they were able to talk about a concept even if they had forgotten the metalanguage.

6. In the EAP module we saw these resources to write academic texts, are there any (apart from what you have already mentioned) that you used in this assignment?

### 3. Translation Device Sample

Table 10. An external language of description for epistemic and social relations

	EPISTEMIC RELATIONS (ER)			SOCIAL RELATIONS (SR)		
	Concept manifested – Emphasis on:	Indicators	Example quotes from empirical data	Concept manifested – Emphasis on:	Indicators	Example quotes from empirical data
<b>Curriculum</b>	content knowledge	ER+ Content knowledge is emphasised as determining form of legitimate educational knowledge.	The information in the textbook – decided by the teacher – was what a study unit was all about.	personal knowledge and experience	SR+ Personal experience and opinions are viewed as legitimate educational knowledge.	[Students] actually come with a whole range of background and experience ... what they need is a framework to download that.
		ER- Content knowledge is downplayed as less important in defining legitimate educational knowledge.	We ... show them ... digital repositories that they need to go to in order to access those readings that are relevant to their context.		SR- Personal experience and opinions are downplayed and distinguished from legitimate educational knowledge.	Online discussion is chaotic, and is like you conduct a survey and everyone tells you their opinions. That's all. It's different from a class.
<b>Pedagogy</b>	the teaching of content knowledge	ER+ Procedures for learning content knowledge are explicit to learners and emphasised as determining form of pedagogy.	[The teacher] extracts the best things from what he or she knows and gives this to you in class, and then offers you instructions on the tasks you need to complete.	personal dimension of the learning process	SR+ Individual learners' preferences are explicitly emphasised as determining form of pedagogy.	So negotiate to learn in a way that suits them ... it's constructing your own learning in a way that is helpful for you.
		ER- Procedures for learning content knowledge are implicit to learners and downplayed as not significantly shaping form of pedagogy	The teacher only points out the things you need to read.... But as to how to think, how to read and understand, it's your own business.		SR- Individual learners' preferences are downplayed as not significantly shaping form of pedagogy.	Even if your question is brilliant, the teacher still might not answer you because he or she wants to teach something else first.
<b>Assessment</b>	explicit criteria	ER+ Explicit evaluative criteria are emphasised in judging student performances.	When a Chinese child paints the moon blue, the teacher will correct the child, saying that the moon shouldn't be blue.	self-evaluation	SR+ Evaluation of legitimacy of student performances resides in beliefs of individual learners.	What's valid for you and what's valid for me are two different things, aren't they?
		ER- Explicit evaluative criteria are less significant in judging student performances.	It's not like learning medicine, you've got to get it right [otherwise] the patient will die. It's not like that. It's more open to interpretation.		SR- Student performances are judged against shared criteria external to the learner.	I am a "test-taker." If the teacher doesn't give me a standard, I don't know what to do.

NOTE: +/- indicates 'stronger'/'weaker'

Chen (2010, p.83)

# 4. Sample coding screen from MaxQD

The screenshot displays the MaxQD software interface, which is used for qualitative data analysis. It is divided into several main sections:

- Code System:** A grid on the left side where codes are applied to text segments. The grid has columns for different codes and rows for text segments. Codes include categories like 'Led by content, not language', 'Not transferred', 'Analysing the context to make the appropriate decision', 'Transfer for essay', 'Associating the discipline with SIMPLICITY', 'Use feature but implicitly', 'RED', 'Use of THEY to represent the discipline (rather than we)', 'Use of I', 'Inclusive WE for the discipline', 'Transfer occurs when bridging was explicit in EAP', 'Downplays EAP knowledge', 'Distancing the student discipline from the EAP discipline', 'Reason for NO transfer', 'EAP knowledge structure was not understood so cannot be used', 'In the discipline context, this feature is NOT required', 'This context is very different from EAP', 'Not conscious', 'Does not know why did not use EAP knowledge', 'Taught in EAP but not transferred from EAP in particular', 'Transfer from the table to the disciplinary text', 'Endorsing and Distancing', 'Synthesis', 'Logical links', 'Reporting structures', 'Noun group', 'Paraphrasing, to avoid plagiarism', 'Hedging', 'Cohesion', 'Backward reaching transfer', 'Deconstructing samples', 'Help from other sources', 'I have not transferred anything from EAP', 'Isolated Knowledge item from EAP', 'Knowledge oriented conception of the discipline', and 'Reluctant admission of transfer-Transfer occurs during interview'.
- Document System:** A tree view in the center showing the structure of the data. It includes 'Documents' (e.g., Serene, Interview Ryan 3Feb2016, PuaPhyoTun, Le Yuan, Jia Yi, Bingyi2, Bingyi1, Esmond, Bing Han, Lakshmi, Shu Jun 2, Shulun1, JiaMin, Samuel, Marvin, Wayne, Ivan, Yena, DrStrange) and 'Code System'.
- Document Browser:** A window on the right showing the text of a document (Yena) with line numbers (60-99) and various annotations, including question marks and colored highlights. The text discusses technical details and research findings.
- Summary:** A small window on the right side of the grid showing a summary of the coding process, including a note: 'think I am using it in my SP 1501 because it seems the texts are like nearer, more similar, for the science, the lab report it's like different and I can't find the link. 67-67 (0)'.

## 5. Ethics Approval

This project presented the challenge of the researcher's dual role as the participants' EAP teacher. This potential ethical issue was addressed by giving the consent form *at the end* of the EAP course. The consent concerns access to the writing done in EAP, and volunteering for one interview in the subsequent semester.

The approval letter and the consent form/information sheet are shown below.



From Dr Louise Westmarland  
Deputy Chair, The Open University Human Research Ethics Committee  
Email Louise.westmarland@open.ac.uk  
Extension 59198

To Laetitia Monbec [elclm@nus.edu.sg](mailto:elclm@nus.edu.sg)

Project title A longitudinal study of transfer of learning from an English for Academic Purposes course to a Disciplinary course  
HREC Ref HREC/2015/2073/Monbec/1  
AMS ref  
Submitted 29<sup>th</sup> July 2015

Date 17<sup>th</sup> August 2015

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This memorandum is to confirm that the research protocol for the above-named research project, as submitted for ethics review, has been given a favourable opinion by the Open University Human Research Ethics Committee (HREC). Please note that the OU research ethics review procedures are fully compliant with the majority of grant awarding bodies and their frameworks for research ethics.

It is important that where it is necessary to make any substantial changes to your research, that you inform the HREC so they can be reviewed and logged. These, and any question(s) relating to your application and approval, should be sent to [Research-Rec-Review@open.ac.uk](mailto:Research-Rec-Review@open.ac.uk) quoting the HREC reference number above. We will endeavour to respond as quickly as possible so that your research is not delayed in any way.

At the conclusion of your project, by the date stated in your application, the Committee requires a final report to reflect how the project has progressed, and importantly whether any ethics issues arose and how they were dealt with. A copy of the final report template can be found on the research ethics website - [http://www.open.ac.uk/research/ethics/human-research/human-research-ethics-full-review-process-and-proforma#final report](http://www.open.ac.uk/research/ethics/human-research/human-research-ethics-full-review-process-and-proforma#final%20report).

Regards,  
Dr Louise Westmarland  
Deputy Chair, OU HREC



## Consent Form

National University of Singapore (NUS)

Centre for English Language and Communication

### Consent form for persons participating in a research project:

#### Learning Transfer from English for Academic Purposes (EAP) to the Discipline courses

Name of participant:

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Name of principal investigator: Ms Laetitia Monbec, Lecturer at the CELC, NUS and EdD candidate at the Open University, UK.

1. I consent to participate in this project, the details of which have been explained to me, and I have been provided with a written statement in plain language to keep.
2. I understand that my participation will involve text analysis of my writing, semi-guided interviews and questionnaires and I agree that the researcher may use the results as described in the plain language statement/information sheet.
3. I acknowledge that:
  - (a) the possible effects of participating in this research have been explained to my satisfaction;
  - (b) I have been informed that I am free to withdraw from the project at any time before 1 March 2016, without explanation or prejudice and to withdraw any unprocessed data I have provided;
  - (c) the project is for the purpose of research;
  - (d) I have been informed that the confidentiality of the information I provide will be safeguarded subject to any legal requirements;
  - (e) I have been informed that with my consent the data generated will be stored in the the researcher's office at the CELC (office 03-02) in a locked cabinet and on an encrypted computer drive and will be destroyed after ten years;
  - (f) if necessary any data from me will be referred to by a pseudonym in any publications arising from the research;
  - (g) I have been informed that a summary copy of the research findings will be forwarded to me, should I request this.

I consent to the semi-guided interviews being audio-taped/video-recorded  **yes**  **no**  
(please tick)

I wish to receive a copy of the summary project report on research findings  **yes**  **no**  
(please tick)

Participant signature: \_\_\_\_\_

Date: \_\_\_\_\_

Laetitia Monbec (Ms), Lecturer, Centre for English Language Communication, National University of Singapore, 10 Architecture Drive, #03-02, Singapore 117511. Office number:65-6516 3868. Fax: 65-6777 9152

## **Information sheet on Research Project**

**Dear student,**

I am currently a candidate on the Doctorate of Education programme of the Open University in the UK. I am researching how effective the English for Academic Purposes ES1102 course (which you took this semester with me as your teacher) is in supporting you in your undergraduate studies. I am the principal investigator of this study and can be contacted on [elclm@nus.edu.sg](mailto:elclm@nus.edu.sg)

The **aim of the project** is to investigate the impact of a specific EAP pedagogy on student writing in their disciplinary courses.

If you accept to be a participant in the study, I will access some of the writing tasks you completed in the EAP course to analyse the impact of the pedagogy used. All data will be anonymised or pseudonyms will be used.

At the beginning of next semester, I will invite (by email) volunteers to take part in one 30mn interview about a writing task taking place in one of your discipline module. Of course you can simply decline to be a volunteer when you receive the invitation to take part next semester.

All data will be kept confidential, your name will not appear on any reports, and all data will be securely kept in a locked cabinet in my office (CELC, 03-02) and on an encrypted thumbdrive.

### **A final note about my role as your teacher and as a researcher:**

Please do not feel pressured at all to take part. In fact you can decide to take part later if you are not sure now. You can also accept to take part and then change your mind and withdraw (but please note you cannot withdraw after **1 March 2016** which is when I will analyse and write up the data). You can ask me to destroy the data such as the recording of the consultations and to not include your writing in my study any time before 1 March 2016.

**My first role is to be your ES1102 teacher** and your decision to participate in my Doctoral research will not affect, in any way, your experience of the ES1102 course or the amount of support you receive from me or the manner I evaluate your work. I will not know who has provided consent before the end of semester.

I will send you an email at the end of the study (AY 2017-2018) and if you wish to receive a report summarizing the results of the study, I will share this with you.

Thank you so much for taking the time to read this information. If you have any questions, do not hesitate to ask in class or by email.

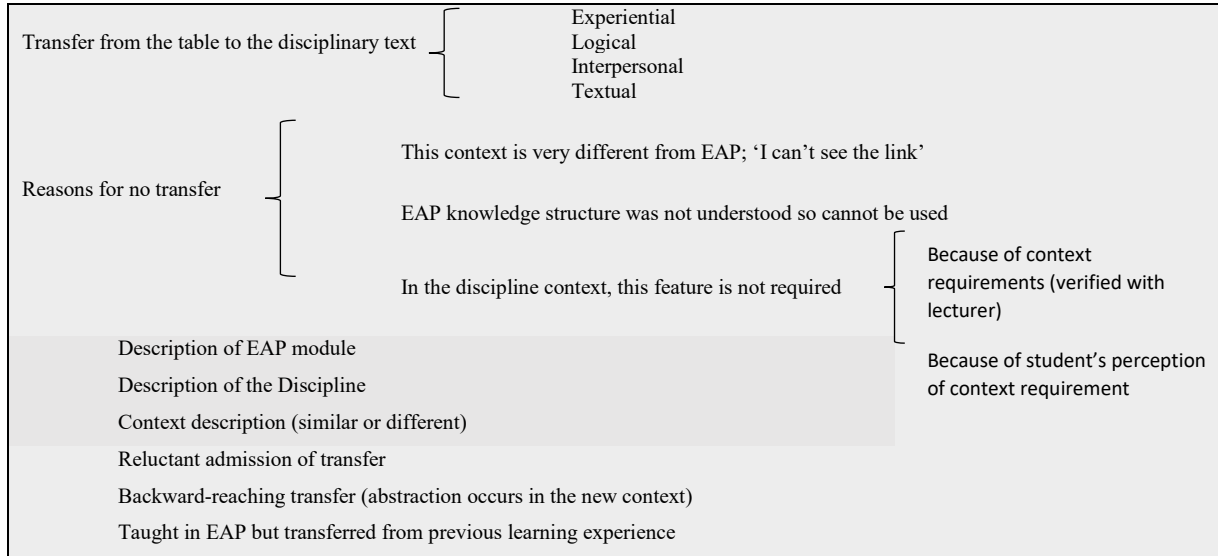
Laetitia Monbec  
Lecturer at the CELC  
ES1103 Coordinator

Office : CELC 03-02  
[elclm@nus.edu.sg](mailto:elclm@nus.edu.sg)

# 6 Inter-Coding Reliability

*Coding reliability exercise:*

Instructions for coder: Please use the coding system and the detailed translation device below to code the following two interview transcripts.



<i>EPISTEMIC RELATIONS (ER)</i>		
<i>Concept manifested :</i>	<i>Indicators</i>	<i>Examples from empirical data</i>
<i>Content knowledge in the modules (EAP or the discipline)</i>	<p><i>ER +</i></p> <p><i>Content knowledge is emphasized when talking about the discipline</i></p> <p><i>Mention of specific syllabus content</i></p> <p><i>- Use of technical terms</i></p> <p><i>- Description of processes such as scientific processes in the discipline</i></p>	<p><i>“In Science you have to explain how you derive...”</i></p> <p><i>“applying pattern 2 of thematic progression”</i></p>
	<p><i>ER -</i></p> <p><i>Content knowledge is downplayed when talking about the EAP module.</i></p> <p><i>-Content knowledge is minimized or described reductively</i></p> <p><i>-the knowledge is not seen as useful.</i></p> <p><i>-knowledge, if mentioned, does not contribute to achievement in the discipline.</i></p>	<p><i>“In terms of grammar...” (this will be explained in chapter 4)</i></p> <p><i>“No, I don't read [the senior reports] for the grammar, I just go and get the gist for the content.”</i></p> <p><i>“it's more like generally [general knowledge, not from the EAP module], coz always writing essays as a child so unconsciously</i></p>

# Jane

## Second analysis

**First participant: Jane** (pseudonym), Engineering student. All greyed elements are changed for anonymity.

I=Interviewer

P=Participant

I: OK, This is Jane and it's on the Exxxx Lab report...Can you tell me about this task, what do you have to do? Are these the questions you have to answer?

P: It's just basically you do the experiment and you answer the various question they ask you to answer

I: What are the types of experiments?

P: Each studio has an objectives, and a lesson plan, and experiments, the basics first ... this is like the first studio, the basics, introduction to those electrical appliances at home.

I: OK. So this tells you how long to spend on each

P: Yes this is the lesson plan

I: So tell me how you go about writing this?

P: It's just a summary of what we did. And this is activity one, like the steps they asked us.

I: Why did you do a summary first?

P: I think they mentioned

I: OK and this is what should go into the report (I read the task sheet/PDF.) So these are the support you get for what the report should look like. 2 pages, presentation, individual report...evaluation of what is best... [I read the task sheet], ok the best one had evaluation. It's quite helpful how they provide this support. So can you show me all these parts then?...You don't have to, just tell me what you want.

P: These are the ...we discussed, and how to improve

I: And here? power source...what did you put here? ...Has the lecturer given you some feedback already?

P: I think they will only mark and give a grade/ I think I have it at home.

I: Did they give feedback?

P: No I don't think so.

I: So do you want to tell me whether at any point when you were writing this, the content in EAP module was useful?

P: No I don't think so, it's quite basic, it's just answering the questions, I don't really need citations, don't need to do hedging and stuff, it's quite straightforward, it's just yes or..

I: Yes, OK. How did you write the summary? How did you organise it?

P: It's just basically my... what we observed during while conducting the experiment, what we observed and the summary of our data.

I: OK so you estimate...[I read] So here you have your findings, and here are your methods (by estimating...). We've also identified (more results)...[I read]...So that's the results...so you have that By, By By for methods and then 'we find' for results, good OK.. (I read the end of the summary) so this summarizes the whole experiment. You have your method and findings. But do you have

### Reviewer

Interpersonal comes up a little with hedging but it's from researcher. This is dismissive. Thus, ER-

### Reviewer

ER- -does not provide info on summary features

(from previous page): this summarizes the whole experiment. You have your method and findings. But do you have evaluations and suggestions?

P: Not here, inside the report

I: OK in terms of here I just noticed...you have 'we could, also we could increase'. You use the same language which was used in the problem solution essay and in your evaluation you have 'may 'not be ideal. You see? You do have some hedging, but maybe you don't think about it

P: I don't realize.

I: OK, [I read]..So I was going to show you this but if you tell me there is nothing, then...do you remember this [I show the table of instantiation].

P: Oh yes

I: Do you remember that was the language content of the module. But for writing this thing you tell me there is nothing you...you didn't actually apply...when you thought about OK how do I write my executive summary.

I: Do you remember that was the language content of the module. But for writing this thing you tell me there is nothing you...you didn't actually apply...when you thought about OK how do I write my executive summary

P: Yeah, when I write it I didn't think about..

I: OK nothing about the cause relations, the consequences links? This (hedging) you used but not thinking back to EAP module

P: Yeah

I: Do you know why?

P: I don't know, like, coz this is like an engineering module, and that was from a language mod so I don't really connect them together, they're separated. But when I am writing an essay, then I will think about EAP module but when I am writing about an ES I will think back to what I learned in EAP module, but I'm doing an engineering mod now so I'll think more about the methods and science part not of the language.

I: Even though when it's writing

P: Yes my focus is on results, it's not the language

I: OK, so for you it's really if the task is similar, then it becomes useful but if the task is too different, and the discipline is different, then you don't use the ...OK alright. Is there anything else you can tell me? If we look to the other task you wrote about...this is what you wrote... [The discussion/interview here shifts to another, non-Engineering module]. So here is there more that you used?

P: I think it's more, writing a proposal so I try to make it more formal.

I: For you this is more related to what we did in EAP module? I can see you have citations, are you given the structure?

P: Yes, they tell us what they want inside.

I: OK so this is the project summary, this was at the beginning of the sem, just a summary. The aim is to (I read) Who are the participants?

P: We are looking for participants.

I: Can you connect any of this with the EAP module more specifically or not?

P: Not really,

I: Not really you did the ref, but another style. Alright, OK, so in this case, how could the mod be made more useful to make the connections clearer to students?

P: I think it could be more relevant because in Eng we don't really use it until we are in final year. I guess all our modules will be solving the problems, we don't get to use the skills that we learn in EAP module, maybe make it generalised to the faculties.

I: Yes that's what we try to do with the second half of the semester. Some students can see it a general skill that you can use in other contexts.

P: Even though we don't use it on our discipline, I think there are other mods we can use it with it, like in GEM modules.

I: Because in the EAP module, we try to teach more generic things, some students could actually use the concept of thematic progression in proof writing, which is completely different.

P: They can see the connection, but I don't see the connection. In Engineering you don't write too much

I: OK Jane thank you so much for taking the time to answer these questions.

**Reviewer**

Separates science and language –EAP is only useful for language mods

Downplaying ER in EAP

**Reviewer**

Downplaying ER in EAP

## Walter

I: OK, this is working, this is Wayne and this is a lab report. OK, what course is this?

P: This is CMxxxx, intro mod for Chemistry students. For this experiment, we are just doing some extraction of chlorophyll and into their smaller component, basically a lab report to describe our results. So the main thing for this report is to repeat and analyse and be very concise with the language.

I: So they want you to be clear and concise. Do they give some guidelines?

P: We have a lab report for the steps, and a bunch of questions to make it cohesive.

I: Do you have a word count?

P: A page limit

I: You got an A+ and the comment 'Can improve on use of sub-heading'. But this is not said in the guidelines?

P: Not explicitly mentioned, more like for organisation. There's a tiny little asterix.

I: OK do you want to tell me how you organise, how you went about writing this?

P: So the main thing is always I need to... they always tell us the same thing that I learned from EAP module last sem, first you you have to bring the key point, then explanation, then references or citations and figures, especially. So I put it there, after that you reiterate your main point, so that's really what I learned the last sem. Most of the skills I learned is the synthesis task. The main challenge was to keep within the time limit. You learn a lot synthesis [I think he means summary]. Then I learned about cohesiveness, to make sure for one paragraph to another are linked. For example he [the lecturer] wrote here 'Good correlation', because I was explaining based on this table, and I was correlating.

I: You refer to table 1 and figure 2.

P: Instead of using one paragraph for one data, I tried to relate for other sources

I: Yes, it is a bit like synthesising all the strands of the results

P: This part ...A conclusion to basically answer the aims here, after that we don't talk about the significance of the result, because it is basic so we don't have to think so much, after that we do our ref and our appendix (the place where we put our tedious calculations), no calculations in the lab report. When the teacher gives you an A+, it's more how well you analyse the data and how well you can account for the mistakes, there was a mistake but unexpectedly it did not appear, and so I accounted for that, I maybe did not do the procedure well. How well you process your data. You can make some errors, and still do well. Obviously you need to get some results, otherwise there's no point

I: OK, that's very good. Now anything from ES1103 that was useful? You already told me about cohesion, and paragraphing with topic sentences, and rounding up. What else, or anything else?

P: I would say learning how to use formal languages, the part whereby you need to use more indirect speech, [yes yes] and try to be more formal complex sentences, clause and stuff like that, I kind of put into practice, although I'm not really sure how well but I kind of use conditionals, conditions, given, and which clauses to put the extra information to describe components and more components, clauses (which) on p 1 to describe components.. I put that clause in between so that's

Reviewer  
ER+

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ER+

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ER+

one thing I use a lot, it's very important given I have to synthesise and keep to the page number.

I: When you say about formality, do you remember the noun group, the which clauses, the modifiers?

P: I don't remember this in particular

I: OK, you paid attention to which clauses to develop content in a concise manner, how about hedging, the expressions like

P: Yes definitely in page 3, suggests the presence of more ..that's suggest we don't fully confirm that this think exist rather we like to match things with other literature, so we match our data with the lit and so we can suggest that our data is credible.

I: How about thematic progression, to go from one sentence to another?

P: I think I used this, let me think..[he hesitates] OK, let me just think about which one I used a lot: maybe I use this ... basically the main first theme was about the Presence, then I went on to the spectra it kind of like goes ..After that I went back to my theme about presence.

I: OK, I'll show you this Wayne (the table) do you remember any other things that you consciously used:

P: Conjunctions and linkers I used a lot...to show the meaning relations

I: Yes, so what else

P: The hedgers definitely

I: Any of this? The distancing and even the concessive clauses?

P: Yes this is more towards the ending part, the conclusion, I suggest that...although... I suggest better solutions to do it, although is used, I use that quite a lot, only in the conclusion that's where you put in your opinion, and elsewhere you really don't put it. Otherwise...Structure, impersonal tone, hedging, which clauses to develop the noun group, conjunctions

P: If there is nothing else, it's OK, you don't need to have used anything, you got an A+

I: Alright I don't have much more to ask you. Anything to change in the EAP mod to make it more useful;

P: I'm not sure, I think most people need to have more practice regarding their own field, let them do a work regarding their area, so the tutors may want to be trained more towards one subject, I would be more prepared for my discipline.

I: Yes it is the challenge, the curriculum is generic

P: But definitely this mod introduce me very well to the style of academic writing, things like citations, formal language, I can't say that I can see that a lot in other modules, but I understand what's expected out there, I am much more equipped in writing. Even though I'm saying it could be more discipline specific, I still think that nonetheless it is very very useful.

OK alright, Wayne can I keep this?

Do you use senior reports?

I want to learn my style of writing, so I did not use the senior reports. I prefer it's better to do it myself.

A lot of your cohort, group, they use the senior, Maybe they use some wrong stuff as well.

The most you can get is your senior mark. You can get better and learn to write it well.

Thank you so much

Reviewer  
ER+

Reviewer  
ER+



## 7. EGAP Module Syllabus

The KAL (table of instantiation content) is highlighted in green. Elements of the syllabus where the KAL is drawn on are highlighted in yellow.

	Session 1 (1h30mn)	Session 2 (1h30mn)	Tasks/Reminders/Assessment
<b>Week 1</b>	<b>No tutorial</b>		Access the IVLE and read the course information
<b>Week 2</b>	Introducing ES1103 Overview of Academic Discourse: Genre and Language Building Genre awareness	Reading and note-taking strategies Overview of Academic Discourse: Genre and Language	<i>Write a short introduction on the Forum</i>
<b>Week 3</b>	Using Citations: Paraphrasing Summarizing and Stance (1) Avoiding plagiarism /APA-in text mechanics (1)	Using Citations: Paraphrasing Summarizing and Stance (2) Avoiding plagiarism /APA-in text mechanics (2) Synthesizing (1) Reporting verbs\Evaluative language	Complete Plagiarism Quiz Work on the Synthesis task  Complete the <b>Synthesis Task by ---</b> , run a Plagiarism check and consult the report.
<b>Week 4</b>	Synthesizing (2)	The Essay Writing Process Analyzing Essay/Task prompts From brainstorm to <b>outlines</b> Gathering sources	Search for sources and think of a topic for your essay
<b>Week 5</b>	Writing cohesive texts Essay sample deconstruction	Writing an introduction Writing workshop	Prepare for the presentation of your essay outline.

<b>Week 6</b>	Presentations of essay outlines and sources	Expressing logical relations between ideas	Work on your essay
	<b>Recess Week</b>		Write Essay draft 1 and share the draft on - -- run a plagiarism check
<b>Week 7</b>	Peer Review of Essay Draft 1	Open session for revisions/students' specific queries/Text analysis or joint construction of a specific text segment	Revise your draft after Peer Review <b>Submit Essay Draft 2</b> for tutor's feedback on --- in IVLE folder. Run a Plagiarism check and consult the report.
<b>Week 8</b>	APA/Revision and reference list Mechanics Citation Software Workshop	Expressing academic content: nominalization and noun group Analyzing disciplinary texts	Consult tutor feedback on your essay draft 2 as it becomes available and prepare for the consultation
<b>Week 9</b>	Consultations		Prepare for the consultation Revise your draft after consultation
<b>Week 10</b>	Consultations		Select a disciplinary text and complete an analysis to bring to class in Week 11
<b>Week 11</b>	Disciplinary texts analysis Transfer to the discipline	Writing a Reflection (tutorial)	<b>Submit Essay Final Draft</b>
<b>Week 12</b>	Consultations/Revisions		Write the Reflection (draft 1) Revise the course content Prepare for the exam
<b>Week 13</b>	Reflection Assignment (20%)	Course revisions	

## 8. Text Analysis

The following pages provide the more comprehensive text analysis done on the EAP texts (to provide a profile of the participants) and their disciplinary texts. Note that most texts are several pages long, so only a segment was selected for analysis. Moreover, not all features are highlighted as this may prevent readability. Following Eggins (2004) recommendations, only salient features are highlighted to illustrate the description of the students writing.

For each toolkit, salient features are colour coded in the text and commented on in the relevant column on the right hand-side. Where possible the comments are aligned with the appropriate section of the text. The EAP profile provides an overview of the student's writing performance which is then supported by the text analysis. The disciplinary text analysis shows the student's control over the toolkits in their disciplinary contexts. For Reena, Lucy and Julia, a table to compare the use of resources in the EAP text and in the disciplinary text is provided. This comparative approach was initially pursued in the thesis, but was left aside to prioritize the student's voice over the phenomenon of transfer.

Participants	Appendix
Dr Strange	8.1
Yena	8.2
Kali	8.3
Ben	8.4
Reena	8.5
Lucy	8.6
Sobek	8.7
Julia	8.8
Walter	8.9
Igor	8.10
Paul	8.11
Jane	8.12

### Key to coding in texts:

**Textual resources** are highlighted in yellow. **Macrotheme** are bolded; hyperthemes are underlined. Note that macrothemes are understood as thesis statement rather than introduction (and are taught as such).

**Experiential resources** are highlighted in pink. **Headnoun** are in bold; *nominalizations* are in italics.

**Logical resources** are highlighted in blue

**Interpersonal resources** are highlighted in green

Comments on each toolkit are provided in the right hand-side columns, as much as possible aligned with the segment of the text they describe. When needed, additional comments are inserted in the text in blue font.

When needed, grammatical accuracy errors are indicated in red.

## **8.1 Dr Strange**

### **Participant profile**

Dr Strange is an Indonesian student who speaks Bahasa Indonesian as a first language. He was schooled in Indonesia in Bahasa medium of instruction, except for his high school which he completed in an English medium of instruction school in Indonesia before joining the National University of Singapore in Pure Mathematics.

### **EAP profile**

Dr Strange started as an uninterested, but diligent, student. He attended and submitted the written assignments. The week 5 critical incident he describes in his reflection was felt in his participation and engagement in class.

His first written task in the EAP module is shown below with some comments in blue. Students were answering the prompt.

#### **Week 1 diagnostic Task:**

#### **Write an essay for this prompt**

Deforestation has been on the news for many years but despite the many different problems it creates, there seems to be very little improvement to the scale of this phenomenon.

Describe ONE problem caused by deforestation and suggest one or more solutions.

Write about 600 to 700 words and use your own ideas as well as the source texts below to support your development.

**Overall evaluation:** Dr Strange represents a fairly good writer in the EAP cohort. As his first EAP writing task shows below, he has some control over the toolkits but lapses in terms of source use (no in-text citations) in terms of modality (not always well managed). Dr Strange has overall good awareness of text organisation although he does not follow the EAP module convention of stating his thesis in the first body paragraph. There are several instances of congruent grammar where a nominalisation would have helped the flow and the clarity. External conjunction is generally well used but some lapses affect clarity.

	Toolkit #1 to organize a text: Textual cohesion	Toolkit #2 to express logical links: Conjunction	Toolkit #3 to express the subject matter	Toolkit #4 to express evaluation and stance: Appraisal and Engagement
<p>(P1) Environmental issues have been one of the most discussed <b>issues</b> nowadays. People start to pay attention about the condition of our environment <b>because</b> of the <b>effects</b> that occur. Climate <b>change</b> and the <b>increase</b> of earth's temperature that affect people badly seem to <b>trigger</b> people's conscience (Good background/ tenses are not right). The <b>awareness</b> on how to conserve our environment is now increasing. One of the main <b>causes</b> of environmental problems is <b>deforestation</b> (unclear thesis statement- There should be one specific problem). Deforestation has been declared as something illegal and destructive since a long time ago <b>but</b> rules and regulations do not have the power to stop people from chasing profits. <b>In order to</b> stop deforestation, all parties including government, citizens and public organizations <b>should</b> work together and come with a concrete <b>solution</b>.</p> <p>(P2) Deforestation <b>can</b> be categorized as <i>one of the main causes of environmental problems</i> <b>not only</b> because of its large scale <b>but also</b> because of its <b>effects</b>. <b>One big problem caused by deforestation is environmental instability</b> (This problem is not very clear. This is a better thesis but should be in the intro). We all know (modality) about the cycles that happen on earth such as nitrogen and carbon cycles. All <b>these</b> cycles involve trees. With trees continue to be cut down during deforestation these cycles <b>must</b> be disturbed. The need of oxygen on earth continues to increase <b>as</b> the human population increase. <b>However</b>, that fact is not followed by the increasing number of trees that convert carbon dioxide into oxygen. <b>If this</b> continues, carbon cycle cannot run properly and we can never ensure the stability of our environment.</p>	<p>The text is cohesive and the student seems to use the toolkit resources effectively although there are a few issues.</p> <p>The prompt is not precisely answered in the introduction. The answer to the prompt is found in the second paragraph. <b>macrotheme is underlined in bold</b></p> <p><u>hyperthemes are underlined</u></p> <p>General nouns are used. To preview the text (<i>causes, solution, P1; causes, effects in P2</i>)</p>	<p><b>Toolkit 2</b></p> <p>Logical links through external conjunction are not always clear, especially in the explanation of the nitrogen and carbon cycles in P2, although propositional content is also at fault here.</p> <p>Some links expressed in the verb clause (<i>trigger, cause</i>)</p>	<p><b>Toolkit 3</b></p> <p>Use of nominalisations, but instances of congruent grammar is several places.</p> <p>(P2) <i>With trees continue to be cut down during deforestation =&gt; could be nominalised: for example:</i></p>	<p><b>Toolkit 4:</b></p> <p>There is no use of citations or distancing/endorsing language, so the student is not aware this is a requirement when using external sources.</p>

<p><u>(P3) Another environmental instability</u> caused by deforestation is the extinction of some populations of flora and fauna losing their homes (good hypertheme with clear transition from previous paragraph but does not answer the prompt). There are a lot of animals and plants living inside the forests. Even 70% of animal population that we know lives in the Amazon Rainforest. Deforestation <b>causes</b> these animals to lose their shelter. Some of them cannot survive and others migrate. We all know about food chains existing around us. <b>If</b> one of the components cannot survive losing their shelter, it will cause chaos to another component in the food chain. One population can increase significantly while other populations can extinct. This environmental instability will definitely bring harm to human beings.</p> <p><u>(P4) We can classify people who have been deforesting into two main groups.</u> <b>The first group</b> consists of firms that aim to collect woods and the <b>second group</b> consists of people who deforest because they live migrating and they need to find good soil to plant their crops. Usually the second group does not know that deforestation is harmful. <b>Two different approaches should be done to these groups</b> (the solutions should be clearly signposted at the beginning of the paragraph but nice approach to link the solutions to the types of purpose). Strict rules and regulations with written fines <b>should</b> immediately be made. Deforestation <b>should</b> be made illegal and those who violate <b>should</b> be fined with a large amount of money. If there are firms who need to gain materials such as woods, they need to replant trees after they cut down the old trees. This regulation is made to maintain the population of trees in the forests. Not only that, they <b>should</b> only be given a certain area of land to carry out their business. This regulation is to ensure that there will still be forests untouched by human as a place for animals to take shelter. <b>The second group</b> needs to be approached differently. They need to be educated that deforestation is harmful for the environment. They also need to be taught on how to live permanently in a place and take care of</p>			<p>Deforestation disturbs these cycles.  (P3) <i>If one of the components cannot survive losing their shelter, it will cause chaos to another component in the food chain.</i>  Could be revised to: The disappearance of one element of the chain affects all links.</p>	<p>The student uses should efficiently for recommendation but modality is not used well for hypothetical results (use of present simple). For example:</p> <p>.</p> <p>(P4) <i>If there are firms who need to gain materials such as woods, they need to replant trees after they cut down the old trees.</i>  Need should be replaced by 'should'.</p>
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<p>the soil so that they can use the same soil to replant their crops. <b>However</b>, there <b>should</b> also be laws for them to follow so that they will not continue their traditional ways of living that is migrating. (Solutions should be contextualised, one country for example. + evaluation)</p> <p>(P5) These <b>solutions</b> need to be socialized to all people. Government <b>should</b> implement the rules and regulations immediately. People <b>should</b> not be afraid to report if they witness illegal deforestation. Public organizations <b>should</b> continue their campaigns so that more and more people are educated and aware of the damage caused by deforestation.</p>				<p>(P4) <i>This regulation is made to maintain the population of trees in the forests.</i></p> <p><i>Is made</i> refers to a hypothetical measure and so should be revised as: This regulation would/could be made to maintain...</p>
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## Dr Strange Disciplinary assignment:

Prompt:



### MA1100 Fundamental Concepts of Mathematics AY2016/17 Sem 1

Homework 4 – due on 13 Oct (Thurs) at 12pm

1.

Determine if each of the following is an equivalence relation. Justify your answer using the definition.

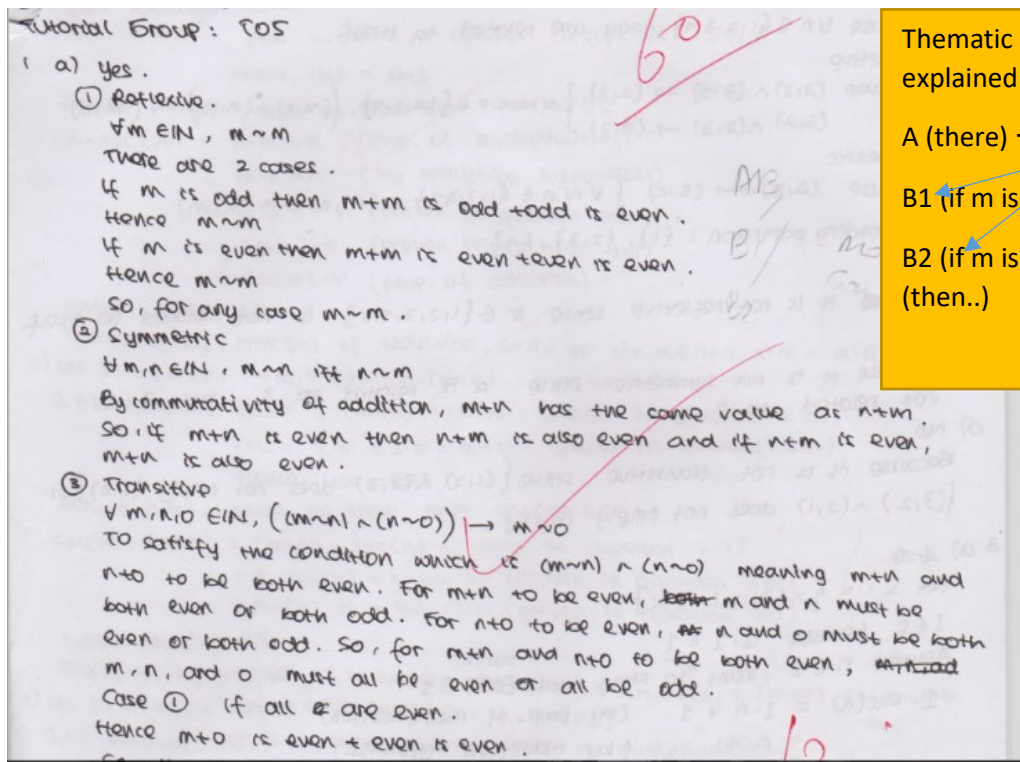
- (a) The relation  $\sim \subseteq \mathbb{N} \times \mathbb{N}$  defined by  $m \sim n$  iff  $m + n$  is even.
- (b) The relation  $\sim \subseteq \mathbb{N} \times \mathbb{N}$  defined by  $m \sim n$  iff  $mn$  is even.
- (c) The relation  $\sim \subseteq \mathbb{N} \times \mathbb{N}$  defined by  $m \sim n$  iff  $m = n + 3$ .

2.

For each of the following relations determine if it is an equivalence relation. Justify your answer using the definition. If the relation is an equivalence relation, compute the corresponding partition. If it is not, determine which of the three properties of an equivalence relation are not satisfied.

- (a)  $\{(1, 1), (2, 2), (3, 3), (4, 4), (2, 3), (3, 2)\}$  on the set  $\{1, 2, 3, 4\}$
- (b)  $\{(1, 1), (2, 2), (3, 3), (4, 4), (2, 3), (3, 2)\}$  on the set  $\{1, 2, 3, 4, 5\}$

Dr Strange's answer:



Thematic analysis (as explained by the student)

A (there)  $\rightarrow$  B (2 cases)

B1 (if m is odd)  $\rightarrow$  C (then...)

B2 (if m is even)  $\rightarrow$  D (then..)



## **8.2 Yena**

### **Student profile**

Yena is a Singaporean student, whose stronger language she says is English. She was schooled in a Singaporean system with English as the language of instruction.

### **EAP profile**

See the reader response analysed below.

The task required the student to respond to a given text. This was written in Week 3 of the semester.

Yena starts at a fairly high level in the module. Although the text below is written after the toolkit 4 was taught, she at the very least shows she has been able to apply a lot of the teaching in her writing. However, the overall structure is not as was expected. The student response should have appeared in the introduction, following a brief summary of the text. Beyond this, Yena seems to control toolkit 1 fairly effectively with hyperthemes that clearly link to the macrotheme and preview the paragraphs. Toolkit 2 is used effectively. Toolkit 3 is also used well, with a range of technical entities used and few instances of congruent grammar. Some expressions are quite personal (the use of *we*, for example). Toolkit 4 shows both areas of confidence (the use of various distancing resources for example shows Yena has benefited from the tutorial), and areas to improve: the tone overall is that of a 'high school essay', with rather strong evaluative judgements made without much evidence being provided.

Yena's EAP text:

	Toolkit #1 to organize a text: Textual cohesion	Toolkit #2 to express logical links: Conjunction	Toolkit #3 to express the subject matter	Toolkit #4 to express evaluation and stance: Appraisal and Engagement
<p>(P1) In 'A poisonous mix of inequality and sluggish wages threatens globalisation' (2007), Fryer <b>argues</b> that we <b>ought</b> not to impair globalisation though it has resulted in larger inequality between the rich and the poor of developed countries. With the growing unhappiness from stagnant wages, rising income disparities and home-grown companies opting for outsourcing, Fryer foresees <b>democracies practicing protectionism</b> soon. <b>However</b>, it is not feasible to eliminate globalisation. <b>Increased productivity, quality of life, economic prosperity and the opportunity to break away from impoverishment</b> are advantages of globalisation. <b>Hence</b>, globalisation is necessary for a country's economy to strive in the long run and adopting protectionism is not a wise idea. <b>Putting the blame of our predicament on globalisation entirely is unfair since technology might have a larger part to play in inequality (if this is taken to be the macrotheme = the response, then the student does not understand the original text where the blame is not entirely placed on globalisation)</b>. Since it is impossible to eradicate inequality, Fryer <b>suggests</b> improving occupational mobility to minimise inequality. This meant less friction in labour markets and a regulatory system that aids investment. An educational system that allows people to gain general skills, removing welfare benefits from employment and funding training and active policies are necessary.</p> <p><u>(P2) More specifically, Fryer believes that technology could have played a greater role in contributing to the rising inequality today. He also predicts that along with the increasing pressure from the</u></p>	<p>Macrotheme is in bold Hyperthemes are underlined.</p> <p>It is unclear until P2 what the student's response is,</p>		<p>Headnouns are in bold, nominalisations are in italics.</p> <p>In this area, the student produces a fairly abstract text, with technical entities and several examples of nominalisations throughout the text.</p> <p><i>'The pursuit of advanced technologies to increase the productivity and efficiency of our work has caused machines to replace workers (Rotman, 2014)' (P3)</i></p>	

<p>public, democracies would soon practice protectionism to protect local companies and minimise the effects of globalisation.</p> <p><b>I do agree with Fryer that technology has greatly contributed to rising inequality. However, there were insufficient explanations provided for his claim to understand the extent of impact technology has on inequality. On the other hand, I disagree with the assumption made by Fryer that there might be a high possibility that democracies would soon practice protectionism (this works better as a macrotheme).</b> His assumption is the result of logical fallacies like slippery slope and over-generalisation, whereby he did not consider the differing contexts of different countries.</p> <p>(P3) <b>While we are busy welcoming technology into our society today, it seemed that it had never occurred to us</b> that technology might have been the largest contributor to rising inequality. Contrary to the traditional belief that globalisation is the sole cause of rising inequality; Stephen Hawking lamented that “technology is driving ever-increasing inequality”. <b>The pursuit of advanced technologies to increase the productivity and efficiency of our work has caused</b> machines to replace workers (Rotman, 2014). New, innovative inventions like robots and automation are replacing various sectors of jobs at an alarming rate. Skills that were once deemed useful become obsolete, <b>resulting in</b> widespread technological unemployment. <b>However,</b> the negative impacts of technology contributing to rising wage inequality do not stop here. According to Brynjolfsson (2014), <b>the small pool of highly skilled individuals</b> is usually valued for their talents in today’s technological-driven economy. <b>While</b> lowly skilled workers experience a stagnant pay, companies have no qualms in giving out rewards and huge pay increments to the highly skilled workers. As such, widening income gap continues to persist in today’s society as technology fuels this trend.</p> <p>(P4) Fryer also <b>speculates</b> how the escalating unhappiness from</p>	<p>what she agrees with and disagrees with.</p> <p>The overall structure is awkward. The points the student is responding to become obvious only in P2, leaving the purpose of P1 unclear:  <i>“I do agree with Fryer..  On the other hand, I disagree with..”.</i></p> <p><i>The student then develops her agreement point in P3 and her disagreement point in P4.</i></p>	<p>The student has a good control over these resources. Conjunction relations are expressed both between clauses and in the verbal groups:</p> <p><i>‘Skills that were once deemed useful become obsolete, <b>resulting in</b> widespread technological unemployment’ (P3)</i></p>		<p>The tone also shows judgemental bias without any evidence. For example, in P3 ‘it seemed that it had never occurred to us’. This shows that the student is transiting from a high school type of essay to academic writing at university where such claim may not be acceptable without evidence.</p> <p>The evaluative tone is not completely appropriate for</p>
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<p>the public <b>could</b> pressure democracies into implementing protectionism especially since Japan and USA have also jumped on the bandwagon. <b>However</b>, these do not justify his assumption that protectionism would soon be common in democracies. He <b>failed</b> to consider the differing contexts and the stance of different countries to protectionism. <b>Countries dependent on trade for their economic growth like Singapore</b>, strongly opposes the idea of protectionism (Ministry of Foreign Affairs). According to The Economic Times (2009), Asia-Pacific economies (APEC) have also gathered to address and resist the growing protectionism practiced internationally. <b>Additionally</b>, it is highly unlikely for democracies to carry out protectionism as free trade agreements still hold between countries. <b>Indeed</b>, it may seem that democracies would soon look to implementing protectionism since it would be the simplest way to solve the rising inequality. <b>Nonetheless</b>, democracies weigh the consequences of protectionism seriously and are aware of the harm it will bring to the world's economy. As such, Fryer assumption is <b>invalid</b> as it was a hasty conclusion drawn from his superficial understanding and over-generalisation of the situation.</p> <p>(P5) In conclusion, Fryer's claims are <b>unjustifiable</b>, as <b>he did not analyse the situation in-depth</b>. In addition, he only provided a brief elaboration that lacked sufficient evidence to back his claim. The advent of technology has a role to play in increasing wage and social inequality. With regards to the decision to practice protectionism, it differs between countries. Given the severity of the impacts of protectionism, democracies would also take a long time before a consensus is reached and pressure alone is insufficient to convince democracies to mete out protectionism.</p>				<p>the task. This is shown in a range of evaluative terms such as 'failed' 'invalid' (P4); <i>Fryer's claims are unjustifiable, as he did not analyse the situation in-depth</i> (P5)</p> <p>Also, the student aligns with one claim and disagrees with another claim, which does not match with the overall harsh tone and the uncompromising conclusion that the claims are unjustifiable.</p> <p>However, the student does try to use distancing resources: <i>suggests, speculates</i> which show she understands the task purpose and engages useful resources to respond to the author's claims.</p> <p>The student also includes a range of sources to support her response.</p>
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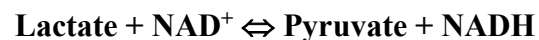
## Yena's Disciplinary assignment

	Toolkit #1 to organize a text: Textual cohesion	Toolkit #2 to express logical links: Conjunction	Toolkit #3 to express the subject matter	Toolkit #4 to express evaluation and stance: Appraisal and Engagement
<p><b><u>Abstract</u></b> Lactate dehydrogenase (LDH) is an enzyme that is involved in the anaerobic glycolysis pathway and usually serves as a biomarker in cancer studies to help detect cancer (Miao et al., 2003) since higher levels of LDH are typically found in cancer cells (Background and purpose) . In this study, mouse fibroblast cells containing LDHA are reverse transcribed and amplified for insertion into pET11a plasmid vectors, which are then transformed into E.coli DH5<math>\alpha</math> cells (methods). Transformation was successful (results). The cloned recombinant pET11a plasmid is then sequenced to check for mutations (methods). 2 true mutations have been identified. 2 true mutations which result in a different amino acid being encoded for at base pair position 241 and 643 changes primary sequence of amino acids, thus affects the secondary and tertiary protein</p>	<p>The disciplinary informant provided a positive evaluation of this lab report. The genre expectations and staging are respected.</p>	<p>Conjunction is highlighted in blue; there is a clear effort to clarify the logical progression between the concepts.</p>	<p>Noun groups are highlighted in pink with nominalizations in <i>italics</i> most of which are established technical terms, or dead metaphors.</p> <p>The technical entities are expressed with a range of technical noun groups and technical terms.</p>	

structure, of which future work in expressing a functional LDH protein could be affected (results and discussion).

### **1. Introduction**

Lactate dehydrogenase, LDH, is an enzyme that is extensively researched about due to its pathophysiological importance and commonly found in many organisms (Markert, 1984). Existing in 5 different isozymic forms, each isoform of LDH exist as a tetramer made up of 4 subunits. For example, LDHA and LDHB genes codes for LDH-M and LDH-H subunits respectively that will come together to form a LDH isoform (Quistorff & Grunnet, 2007). LDH plays an important function in the glycolytic metabolism.



LDH catalyses the conversion of lactate to pyruvate and vice versa via the oxidation of NADH and reduction of  $\text{NAD}^+$  respectively, of which, oxidation of NADH (regeneration of  $\text{NAD}^+$ ) generates ATP. More importantly, the role of LDH in glycolytic metabolism has a significant impact in cancer cell studies. Occasionally, cancer cells lack oxygen, as cancer cells are either further away from the nearest blood vessels or proliferation of cancer cells outgrows its blood supply. Hence, during hypoxemia, cancer cells, which require high levels of energy for proliferation of cancer cells, produce ATP anaerobically via glycolysis by upregulating glucose and lactate transporters instead of oxidative phosphorylation. This is known as the Warburg effect (Lopez-Lazaro, 2008). Found in cancer cells in high levels (Miao et al., 2003), LDH sustains growth of cancer cells by glycolysis. By inhibiting

Clear hypertheme

Evaluative resources are used to highlight the worthiness of the experiment. 'More importantly', 'a significant'.

Reference to expert sources and disciplinary concepts ('the Walburg effect')

LDHA, insufficient energy is produced due to decreased levels of glycolysis, thus reducing the proliferation of cancer cells and its invasive potential (Miao et al., 2003).

In this experiment, we aim to clone LDHA genes from mouse fibroblast cells into pET11a plasmid vectors. mRNA isolated from the mouse fibroblast cells and reverse transcribed into cDNA via reverse transcription and amplified during PCR to be inserted into the pET11a plasmid vector. To ensure that directional cloning is carried out between pET11a and LDHA cDNA during ligation of complementary sticky ends, 3 restriction enzymes (EcoRI, NdeI, BamHI) are used to nick pET11a plasmid vector to further minimise self-ligation. The recombinant plasmid is then transformed into bacteria cells. Subsequently, the plasmid is cleaved by restriction enzymes and the DNA insert is sent for sequencing to check for mutations.

**2. Materials & Methods**

**2.1 Total RNA isolation from mouse fibroblast cells**

1ml of TRIzol Reagent is added to 2x10<sup>6</sup> mouse fibroblast cells in each 1.5ml reaction tubes, labelled 1 and 2, followed by chloroform, which separates the mixture into 3 phases (lower phase, interphase and upper aqueous phase) after centrifugation. RNA present in the aqueous phase is aspirated carefully to prevent contamination. The aqueous phase is then treated with DNaseI, followed by isopropanol and 75% ethanol to precipitate total RNA before quantification via Nanodrop.  
[...]

A range of external conjunction to sequence the experimental steps chronologically (followed by, after, then)

Technical terms and 'dead metaphors' such as 'absorbance', and 'concentration'

<p><b>4. Discussion</b>  <b>4.1 Quality of RNA and DNA quantitated from Nanodrop</b>  Making use of <b>UV absorbance ratios, quantitation</b> of our samples using Nanodrop tells <b>us</b> the <b>purity and concentration</b> of our samples, which is crucial in helping <b>us</b> to identify which sample should be used before proceeding with further experiments. The <b>A260/280 ratio</b> is used to determine the <b>purity</b> of our samples. A <b>RNA and DNA sample</b> is said to be pure <b>if</b> it falls within the <b>A260/280 ratio</b> of 1.8-2.0 and 1.6-18 respectively. <b>However, if</b> the RNA or DNA <b>sample</b> quantitated falls below or above the <b>optimal range</b> of purity, <b>this could suggest</b> that <b>contaminants</b> such as ethanol and proteins are present in the sample. <b>With regards to</b> the <b>quality</b> of RNA samples isolated, <b>RNA isolation</b> was successful <b>because</b> <b>RNA sample 1 and 2</b> are within the expected <b>A260/280 ratio</b>. <b>Although</b> <b>A260/280 ratio</b> of RNA sample 2 was slightly below expected ratio, <b>high concentration</b> of RNA was present in it. <b>RT-PCR products</b> were <b>also</b> pure. <b>However, concentration</b> of RT-PCR products produced is <b>significantly</b> lower than <b>the concentration</b> of total RNA</p>	<p>The purpose of the section is clearly shown in the hypertheme: to select the appropriate sample before proceeding to further experiments.</p> <p>A range of internal conjunctions here to support the coherent development of the discussion (<i>however, although, since</i>)</p>			<p>Some elements of a more personal tone in the hypertheme here with several references to the 'us' representing the student group.</p> <p>Instances of hedging are highlighted in green. Yena uses a range appropriately to explain the results</p>
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isolated. This is because total RNA contains mRNA, tRNA and rRNA. Since mRNA constitutes 1-5% of the total concentration of RNA, during reverse *transcription*, where only mRNA is required (template) to form RT-PCR products, it is reasonable to observe a lower concentration due to the removal of tRNA and rRNA.

[...]

## **8.3 Kali**

### **Student profile**

Kali comes from an Indian family long established in Singapore. She was schooled in English in Singapore and speaks English and Tamil at home.

### **EAP Profile**

This is a very fluent writer who starts the module with a good control over the language but a few areas that need paying attention to support a transition to academic register: A range of stance and evaluation feature but this seems to be developing still; there are some instances of awkwardness (*according to me*) and of registerial problems (*absurd*). The text is generally well structured but not all paragraph relate to the macrotheme clearly.

	Toolkit #1 to organize a text: Textual cohesion	Toolkit #2 to express logical links: Conjunction	Toolkit #3 to express the subject matter	Toolkit #4 to express evaluation and stance: Appraisal and Engagement
<p>(1) In ‘How Globalisation Begets Inequality’, the Economist explains that along with the increase in the annual average income during the globalisation period, the Gini index (measures the inequality) has increased from 0.3 to 0.45, indicating an increase in the income inequality. This is contradicting as globalisation predicted that the poor workers will benefit from the growth in trade. The exchange between the skilled workers in the developed countries and the unskilled workers in the developing countries should have been beneficial to the low-end workers of the developing country. However, the reality is not on par with the traditional theory. Professors Maskin and Kremer, working to explain the incongruity between the reality and the theory, proposes that globalisation opened up avenues for the high-skilled workers in countries like India, letting them work across borders. This is disadvantageous to the low-skilled workers as, without the guidance of the skilled workers, they are unable to be a part of globalisation. Even the low end workers doing monotonous labour needs to have a good educational qualification to meet the high western standards. According to me, globalisation is not as negative as it is portrayed by the author. It is in its developing stage with positives and negatives. On one hand, I agree with Maskin’s claim of education being the key to eradicate the negative effects of globalisation,</p>	<p>Clear and effective macrotheme at the end of the introduction paragraph (a clear response to a specific point in the text).</p>	<p>Some elements of external conjunction. A range of clause complex.</p>	<p>A range of noun groups, with several instances of nominalisations.</p>	<p>A range of resources to express stance: ‘According to me’, ‘I don’t completely agree’ (P1), I agree, I don’t think (P3)</p>

<p><b>while on the other, I don't completely believe that compulsory minimum education level is necessary for the first generation workers to be hired.</b> (the summary is concise and the response is clear)</p> <p>(2) <b>Globalisation</b>, in its developing stage, has positive and negative effects. Globalisation enables the people across the world to interact and learn from each other. Countries separated by boundaries and seas are linked by globalisation. <b>It has increased</b> the social exchange among people leading to an increase in tolerance level among people regarding different cultures and societies (Collins, 2015). It is a positive boom for the rich and it makes them richer. <b>But at the same time</b>, the question of <b>whether</b> it make the poor poorer also needs to be considered. The services sector including low-end workers are progressively affected by globalisation. Many such jobs are now under threat <b>as</b> the international companies are trying to minimise their cost by outsourcing and offshoring (Schifferes, 2007). <b>It is possible</b> that over time, the benefits of globalisation will reach the low-end workers, but waiting for it to happen without any action is baseless.</p> <p>(3) <b>While I agree</b> to the author's claim of education being the ultimate key to raise the standards of the poor, <b>I don't think</b> it plays a big role in helping the uneducated first generation workers. <b>When</b> the children of poor families unable to be a part of globalisation, receive education, the future of the next generation becomes secured. <b>However</b>, this course of action neglects the</p>	<p>This paragraph does not link back clearly to your thesis statement: do lower skill workers need to be trained</p>			<p>A range of resources to express tentative and interpretative meaning: 'It is possible' (P2)</p> <p>Stance markers: I agree, I don't think (P3) Concessive clause 'while' for stance.</p>
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<p>present generation of uneducated suffering workers. As the author mentions, the companies are biased towards hiring workers with a good foundation in education. Workers without education are completely neglected. This is <b>absurd</b> as after hiring the workers, both the educated and the non-educated ones will be trained according to the company's standards. As, the companies do not gain anything by retaining the low-skilled workers, they hire only the skilled workers to progress in their business. Education, flexible and adaptable workforce is the only way to induce the companies to retain the low-end workers (Smith, 2007). The companies, <b>instead</b> of just focussing on the short- term gains, think big enough to hire and train the non-educated workers, it will be beneficial to all classes of people.</p> <p>(4) Globalisation is developing rapidly. Education along with support for the first generation workers will accelerate the reach of globalisation and the fruit of it can be shared equally by all of us.</p>				<p>Some evaluative items may not be appropriate for the register: 'absurd' (P3)</p> <p>Some lack of control in modality in some instances (due to a type perhaps, an omission of 'should'?)</p> <p><i>'The companies, instead of just focussing on the short-term gains, [should] think big enough to hire and train the non-educated workers, it will be beneficial to all classes of people'.(P3)</i></p> <p><i>'Will' should be would</i></p>
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## Disciplinary assignment

The task required students to deduce the characterization of a given DNA sequence. This has to be done through various IT tools and databases. The lecturer requires for the logical reasoning to be visible, including the dead ends and errors.

The disciplinary text shows increased control over interpersonal resources and a very deliberate use of textual resources for information flow. The text requires a deductive reasoning to be visible to the lecturer, and Kali achieves this through engaging clear logical, textual and interpersonal resources.

The lecturer's comment on the assignment was very positive overall (although he mentioned that the first two sentences of the introduction were too general and that the student should go straight to the point.)

<b>Inquiry-based individual writing assignment</b> <b>Bioinformatic Characterisation of Sequence</b>	<b>Toolkit #1 to organize a text:</b> <b>Textual cohesion</b>	<b>Toolkit #2 to express</b> <b>logical links:</b> <b>Conjunction</b>	<b>Toolkit #3 to express</b> <b>the subject matter</b>	<b>Toolkit #4 to express</b> <b>evaluation and stance:</b> <b>Appraisal and Engagement</b>
<p><b>Introduction</b>            Bioinformatics is the <b>application</b> of computer technology to the management of biological information. A DNA sequence is given to be characterised and no other information is given (context). The sequence might code for a functional protein or it might be a non-coding sequence (hypothesis). Various bioinformatics tools like database searches, pattern, profile and alignment of sequences were subjected to the given DNA sequence to characterise it (method). <b>Using this approach, the structure of the given sequence and the evolutionary relationship with other organisms are identified to characterise the sequence.</b></p> <p><b>Methods and Results</b>            In an attempt to characterise the given sequence, the sequence was subjected to the Blast suite of programs (Altschul et al., 1997) and the different profile based approaches. The thought process behind each approach, the</p>	<p><b>The macrotheme is in bold.</b>            Thematic progression analysis of a paragraph is provided in the thesis, showing good control over the resource.</p> <p>Clear hypertheme            General nouns to predict the section content 'suite' and 'approaches'. Clear preview of content.</p>		<p>Kali uses a range of complex and technical noun groups throughout. There are no instances of out of place congruent grammar.</p>	<p>A range of modality resources show the student's control over meanings that support her deductive work in this assignment.</p>

process involved and the interpretation of the results are discussed as follows.

Six-Frame Translation:

The given nucleotide DNA sequence was subjected to Six-pack Emboss Translation (Li et al., 2015) to figure out the preferred frame of translation. Longest Open Reading Frame (ORF) was obtained in Frame 1, 6 and the shortest ORF was obtained in Frame 4. ORF is the region with no stop codons and translation prefers a longer ORF ("Translation and Open Reading Frames,"). This indicates that the positive frame 1 is the most probable frame for the translation of the nucleotide.

Blastn:

The sequence was blasted using a standard nucleotide blast to compare the given nucleotide sequence with the database of nucleotides. The initial blastn was performed with default parameters excluding models. 39 hits were obtained with scores ranging from 40 to 50. Nucleotide region from 37 to 66 of the query sequence shows similarity with genome sequence of Mus musculus (Rodent) and proteobacteria. This indicates a slight chance of rodents, proteobacteria and the protein coded by the given sequence to be distant homologous. The top hit, Apteryx australis mantelli (Bird) genome, has a score of 44.6(0.51E) and is similar to the second half of the query sequence. Taxonomy report of the search for the second half of the query shows a wide variety of organisms ranging from flatworms to humans. Hence, it is difficult to make any predictions about the second half of the query sequence through this blast. Distance tree of the blastn search is shown in Figure1.

Clear signal to the interpretation of the results. 'this indicates'

A range of resources to express the deductive reasoning required in the assignment. Both boasting and hedging are present: 'shows' 'it is clear that' (below), and several hedging devices (could and might below)

<p>When multiple sequence alignment was done for the top 10 hits and the query sequence, the sequences align in the 64-100 region. Some places are always seen to be occupied by purines and some are always occupied by pyrimidines in the alignment, indicating a positional importance to the nucleotides. When the same blastn was run with a smaller word size of 7, the number of hits increased rapidly. This is because, smaller word size [3] increases the sensitivity of the search (Korf, Yandell, &amp; Bedell, 2003). Performing the nucleotide search with megablast yields no result as the query sequence is too small. [...]</p> <p><b>Discussion</b> After subjecting the given sequence to various bioinformatics tool, some major features about the sequence can be characterised. From the Six-Frame Translation, it is clear that the 183 nucleotide DNA sequence translates to a protein sequence using the frame 1 translation. Blastn search gives information about the first half of the sequence, indicating that the first half could be distantly homologous to Mus musculus and proteobacteria. Plotting a SeqLogo for MSA constructed from a section of results in blastn search gives an idea regarding the position specificity of the nucleotides (Thomsen &amp; Nielsen, 2012) (Figure 5). [...]</p> <p><b>Conclusion</b> Overall, it is clear that the given nucleotide sequence is highly similar to carboxymethylenebutenolidase protein and iron permease protein of proteobacteria. The sequence is homologous to proteobacteria and rodents. The protein might belong to a hydrolase family and might have related</p>	<p>Uses general nouns 'tool' to refer back to the methods, before announcing the content of the coming section ('features'). 'After' as internal conjunction to sequence the discussion as a follow up from the methods and results.</p>	<p>The student uses a range of external conjunction to compare and contrast results as part of the deductive reasoning.</p>		
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<p>domains. Information about the domain is not available. Further research with advanced bioinformatics tools can be performed to infer more about the structural aspects of the given sequence.</p>				
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## **8.4 Ben**

**Participant profile:** Ben is a Singaporean student of Chemistry. He was schooled in an EMI Singaporean school. When such student fails the entrance written level text (which leads them to the compulsory EAP module), their writing tends to show a lack of practice as they have been away from academic pursuits for 2 years while completing their military national service. This may be evident in the cohesion of the text and awareness of academic register may be lacking.

### **EAP profile:**

Ben's essay on the Deforestation prompt (see p.21-22).

**Overall evaluation:** Ben has general good control over the language but is not used to the academic register: he writes like in high school. His register is not yet very academic (tone is more hortatory than impersonal with evaluative language that is quite emotional, a moralizing tone). The register also lapses in the fact that there are some abstractions but also many instances of common-sense language (the joke developed over one paragraph). Textual resources are used to a certain extent, but the overall structure of the text is not completely effective: the macrotheme is difficult to locate. There are also a few syntax errors and surface errors. Overall Ben does not seem aware of the genre the prompt requires (a problem/solution) and he produces a text which veers off to a cause/effect text.

	Toolkit #1 to organize a text: Textual cohesion	Toolkit #2 to express logical links: Conjunction	Toolkit #3 to express the subject matter  Nominalisations are in italics Headouns in bold	Toolkit #4 to express evaluation and stance: Appraisal and Engagement
<p><b>(1)Deforestation</b> has been an ongoing process since decades ago. It started out when man destroyed forests permanently to make land for <b>them</b> to use. At that point of time, it did not occur to them that such action had serious ramifications, be it in the short run or the long run. In today's world, education and advancement in technology have allowed us to realise the <b>seriousness</b> in the <b>consequences</b> of <b>deforestation</b>. <b>However, despite</b> the fact that scientists around the world are warning us about the problems of deforestation, and that Mother Nature is giving signals that she is not feeling well, <b>little</b> has been done to address the issue. What is worse is that some people are turning a blind eye to these signs and warnings, and insisted that <b>problems</b> caused by deforestation, such as climate <b>change</b>, do not exist. Regardless of these critics, the <b>problems</b> resulted from deforestation are very real, and there is a need to contain the rate of deforestation before nothing can be done to revert Mother Earth to its previous glory. (A nice introduction which flows well and describes the general issue well but the thesis is not there. The beginning is a little confusing too with 'decades ago')</p> <p>(2) <u>There are many problems associated with <b>deforestation</b> (the prompt asks for one problem to be detailed, so this is not effective).</u> The <b>loss of habitats, desertification</b> and climate <b>change</b> are just a few of the many problems <b>we</b> come across on radio, newspaper and Internet. There is even a joke circulating around the Internet that compares the <b>extinction</b> of bees and the human race. <b>While</b> the former will result in destruction of Earth, the latter will allow Earth to flourish. This</p>	<p>Macrotheme is not apparent. There is no answer to the prompt (the causes are discussed but not the impact of deforestation).</p> <p>The second hypertheme is not effective, confusing cause and effect: <i>'One problem caused by deforestation that has not been readily discussed is Man's greed'</i></p> <p>The solution hyperheme is the only effective one (and linked to the prompt): <i>In order to tackle the problem of deforestation, there is a need to derive both short-term and long-term solutions (P4)</i></p>	<p><b>Toolkit 2</b></p> <p>Clause complex not always well constructed/syntax errors.</p> <p>External conjunction usually well used.</p>	<p><b>Toolkit 3</b></p> <p>Instances of congruent grammar: <i>By clearing forests, Man can use these lands for agricultural purposes and mining (P3).</i> This could be phrased as Deforestation/Land clearing allows for mining and agricultural activities. Generally the text has many participants doing things (Man mostly), which means there is a lost opportunity to discuss more abstract entities.</p>	<p><b>Toolkit 4</b></p> <p>Some concession clauses. Some instances of modality used well but the solution paragraph (P4) does not convey the recommendation and evaluation meanings very effectively:</p> <p><i>'as a sudden ban in deforestation will result in'</i> (P4): lack of hedging here in the hypothetical consequence.</p> <p><i>'This slow and gradual process provides time for industries'</i> (P4). <i>The present simple does not work in the description of a suggested solution.</i></p> <p>Several instances of 'we'(2)</p>

<p>joke is popular because the extinction of the seemingly insignificant bees has such an unexpected drastic effect on Earth. However, joke aside, there is a serious implication behind this “joke”, and that is the self-importance of the human race. Man place high importance in themselves, resulting in them being self-centred, and that is where the biggest problem caused by deforestation lies. (This para leaves the trail you need to mention the one problem you want to discuss and the bees extinction is not linked to deforestation. So I think I would mention the bees somehow but not dedicate one para to this and develop one consequence of deforestation).</p> <p>(3) One problem caused by deforestation that has not been readily discussed is Man’s greed (a cause or a consequence?). Man has been clearing forests for their own interests. The benefits, to them, outweigh the cons of deforestation. One such benefit is profitability. Ralph Waldo Emerson once said, “A man is usually more careful of his money than he is of his principles.” (Great quote, very relevant, and here a direct quote works well because RWE is a famous thinker. However, does the prompt ask for the causes of deforestation to be developed?) In a world where money is utmost important to many, the monetary benefit arises from deforestation is too attractive for Man to look beyond. By clearing forests, Man can use these lands for agricultural purposes and mining. Woods are also acquired in the process. Woods are important material to make paper and furniture. The sales of woods, crops and ores mean profits, and that is the aim of deforestation. In addition to profitability, another reason for deforestation is urbanisation. With the growing human population, there is simply not enough land for Man to establish housing. Hence there is a need to clear forests to provide lands for settlement. Man’s greed feeds on these benefits and continues to destroy forests to gain more such benefits. Thus deforestation continues to occur.</p>	<p>Some general nouns are used to preview the text: problem (P1); another reason (P3)</p> <p>Internal conjunction is also used throughout</p> <p>However (P2), In addition, thus (P3)</p>		<p>lexis is almost religious: <i>Man, greed... self-importance</i> (P2)</p>	
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<p>(4) <u>In order to</u> tackle the problem of deforestation (<u>good signal that this section is the solution</u>), there is a need to derive <u>both short-term and long-term solutions</u>. The purpose of a short-term solution is to reduce the rate of deforestation <u>as</u> a sudden ban in deforestation will result in other problems economic recession and riots. One <u>possible</u> way to reduce rate of deforestation is to regulate the amount of trees cleared. <u>Government regulation is able to</u> take into consideration the rate of growth of forests and calculate how much forest can be cleared. Of course, this method is by no mean an encouragement for deforestation. <u>On the other hand</u>, government <u>should</u> reduce the amount of trees allowed for deforestation. This slow and gradual <u>process</u> provides time for industries relying on deforestation to make a living to find an alternate revenue method. At the same time, there is a need to educate children (<u>only children?</u>) about the importance of trees. “We must turn to the child as the key to the fate of our future life.” As stated by Maria Montessori, children are the future. By imparting them with knowledge about the importance of forests, and the devastating problems arise from deforestation, the future generation can be one with mindset that wants to preserve forests.</p> <p>In conclusion, the biggest problem caused by deforestation is the benefits gained from deforestation. The solution is, therefore, to reduce the gains by Man. Thus solutions to educate the next generation about the cons of deforestation and to regulate the benefits of deforestation are essential to stop deforestation. With these two solutions working hand-in-hand, I believe that deforestation can be <u>eradicated</u> and Mother Earth will be flourished with beautiful greeneries and abundance creatures once again.</p>				
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## Disciplinary assignment

The prompt was not provided. The lecturer's comments were not obtained but according to Ben this was an A paper. The overview of the way each toolkit is used is shown in the table below and the assignment is annotated. The sample below is not the complete lab report which was 1800 words long. Some figures and sections have been omitted (shown in the text as [...])

**Overall description of Ben's use of the 4 toolkits:** Ben's control over the register required is much better than was shown in the deforestation essay above. In his disciplinary text, Ben shows a great deliberate attention to macrostructure, beyond the use of headings. The introduction stages recall an essay genre structure, and it would have been useful to know the lecturer's opinion on this particular section. Referencing and attention to thematic progression is used throughout. Internal conjunction is used effectively to sequence of the experiment and external conjunction supports the logic of the process of calculation. In this lab report, there are no syntactic problems. The experiential meanings are expressed through technical groups with some nominalisation occurring. The modality resources are used adequately in the discussion segment of the report.

Optical Microscopy of <i>E. coli</i> Cells	Toolkit #1 to organize a text: Textual cohesion	Toolkit #2 to express logical links: Conjunction	Toolkit #3 to express the subject matter	Toolkit #4 to express evaluation and stance: Appraisal and Engagement
<p><b>Chapter 1: Introduction</b></p> <p>A bacterial cell has circular deoxyribonucleic acid (DNA) consisting of all the genes that it requires to grow and reproduce. In addition to this single chromosome, most bacterial species may have additional sets of small circular DNA known as plasmids. (zigzag progression) These plasmids carry fewer genes than bacterial DNA, yet they may contain genes that produce resistance to antibiotics. During DNA replication, both bacterial DNA and plasmids get duplicated. Hence when bacteria undergo binary fission, the process of cell division, the offspring generation of bacteria contains both bacterial DNA and plasmids similar to parental generation.</p>	<p><b>Toolkit 1:</b></p> <p>Headings are used to show the sections of the lab report: introduction ^ Materials and Methods ^ Results ^ Discussion and Conclusion ^</p>	<p><b>Toolkit 2</b></p> <p>Internal conjunction is also used in the results to lead the reader through the process and rationale of</p>	<p><b>Toolkit 3</b></p> <p>Nouns groups are highlighted in pink; headnoun are in bold, nominalisations are in italics). circular deoxyribonucleic</p>	<p><b>Toolkit 4</b></p>

<p>Binary fission results in doubling of bacteria. The time taken for a population of bacteria to double is called the doubling time, <math>\tau</math>. <b>In this report, we will be looking at the doubling time of bacteria species known as <i>Escherichia coli</i>.</b> A single <i>E. coli</i> cell would undergo binary fission every thirty minutes under ideal circumstances. The <i>E. coli</i> used in this experiment also consists of modified plasmid known as cloning vector. A cloning vector is able to accept foreign DNA via transformation. <b>Hence these <i>E. coli</i></b> are able to accept green fluorescent protein (GFP) gene that allows transformed <i>E. coli</i> and its progenies to fluorescence under optical microscope.</p> <p><b>This experiment's purpose is to use study the growth of <i>E. coli</i> cells and to understand diffraction limits and the idea of doubling time, <math>\tau</math>.</b></p> <p><b>Chapter 2: Materials and Methods</b></p> <p><b>2.1 Materials</b> [...]</p> <p><b>2.2 Methods</b></p> <p>The experiment was divided into 4 <b>segments</b>, namely <u>streaking, slide preparation, bacteria imaging and single cell imaging</u>. Ethanol was used to sterilize all the equipment before the start of the experiment. All sterilized materials were placed in a biosafety cabinet.</p> <p>2.2.1 Streaking</p> <p><b>In this segment</b>, sterilized inoculating loop was used to remove a single colony of <i>E. coli</i> from the given plate containing pGFP transformed <i>E. coli</i> culture. <b>This</b> colony was <b>then</b> immediately streaked very gently on a quarter of the agar plate in a zigzag motion. A <b>second</b> inoculating loop was used to extend the streaks into second quarter of the agar plate. <b>This process</b> was repeated one more time. <b>Lastly</b>, a forth inoculating loop was</p>	<p>The macrotheme is clear: <b><u>In this report, we will be looking at the doubling time of bacteria species known as <i>Escherichia coli</i></u></b> and is preceded by background and followed by a clear purpose (highlighted in yellow).</p> <p>The methods start with a clear hypertheme that fans out to the <b>4 segments</b> of the experiment.</p> <p>General noun and deictic pronoun '<i>this segment</i>' are used.</p>	<p>calculations of the result. <i>In order to, can be done by, hence</i> integrate mathematical equations into the text.</p> <p>Clear sequencing of the streaking experiment through internal conjunction (<i>then, lastly</i>) (see 2.2 Methods)</p>	<p><b>acid (DNA)</b> consisting of all the genes that it requires to grow and reproduce (<i>Chapter 1</i>)</p> <p>Impersonal tone with past tense passive is used in the methods.</p> <p>Technical lexis used throughout</p>	
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used to extend the streaks into the center of the plate. This agar plate was then sealed and placed in an incubator for *E. coli* to grow for 24 hours.

#### 2.2.2 Slide Preparation

In this segment, 4 colonies of pGFP transformed *E. coli* cells were removed using 4 different inoculating loops and suspended in an Eppendorf tube containing 200 microliter of PBS. This tube was vortex for 20 seconds using the vortex mixer before 5 microliter of the cell suspension was removed and placed on a glass slide. Glass cover slip was put over the glass slide gently at 45 degree to prevent air bubble formation.

#### 2.2.3 Bacteria Imaging

In this segment, glass slide was placed on the slide holder of microscope with the cover slip facing down. Object lens was changed to 100X, power source for bright field was turned on, and view was changed to eyepiece. DP controller was used to view the *E. coli* in the glass slide. In DP controller, sample was focused and scale bar was resized to 5.0 micrometer. Under capture tab, scale objective was changed to 100X. Exposure time was changed to 1 second. This image was then captured and saved. The slide was moved around to capture 5 photos in total.

This process was then repeated. The only exception was that in the repeated process, a drop of oil was added to the objective lens. The remaining procedures remained the same, and a total of 5 photos were taken.

#### 2.2.4 Single-Cell Imaging

In this segment, under the bright field microscope, zoom in onto a single *E. coli* cell and tuned the image as clear as possible. This image was captured and its wavelength range of light was recorded. Then, bright field power switch was turned off and filter was changed to WB (No. 3). The shutter was opened and view was changed to camera. This was the fluorescence microscope. The fluorescence microscope was used to zoom



in onto a single *E. coli* cell to capture the image and record the wavelength range of light.

### Chapter 3: Results

#### 3.1 Doubling Time, $\tau$

Table 1: Average Number of *E. coli* Cells

Table 1 shows the number of *E. coli* cells in each photos and the average number of *E. coli* cells in each photos. The photos used in this table are attached in annex A.

In order to calculate  $\tau$ , there is a need to find the total number of cells ( $N_1$ ) on the glass slide. This can be done by using the following equation:

$$N_1 = N_0 \times \frac{S_2}{S_1}$$

where  $\frac{S_2}{S_1}$  is the ratio of glass cover slip area to image area.

Hence,  $N_1$  is found to be

$$N_1 = 57.4 \times \frac{4.84 \times 10^8}{100^2} = 2778160$$

[...]

#### 3.2 Diffraction Limits and Resolutions

[...]

Table 2 shows the differences between wavelengths and diffraction limits of bright field microscope and fluorescence microscope. Bright field microscope has higher wavelength which fluorescence microscope has lower wavelength. This suggests that diffraction limit of bright field

*microscope* is higher than that of fluorescence microscope due to the following equation:

$$D = \frac{0.61\lambda}{1.4}$$

where 1.4 is the numerical aperture for the optical microscope.

In addition, a lower wavelength, thus a lower diffraction limit, suggests a higher resolution. This can be shown in the figures below

Figure 1: Single *E. coli* Cell Under Bright Field Microscope

Figure 1 shows single *E. coli* cell under bright field microscope while Figure 2 shows single *E. coli* cell under fluorescence microscope. It is clear that the *E. coli* cell is can be seen much clearer in fluorescence microscope as compared to bright field microscope. This shows that fluorescence microscope has, indeed, higher resolution.

[...]

#### Chapter 4: Discussion and Conclusion

##### 4.1 Doubling Time, $\tau$

Doubling time is defined as the period of time for a bacteria cell to double in size. *E. coli* undergoes a process called binary fission to allow it to grow at an exponential rate. The 5 pictures that were taken are used to calculate the average number of *E. coli* in an area of 100X100 micrometer square, and the average number is used to estimate the total number of *E. coli* cells in the glass slide with area 22X22 millimeter square. The total number of cells is then used to calculate doubling time over a period of 24 hours. In this case, doubling time is expected to be >1 as it suggests number of *E. coli* indeed grow in size.

A range of hedging devices in the discussion section to show interpretation of results: *tend to, suggest, may...* Also, some boosting devices in the results: *That shows that...indeed...*

Though the result reflects correctly that there is growth of *E. coli*, there might be possible errors that have taken place to prevent optimal results. One such error may be that the estimated total number of cells in glass slide does not truly reflect the total number of cells in glass slide. This is because 5 pictures may not be enough to truly reflect the average number of *E. coli* in an area of 100X100 micrometer square. In addition, the image area is far too small as compared to the glass slide area, hence 5 pictures may not be sufficient.

#### 4.2 Diffraction Limits and Resolution

[...].

This, however, may also be subjected to possible errors. One such error is human error. There may be a chance that a clearer image is shown in bright field microscope, yet we chose to take image of the one that is less clear. This may lead us to wrongly conclude that bright field microscope has a higher resolution.

#### 4.3 Resolution with Effect of Oil

Oil immersion is a technique used to increase resolving power of microscope. In another word, addition of oil to microscope increases resolution of the microscope. This is because oil has a higher refractive index, which in turn increases numerical aperture of the lens of microscope. Therefore, as chapter 3.3 suggests, microscopes with oil tend to have a higher resolution than microscopes without oil.

Possible errors exist in this case too. One error is the presence of impurities such as dirt, dust or fingerprint. As shown in figure 3, impurities may lead us to mistakenly recognize an impurity as *E. coli* cell. This results in a wrong conclusion that microscope with oil immersion has a higher resolution than microscope without oil immersion.

## **8.5. Reena**

### **Student profile**

Reena is a first year Life Science student. She comes from a Mandarin speaking Singaporean family and feels more confident using Mandarin than English. She does, however, communicate in English with her friends.

### **EAP profile**

In her EAP text, Reena shows some degree of awareness (though not a perfect execution) of the overall stages of the text, which is seen through the use of macrotheme and hypertheme. However, the meaning conveyed in these hyperthemes is unclear or does not match the paragraphs' development. The hypertheme underlined clearly echoes the macrotheme through the repetition of the term 'severe punishment', although the sentence structure error greatly impedes the meaning. A weakness in this hypertheme is that it does not clearly show the two functions of the reader response which are to first describe the idea from the text (severe punishment should be implemented), then the response to this idea (I agree/disagree because), which is linked to the Reader Response stage expectations. We expect this double social function to be performed in the paragraph with the harsh punishment being described, then the reason why the writer agrees explained (and supported by external sources).

Control over logical resources is also weak: the second paragraph turns into a list hypothetical statements describing what might happen should the punishments not be implemented. Reena here shows very weak control over logical development with much of the connections between ideas left to the reader to infer and a problematic reliance on conditional hypotactic clauses/or phrases.

Although Reena uses a range of hedging devices, they are not effective because the propositional content is not logical. Reena overall shows a lack of awareness of the need to substantiate her claims

	Toolkit #1 to organize a text: Textual cohesion	Toolkit #2 to express logical links: Conjunction	Toolkit #3 to express the subject matter	Toolkit #4 to express evaluation and stance: Appraisal and Engagement
<p><b>Introduction:</b> In the article, how to solve illegal immigration (2012), Gregg explains that Immigration is good for a country like America as it helps the country to flourish and develop further. [...] Macrotheme: <b>[Though I agree with Gregg that severe punishments should be implemented to deter employers from bringing illegal immigrants into the US], attracting talented individuals from overseas might not actually be a good way to promote growth in the US in the long run.</b></p> <p><u>Severe punishments should be enforced to ensure that employers who recruit overseas talented individuals legally into the country. Without such harsh punishments, employers who are looking to cut cost by employing cheap labour from overseas through illegal means may do so at a frequent basis. If that happens, Americans may increasingly find themselves losing their jobs to illegal immigrants and become unemployed. This might not help in the development of the US in the long run as those illegal immigrants might not be as efficient as those Americans who were retrenched and unemployment rate in the US might increase. Moreover, as a result of the possible increase in unemployment rate, political instability may arise in the country as well.</u></p>	<p>The role of the macrotheme in the reader response is to clearly indicate both the points that will be focused on (stage 1, the description) and the response the writer will develop (stage 2: the evaluation/the opinion)</p> <p>There is a clear macrotheme indicated by the stance marker: 'I agree'. However, the macrotheme is ambiguous due to the use of the hypotactic concession clause [though...], and mismatched propositional content.</p>	<p>Reena shows weak control over logical development resources.</p> <p>For example, The use of the causal hypotactic clause 'as'.. implies causality, but the claim that illegal immigrants may be less efficient is not backed up so the logical progression is lost</p>	<p>Simple noun groups, a few instances of nominalisations. The grammar overall seems to be characterised by congruent form.</p>	<p>Stance markers: 'I agree' Reena overall shows a lack of awareness of the need to substantiate her claims.</p>

## Disciplinary assignment

In terms of **cohesion**, the text is ‘neat’ (in the words of the lecturer). Indeed, Reena has staged the text very much like the lecturer expected. It is interesting to note that the lexicogrammar deployed for these hyperthemes is not completely accurate but the meaning remains clear. This is noted by the discipline lecturer who comments that the structure ‘from..., it..(underlined below).’ is not appropriate but is ‘tolerated’ in level 1 because the meaning is clear.

Reena’s use of hypertheme resources therefore seems to be used effectively: unlike in the EAP text, the reader of this lab report is left in no doubt as to what the purpose of each paragraph is and the remainder of the paragraphs clearly develops the theme announced. We can also note the use of firstly, secondly and however as structural features as well as, in the paragraph, the use of deictic pronouns (sometimes used with a general noun ‘*these results*’) in thematic position to refer to the NEW from the previous sentence. In terms of **Appraisal**, Reena uses hedging when reporting on what may have caused the unexpected results. This is corroborated by the module lecturer who commented on the appropriateness of the tentative tone in that paragraph. In terms of **clause complex and logico-semantic resources**, the disciplinary text shows a wider range and an increased confidence as shown in the detailed analysis below.

Although the lecturer noted the weakness in expression, the lab report was deemed acceptable for a level 1 student

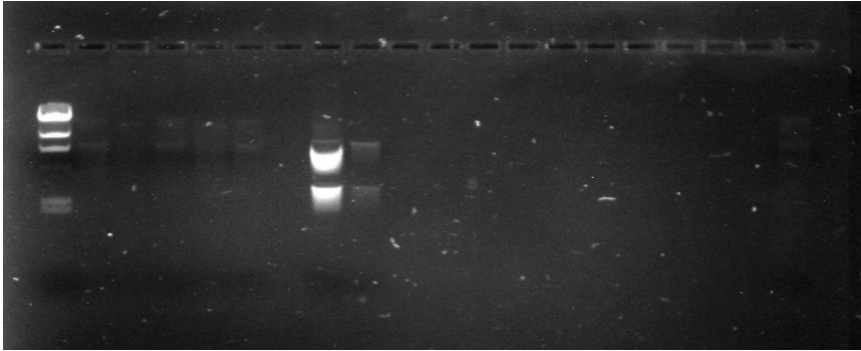
<u>Lab report on Agarose Gel Electrophoresis of Plasmid DNA AND Genomic DNA (4 February 2016)</u>	<b>Toolkit #1 to organize a text: Textual cohesion</b>	<b>Toolkit #2 to express logical links: Conjunction</b>	<b>Toolkit #3 to express the subject matter</b>	<b>Toolkit #4 to express evaluation and stance: Appraisal and Engagement</b>
<p><u>Results</u></p> 	<p>The report does not provide a macrotheme because the students are just writing the results.</p>		<p>Reena uses an increasingly complex noun group and some nominalisation along with the technical terms.</p>	<p>A good range of interpersonal resources, used effectively.</p>

Figure 1. Gel electrophoresis of Plasmid DNA in 1.0% agarose solution. My group's plasmid DNA is in well 5 while the plasmid DNA in wells 1 to 4 and 18 belong to the other groups. Wells 7 and 8 are the positive controls. Well 7 contains the "neat" plasmid DNA sample while well 8 contains the 10-fold dilution plasmid DNA sample. Well M contains DNA markers for comparing with the DNA bands of the plasmid DNA present in wells 1 to 5, 6 to 7 and 18.

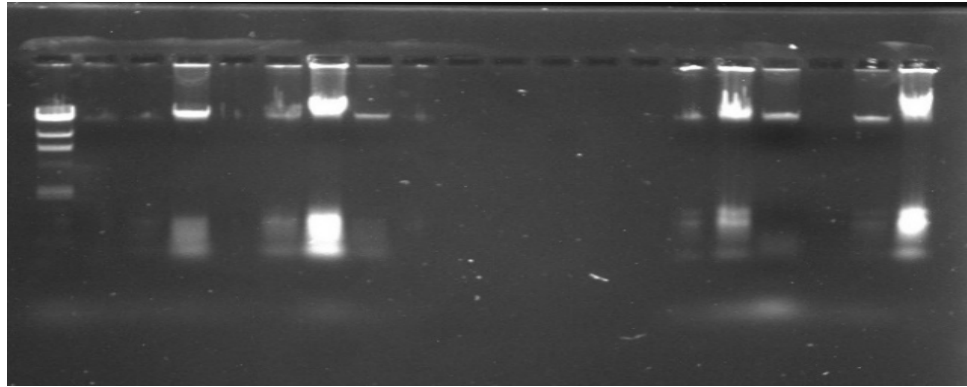


Figure 2. Gel electrophoresis of Genomic DNA in 0.7% agarose solution. My group's genomic DNA are in wells 16 and 17, with the "neat sample" in well 16 and 10-fold dilution sample in well 17 which did not register any bands. The genomic DNA samples present in wells 1 to 7 and 14, 15, 18 and 19 belong to the other groups. Well M contains DNA markers for comparing with the DNA bands in well 1 to 7 and 14 to 19 which contain genomic DNA.

From figure 1, after comparing the bands of plasmid DNA in my group's well (well 5) with the bands in well M containing the DNA markers, the sizes of the DNA bands of my group's plasmid DNA sample are 9416bp and 6557bp.

Next, from figure 2, it shows that the well (well 17) that contains my group's 10-fold genomic DNA sample did not obtain any result and the possible reason behind this will be elaborated further under the discussion section. After comparing my group's

Tentative meaning.

<p>“neat” genomic DNA sample in well 16 with that of the DNA markers in well M, the sizes of the DNA bands of my group’s genomic DNA sample are 23130bp. There are also some other band sizes present which not identifiable using the DNA markers. They are most likely lesser than 2027bp.</p> <p><u>Discussion</u></p> <p>Firstly, from the results of the agarose gel electrophoresis of plasmid DNA that can be seen in figure 1, it shows that the plasmid DNA strands of 9416bp and 6557bp that my group got in well 5 contain nicked and closed circular DNA (Lin <i>et al.</i>, 2011). When I compare my group’s results to the results in the wells of other groups and the positive controls in wells 7 and 9 as seen in figure 2, they register similar DNA bands for their plasmid DNA samples. Since DNA is negatively charged, it will tend to travel to the positive electrode (Rothman, 2015). Although my group’s plasmid DNA strands are relatively big in size, since the plasmid DNA are usually circular in shape and thus more compact than linear DNA, they are still able to move easily through the pores of the agarose gel and thus travel a relatively far distance away from the negative electrode (Smith, 1996). Hence, from figure 1, it shows that some of the plasmid DNA are relatively near to the positive electrode.</p> <p>Secondly, from the results of the gel electrophoresis of genomic DNA in 0.7% agarose gel solution, it shows that my group’s “neat” sample of genomic DNA in well 16 contain mostly supercoiled and a few nicked DNA (Lin <i>et al.</i>, 2011). Since supercoiled DNA is much smaller in size as compared to nicked DNA, it is more likely to travel a further distance and thus closer to the positive electrode of the agarose since it will more likely be able to resist the “frictional drag” in the agarose gel (Smith, 1996). So as seen in figure 2, the supercoiled DNA are found at the side of the agarose gel which is nearer to the positive electrode, while the nicked DNA are found on the side that is closer to the negative electrode.</p>	<p>Clear hyperthemes, labelled with an internal conjunction and a clear indication of the paragraph content.</p> <p>Clear hypertheme</p>	<p>The use of external conjunction is effective; the explanations are clear.</p>	<p>To note, however are some instances of non congruent grammar: ‘ When I compare my group’s., they register’ The lecturer notes some ‘weakness in expression;, which may be partly due to this (this was not confirmed)</p>	<p>Tentative meaning that effective expresses interpretation in a scientific lab report.</p> <p>‘It shows’ indicates a stronger probability, which the lecturer seems to tolerate for this instance of results.</p> <p>The last two paragraphs of the lab report show great confidence in the use of hedging, and combined with the ‘it shows’ above, this indicates the student is able to navigate through</p>
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<p>However, unlike the other groups who did register bands for their 10-fold genomic DNA, my group did not obtain any results for our “10-fold” genomic DNA sample in well 17. This could be because my group’s genomic DNA could have registered a low concentration or could have some contamination when it is extracted from <i>Escherichia coli</i> (<i>E. coli</i>) in the previous practical (Dube, 2007). If my group would have gotten results from our 10-fold genomic DNA, we would have gotten the bands 23130bp and bands that are lesser than 2027bp which are the bands that most of the other groups got in the experiment. These DNA bands indicate that the DNA strands of the 10-fold genomic DNA are mostly supercoiled. These results are similar to that of the “neat” sample of the genomic DNA that my group and other groups obtained.</p> <p><u>References</u></p> <p>Dube, S., 2007. Troubleshooting agarose gel electrophoresis. Retrieved from <a href="http://www.bio.davidson.edu/molecular/tips/trbIDNAgel.html">http://www.bio.davidson.edu/molecular/tips/trbIDNAgel.html</a></p> <p>Lin, C.H., Y.C. Chen, T.M. Pan, 2011. Quantification Bias Caused by Plasmid DNA Conformation in Quantitative Real-Time PCR Assay. <i>PLoS ONE</i>, 6(12): e29101.</p> <p>Rothman, R.H., 2015. Agarose gel electrophoresis. Retrieved from <a href="https://people.rit.edu/rhrsbi/GEPages/LabManualPDF5ed/06%20electrophoresis.pdf">https://people.rit.edu/rhrsbi/GEPages/LabManualPDF5ed/06%20electrophoresis.pdf</a></p> <p>Smith, D.R., 1996. <i>Agarose gel electrophoresis</i>. Basic DNA and RNA protocols. Humana Press. Totowa, New Jersey. 484pp.</p>	<p>Another hypertheme clearly labelled with internal conjunction ‘however’ to indicate the discussion of unexpected results, a key requirement of the task</p>			<p>subtle interpersonal meanings.</p>
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## Additional analysis on Reena's texts

[[embedded clauses]], [ellipsed elements]

Parataxis: 1,2, 3 (*coordinated clauses 1, 2, 3..*)

Hypotaxis:  $\alpha$  (*main clause*);  $\beta$  (*first subordinate clause*);  $\gamma$  (*second subordinate clause*)

Projection: "locution, ' idea

Elaboration =        Extention +        Enhancement x

Adapted from coding protocols (Eggins, 2004, p.359)

'*traditional grammar terms*' in italics

Horizontal lines delineate each sentences.

### EAP Text

$\alpha$	Severe punishments should be enforced to ensure that employers [[who recruit overseas talented individuals legally into the country]]. * unfinished sentence.
$\alpha$	Without such harsh punishments, employers [[who are looking to cut cost by employing cheap labour from overseas through illegal means]] may do so at a frequent basis.
$x\beta$	If that happens,
$\alpha 1$	Americans may increasingly find themselves losing their jobs to illegal immigrants
2	and become unemployed.
$\alpha 1$	This might not help in the development of the US in the long run
$x\beta$	as those illegal immigrants might not be as efficient as those Americans [[who were retrenched]]
2	and unemployment rate in the US might increase.
simplex	Moreover, as a result of the possible increase in unemployment rate, political instability may arise in the country as well.

Disciplinary Text

α	Firstly, from the results of the agarose gel electrophoresis of plasmid DNA [[that can be seen in figure 1]], *it shows (error)
β	that the plasmid DNA strands of 9416bp and 6557bp [[that my group got in well 5]] contain nicked and closed circular DNA (Lin <i>et al.</i> , 2011).
xβ	When I compare my group's results to the results in the wells of other groups and the positive controls in wells 7 and 9 as seen in figure 2'
α	they register similar DNA bands for their plasmid DNA samples.
xβ	Since DNA is negatively charged,
α	it will tend to travel to the positive electrode (Rothman, 2015).
xβ	Although my group's plasmid DNA strands are relatively big in size,
xγ	since the plasmid DNA are usually circular in shape and thus more compact than linear DNA
α1	they are still able to move easily through the pores of the agarose gel
α2	and thus travel a relatively far distance away from the negative electrode (Smith, 1996).
α	Hence, from figure 1, it shows
β	that some of the plasmid DNA are relatively near to the positive electrode.

**Overall comparative use of resources from EAP to the discipline:**

This was done in Year 1 but this comparative analysis was not pursued for all participants because, although it provides insight into the way students use resources differently according to context, the thesis did not provide the space to explore this as well as give prominence to the student's voice. I provide it hear for additional information.

Features	EAP Text	Discipline Text
Stages	yes	yes
<u>Macrotheme</u>	Present but not well managed	Not needed
<u>Hypertheme</u>	Present but meaning is impeded by poor structure	Present and well managed
<u>Cohesive features at paragraph level</u>		Conjunctions: firstly, secondly These results (deictic + general noun)
<u>Thematic progression</u>	Generally managed well although relies on deictic (this and that) as theme to encapsulate previous sentence's NEW, which creates lack of logical progression.	A range of theme types and thematic patterns
<u>Clause Complex and logico-semantic relations</u>	Some errors Expansion = and x (as, if, though)	A variety of intricate complex clauses (While clause to indicate comparison Since, although, thus. Sentences contain switch in taxis (see in

	Problems with logical meaning across clauses and sentences.	blue in clause complex analysis below) Logicality is well managed from sentence to sentence.
<i>Noun group and nominalisation</i>	Noun groups with embedded defining relative clause. One instance of nominalization followed by prepositional phrase 'in'	An increased variety of long noun groups, modified by a variety of prepositional phrases, adjectives and nouns as well as embedded defining relative clauses.
<b>Appraisal features:</b> Hedging  <b>Reporting</b>  Endorsing and distancing	May x3 Might x3  None beyond reference to the article under discussion  None (required)	The possible reason behind this Most likely Could x 2 This could be because Appropriate use of external sources. None: endorsing/distancing is not required

## **8.6 Lucy**

### **Student profile**

Lucy comes from an English and Chinese speaking Singaporean family and prefers Chinese because her school grades were higher in this subject but has been an avid fiction reader and a diary writer, both in English, since young

### **Lucy's EAP profile**

Lucy's early EAP text is characterized by weak cohesion. Sentences are disconnected and the reasoning is somewhat difficult to follow due to weak control over cohesion features, in particular thematic progression, and logical links and this shows in particular through the unclear use of logico-semantic resources. A few simple noun groups, including one or two simple modifiers (adjective + noun). Nominalisations are rare. A few instances of hedging. No additional sources are used

The emerging control over logico-semantic resources and cohesion are quite typical of a Singaporean student in the EAP module: accuracy is not weak but at the level of idea development using logico-semantic, cohesion, theme, the student struggles to clarify her thoughts through their writing.

	Toolkit #1 to organize a text: Textual cohesion	Toolkit #2 to express logical links: Conjunction	Toolkit #3 to express the subject matter	Toolkit #4 to express evaluation and stance: Appraisal and Engagement
<p>In the article "The real problems of migration and work and how to solve them" by Hoffer(2014), he talks about the issues the poorer parts of the population face due to migration, unlike the more well-to-do, and problems immigrants face. <b>Although</b> most people <b>seem</b> to be neutral towards the issue of migration, there <b>surely will be</b> some xenophobic extremists who blame migrants for the problems in our societies such as increased competition in work <b>when</b> it is not their fault. <b>Pro-immigration advocates</b> <b>simply believe</b> that migration will be good for everyone and the economy eventually, <b>but</b> it is not occurring. Hoffer <b>believes</b> that one problem in society is that in an unregulated labour market which is tight, migration is used to exploit workers by making both migrants and locals compete for jobs while keeping salaries low. <b>This is evident</b> across the secondary industries. Migrants also suffer under expensive housing <b>yet</b> are blamed for increasing property prices. Undocumented migrants suffer the most from poor treatment. Avoiding the root causes of the problems in society by emphasising the positive contributions of migration towards the country will be ineffective unless the issues are tackled. Hoffer <b>then</b> describes five ideas aimed at reducing the misconception of anti-migration xenophobia.</p> <p><i>Comment: The sentences do not connect well and jump from one idea to the next. The response is not in the introduction, which means there is no macrotheme (according to the course ILOs, the macrotheme for the reader response is the Response = the response that will be developed in the body)</i></p> <p><u>Hoffer (2014) states that locals do not take on certain jobs <b>because</b> they do not want to earn below a certain amount of</u></p>	<p>There is no strong awareness of the expected stages. The macrotheme seems to come into two steps.</p> <p>The writing is characterised by weak cohesion, with lack of connection between sentences.</p>	<p>A range of external conjunctions, not always very clear.</p>	<p>Some simple noun groups.</p>	<p>Some problematic use of modality: "there surely will be".</p>

<p>salary, not as a matter of principle. <i>This hypertheme is not effective: it only alludes to a claim made in the original text.</i></p> <p><b>Thus,</b> unclear logical link migration is made use of to achieve the aim of getting people to do the jobs while still keeping the pay low. <i>No link I agree with his view here that migration is used to cover up the problem of low wage of certain jobs, because</i> (The causality link between the two clauses joined by 'because' is unclear) the fact that most migrants are away from their home countries in search of better employment opportunities makes them vulnerable to exploitation for low pay and poor working conditions, when they do help to improve the country's economy. <b>These</b> immigrants and poorer locals end up having to compete for certain low-paying positions for survival and livelihood, diverting away attention from the problem of low pay.</p> <p><b>However, this</b> ("This' could be made explicit, instead of referred to, as this is a hypertheme. The use of this reference here muddles the meaning: what is not so true in Singapore? Good attempt at linking back to previous paragraph) <b>is not so true in Singapore, as</b> foreign workers are hired mostly due to reasons such as the increasing ageing population, falling birth rate and lack of local talents in sectors such as R&amp;D to add up to the small labour market, not so much as to keep the wages low. Besides that, locals are unwilling to take up certain jobs such as construction work and cleaners, hence employers have to hire migrant workers instead. <b>The reasons</b> behind their unwillingness are high expectations of pay and also their impressions of certain jobs as degrading. Many Singaporeans who are fresh graduates expect a certain amount of high salary merely because they have gone through university education for a degree, and the standard of living and quality of life in Singapore are increasing, so the pay has to be able to cope with their living expenses. Also, it</p>	<p>First element of macrotheme (agreement with one of the author's claims)</p> <p>Second step in the macrotheme (disagreement with another claim)</p>	<p>'as' implies a cause but the actual proposition that follows is unconvincing.</p>	<p><i>The reasons behind their unwillingness</i> (Article+ headnoun+ prepositional phrase)</p>	<p>Lack of hedging in the development that is supposed to support the claim that the</p>
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can be embarrassing if they work in a job that does not benefit their social status.				
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### Lucy's disciplinary assignment

The lecturer notes that this text satisfactorily meets the expectations in terms of organizing the text to perform the description and the interpretation as well as compare/contrast functions.

The features which were noted as weak in the EAP text show marked change in the disciplinary text:

First, the control over **cohesive features** has changed significantly. From an EAP text that lacked cohesion, the discipline text 'discussion' paragraph in table 4.2 below shows a writer who has grown in confidence in her use of thematic progression, general nouns, linkers and referencing to produce a highly cohesive text. Thematic patterning is highlighted in particular. **Hedging** which was not really apparent in the EAP text is now used effectively and in a variety of realizations. For **noun groups** and **nominalisation**, the change also appears substantial: from a relatively simple EAP text with noun groups that rarely go beyond one or two modifiers, Lucy demonstrates confident control over the resources of decontextualized, abstract meaning-making. In the example below, the noun groups are in italics and are described

<u>LSM1102 Lab Report: Gel Electrophoresis</u>	Toolkit #1 to organize a text: Textual cohesion	Toolkit #2 to express logical links: Conjunction	Toolkit #3 to express the subject matter	Toolkit #4 to express evaluation and stance: Appraisal and Engagement
<u>LSM1102 Lab Report: Gel Electrophoresis</u> <u>Results</u>	Clear organisation and signposting through generally clear hyperthemes (underlined) and a range of textual resources.	A good range of logical resources and clause complexing.	Several instances of very long and complex noun groups, many technical groups.	



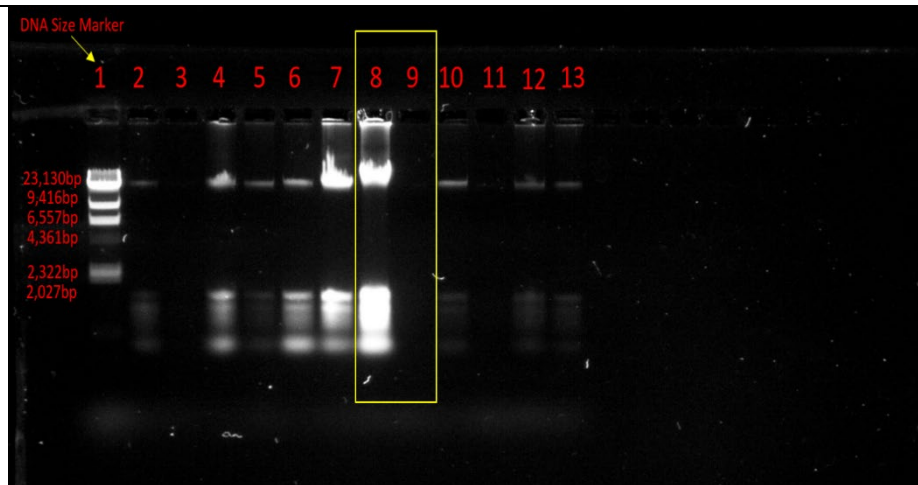


Figure 1: Results of gel electrophoresis for 20µl of “neat” genomic DNA (Lane 8) and 20µl of diluted genomic DNA (Lane 9) extracted from *Escherichia coli* (*E. coli*), after running 0.7% agarose gel at 100V for 45 minutes.

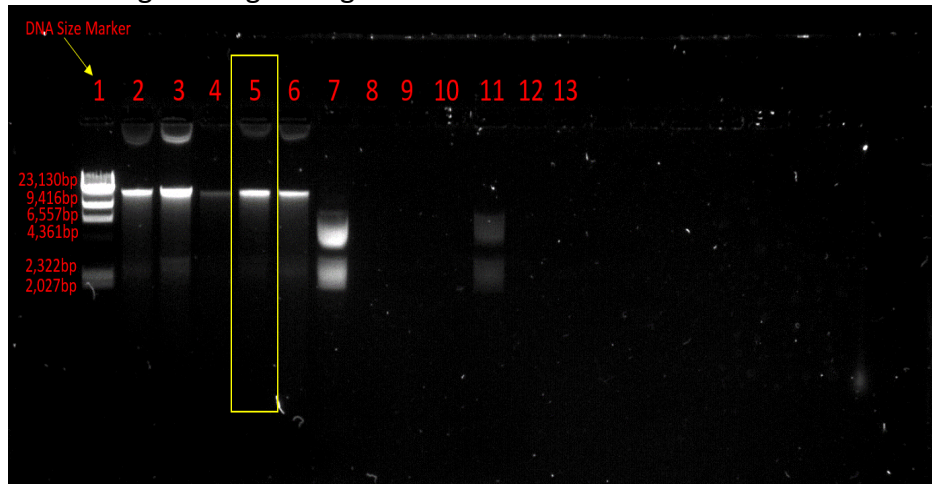


Figure 2: Results of gel electrophoresis for 20µl of “neat” plasmid (pUC18) DNA (Lane 5) extracted from *E. coli*, after running 1.0% agarose gel at 100V for 45 minutes.

<p>The Lambda HindIII-cleaved DNA marker in lane 1 of the gels was used to identify the size of DNA bands. For the gel electrophoresis of genomic DNA samples, in lane 8 where the undiluted sample was loaded, there are 2 distinct regions of DNA fragments. Part of the fragments were found at the 23,130 base pair region, while the remaining fragments were found to be at the 2,027 base pair and smaller region. However, in lane 9 where the diluted sample was loaded, there is no clear result to be seen. As for the gel electrophoresis of plasmid DNA sample, a clear band can be seen at the 23,130 base pair region in lane 5 where the undiluted sample was loaded. Fairly faint bands are also observed below the 23,130 base pair marker and also around the 2,322 base pair region.</p> <p><b>Discussion</b></p> <p>For the “neat” sample of genomic DNA in lane 8 from Figure 1, the thick band found at 23,130 base pair row indicates a high concentration of DNA fragments of that particular length. Perhaps if the gel was run for a longer time, there might be a thinner band or more spread out bands of DNA molecules as larger DNA molecules require more time to move through the agarose gel. The region of fragments found to be smaller than or equal to 2,027 base pair can be seen as a smear, possibly due to contamination of RNA molecules in the undiluted sample of genomic DNA. This is supported by Oswald (2007) who reported that RNA runs “as a low molecular weight smear”. As RNA molecules are smaller in size compared to DNA molecules (Alberts et al., 2002), it means they are lighter in terms of molecular weight thus they are able to move through the microscopic pores in the 0.7% gel at a faster rate than the DNA fragments. Hence, RNA could have been extracted from the <i>E.coli</i> along with the genomic DNA, during Practical 1.</p> <p>However, for the diluted sample of genomic DNA in lane 9 from Figure 1, the lack of an observable result could be explained by the sample not being prepared properly due to improper techniques while carrying out the 10-fold</p>	<p>An overview of the results, with the unexpected results being signalled by the internal conjunction ‘however’</p> <p>The hypertheme signals the interpretation/discussion stage through the use of ‘indicates’</p> <p>The unexpected results discussion</p>			<p>Reporting structures and endorsing feature. A wide range of hedging features to support the interpretation of the unexpected results. ‘might’, ‘Perhaps’, possibly due’ ‘could’</p>
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<p>dilution, leading to insufficient concentration of the genomic DNA being loaded onto the gel.</p>	<p>is signalled by 'However'</p>			
<p>Whereas for the “neat” sample of plasmid DNA in lane 5 from Figure 2, the clear band observed at the 23,130 base pair mark indicates that there is most likely a contamination with genomic DNA from the <i>E.coli</i>. This is in reference to the thick DNA band found at the 23,130 base pair row in lane 8 of the gel electrophoresis result for the genomic DNA samples (Figure 1), and that the total length of pUC18 plasmid is only 2686 base pair long. Furthermore, with respect to Practical 1 during which we extracted the plasmid DNA for this practical from the <i>E.coli</i>, the UV spectrophotometric measurements recorded at the Nanodrop step were 1.63 at a A260/A280 ratio and 0.79 at a A260/A230 ratio. These measurements suggest that the plasmid DNA extracted did not have a good and high purity (Oswald, 2007), thus supporting that the plasmid DNA sample may have been contaminated. The faint DNA bands located below the 23,130 base pair mark could be due to the different conformations of the plasmid DNA. According to Tirabassi (2014), plasmids with a supercoiled conformation migrate through the gel faster than any other conformation due to its twisted double helix structure. Plasmids with a linear structure are more likely to move more slowly, and nicked and relaxed circular plasmids are most likely move the slowest due to its large shape (Tirabassi, 2014). Therefore, this could explain why there is a faint band observed around the 6,557 base pair region – the nicked and relaxed circular conformation of the plasmid could have caused it to move through the pores of the gel at a slower rate.</p>	<p>Deictic + General noun 'these measurements' to refer to previous sentences.</p>	<p>Some clause complexing is not completely syntactically fine, but difficult to process: 'Furthermore, with respect to Practical 1 during which we extracted the plasmid DNA for this practical from the <i>E.coli</i>, the UV spectrophotometric measurements recorded at the Nanodrop step were 1.63 at a A260/A280 ratio and 0.79 at a A260/A230 ratio'</p>		
<p><b>References</b> Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K., &amp; Walter, P. (2002). <i>Molecular Biology of the Cell, 4th edition</i>. New York: Garland Science. Retrieved from: <a href="http://www.ncbi.nlm.nih.gov/books/NBK26887/">http://www.ncbi.nlm.nih.gov/books/NBK26887/</a></p>	<p>Conformations acts as a general noun and sets up the fan thematic progression for the rest of the paragraph (see below for detailed analysis)</p>			

Oswald, N. (2007, August 22). Quick reference: Determining DNA Concentration & Purity. BitesizeBio. Retrieved from: <a href="http://bitesizebio.com/13501/dna-concentration-purity/">http://bitesizebio.com/13501/dna-concentration-purity/</a> Tirabassi, R. (2014, October 8). How to identify supercoils, nicks and circles in plasmid preps. BitesizeBio. Retrieved from: <a href="http://bitesizebio.com/13524/how-to-identify-supercoils-nicks-and-circles-in-plasmid-preps/">http://bitesizebio.com/13524/how-to-identify-supercoils-nicks-and-circles-in-plasmid-preps/</a>				
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### Additional analysis: Thematic progression:

Whereas for the “neat” sample of plasmid DNA in lane 5 from Figure 2, the clear band observed at the 23,130 base pair mark indicates that there is most likely a contamination with genomic DNA from the *E.coli*. This is in reference to the thick DNA band found at the 23,130 base pair row in lane 8 of the gel electrophoresis result for the genomic DNA samples (Figure 1), and that the total length of pUC18 plasmid is only 2686 base pair long. Furthermore, with respect to Practical 1 during which we extracted the plasmid DNA for this practical from the *E.coli*, the UV spectrophotometric measurements recorded at the Nanodrop step were 1.63 at a A260/A280 ratio and 0.79 at a A260/A230 ratio. These measurements suggest that the plasmid DNA extracted did not have a good and high purity (Oswald, 2007), thus supporting that the plasmid DNA sample may have been contaminated. The faint DNA bands located below the 23,130 base pair mark could be due to the different conformations of the plasmid DNA. According to Tirabassi (2014), plasmids with a supercoiled conformation migrate through the gel faster than any other conformation due to its twisted double helix structure. Plasmids with a linear structure are more likely to move more slowly, and nicked and relaxed circular plasmids are most likely move the slowest due to its large shape (Tirabassi, 2014). Therefore, this could explain why there is a faint band observed around the 6,557 base pair region – the nicked and relaxed circular conformation of the plasmid could have caused it to move through the pores of the gel at a slower rate.

**These measurements=**  
general noun with deictic to refer back

**Different conformations**  
(a hypernym/ possibly a general noun in this context) used as NEW which is then picked up in theme position in the following=>

A->B  
B->C  
B->D  
B->E

### Additional Analysis: Noun groups

However, for the diluted *sample* [of genomic DNA] [in lane 9] [from Figure 1]  
(Article + adjective + headnoun+ three prepositional phrases),

the *lack* [of an observable result] could be explained by  
(article+ headnoun+ of-prepositional phrase)

the *sample* [not being prepared properly [due to improper techniques]] while carrying out the 10-fold dilution,  
(Article + headnoun+ non-finite defining relative clause + prepositional phrase)

leading to insufficient *concentration* of the genomic DNA *being loaded onto the gel*  
(adjective+nominalized headnoun+of-prepositional phrase+non-finite defining relative clause).

Additional comparative analysis:

Features	EAP Text	Discipline Text
<b>Stages</b>	Fairly well managed	Very well managed
<u>Macrotheme</u>	Missing macrotheme Hyperthemes are present but not very effective	Not needed
<u>Hypertheme</u>	Hyperthemes are present but not very effective (in representing the content of the paragraph)	Hyperthemes are clear and linked to the purpose of the paragraph
<b>Cohesive features at paragraph level</b>	Some linkers and references are used.	Very impressive range, all appropriate. General nouns and deictic are used to refer back referring back A variety and very well managed.
<u>Thematic progression</u>	Uneven flow. Better managed in last paragraph but weak in the introduction and the first paragraph, with many gaps in between sentences.	Excellent use of a variety of thematic patterns. The information flows well with no gaps.
<b>Clause Complex and logico-semantic relations</b>	Clause complex resources are used but the logical links are often impaired by the choice of conjunction or the propositional content	Wide range of hypotactic and paratactic clause complex. Very well managed
<i>Noun group and nominalisation</i>	Simple noun groups (adjective + noun) and no nominalisation	Impressively managed. Very complex noun groups with a variety of modifiers and many instances of nominalisation
<b>Appraisal features:</b> Hedging <b>Reporting</b>  Endorsing and distancing	A few instances of hedging  No additional sources used	A wide range of hedging devices, especially in the discussion paragraphs. A range of in-text citations

## **8.7 Sobek**

### **Student profile**

Sobek is an Indonesian student of Chemistry. He was schooled in Bahasa Indonesian until coming to Singapore to study at University and learned English through playing games and in his words 'I learned English indirectly while learning Biology' Sobek wrote about his experience learning and using English as a medium of instruction in an introductory text written for the EAP module:

I realized the importance of learning English since I was little. As one of my hobbies is playing games, learning English has made me able to understand the instructions of my games well. Furthermore, my curiosity began to grow as I wanted to know the story in my games, since most of my games are adventures and role-playing. For that reason, I became more diligent in learning English. I even often brought my dictionary beside me when I was playing games. Moreover, I also love to read novels in English. As a result, my progress in learning English was growing rapidly. In my senior high school, since I majored in Biology, I often read thick textbooks in English. Hence, I learned English indirectly while learning Biology. Moreover, I took TOEFL iBT test when I was in senior high school. When I was preparing for TOEFL test, I realized that my greatest weakness in English was speaking. People in Indonesia almost never communicate with each other in English except during English lesson, thus I have never trained my speaking well. As I am attending a university in Singapore, which is NUS, I further realize the importance of English. As I am forced to speak English as my everyday language, listen lectures in English, do my assignments and lab reports in English, and read some textbooks in English, I am practicing my English indirectly. In conclusion, as learning English is very important, I want to further improve my English, and I hope to learn a lot from this module

### **EAP Profile**

Sobek's English shows some syntactic and grammatical errors which sometimes affect clarity of meaning. He also shows a developing control over resources of cohesion, with some problems with internal cohesion in some places. The same can be observed with the other toolkits. There are several syntax errors, and errors in the noun group too.

	Toolkit #1 to organize a text: Textual cohesion	Toolkit #2 to express logical links: Conjunction	Toolkit #3 to express the subject matter	Toolkit #4 to express evaluation and stance: Appraisal and Engagement
<p>In <i>How Globalization Begets Inequality</i> (2015), Garlock says that the theory of comparative advantage shows discrepancy to the fact of modern globalization. The theory of comparative advantage says that low-skilled workers from low-economic countries is more likely to be hired in the high-economic countries because of their relatively cheap cost. Hence, they should gain better advantage of globalization. However, reality shows that because of globalization, the inequality of income between the poor and the rich is higher. To explain this reality, a new theory, which is the theory of “skills matching”, developed. Theory of “skills matching” says that industries in high-economic countries prefer to hire high-skilled workers from low-economic countries because of their quite high education and still relatively low cost. That causes the negative effects of globalization, which make the low skilled worker become poorer as they cannot enter the work competitively. Thus, the author recommends the government to educate and train the low-skilled worker to enable them to be survive in the globalization. In my opinion, the author recommendation is true to the extent that better skilled workers are more likely to survive. However, if all low-skilled workers have increased skills, thus making the average skills higher, the competition will be more intense. The high-skilled workers, having enough resources to trained himself, further trained themselves for higher skills, thus the inequality will remain the same.</p> <p>To educate low skilled workers to remain competitive, a very high cost is needed. Nowadays, a university degree is a minimum requirement for jobs, even for jobs that do not require a skill taught by universities (Rampell, 2013) for screening to get better workers (Brooks, 2014). Additionally, now company begin to distinguish between degree holders that have gained sufficient knowledge and skills with those that are just good in paper (Yng, 2015). Thus, to</p>	<p>The structure for the reader response is fairly well managed, with a summary and a macrotheme that clearly states the points that will be argued.</p> <p>Macrotheme</p> <p>This paragraph concerns fees, which is not previewed in the macrotheme.</p> <p>A good range of internal conjunction to</p>	<p>Several syntax errors. Clause complexing control is developing. The sentences are highlighted in red and underlined.</p>	<p>A few errors in the noun groups, concerning plural/singular, or the article a/the.</p> <p>The noun groups tend to be simple and short.</p> <p>Nominalisations seem to be rare.</p>	<p>Clear stance marker ‘In my opinion’.</p> <p>Some instances of lack of hedging and use of will.</p> <p>Several in-text citations, well managed.</p>



<p>educate a low skilled worker, one must pay tremendous amount of money for tuition fees. To illustrate, NUS (National University of Singapore) cheapest tuition fees is around S\$8000 per year, as stated in NUS website (“Fees for Undergraduate Programmes,” n.d.). Furthermore, as most low skilled workers do not have the basic education levels to be accepted in the university, they must get prerequisite education before they entered the university, thus increasing the cost needed to train the workers.</p> <p>Moreover, educating all low-skilled workers does not solve the inequality. For the sake of the argument, assume the government had enough money to educate all low-skilled workers, thus they have gained Bachelor’s Degree and have enough skills. Seeing the overpopulation of Bachelors, company would then further increase their standards. This has been proven by history. The Cardinal Recruiting Group, for example, in 2006, did not require employees that have college degree as the candidates was not many (Rampell, 2013). However, as the number of candidates increasing, the company need to choose the best candidates, with college degree as one of the screening requirements. Furthermore, the previous high-skilled workers, many have enough resources to train themselves to get higher education or master some important skills, further educate themselves. Hence, the inequalities will remain almost the same.</p> <p>In conclusion, the solution presented by Garlock in the text <i>How Globalization Begets Inequality</i> (2015) will not solve the inequality between high-skilled and low-skilled workers. Another solution will have to be developed to solve the problem of inequality in this globalized workforce.</p> <p><b>References</b></p> <p>Brooks, C. (2014). The Surprising Jobs That Now Require a Bachelor’s Degree. <i>Business News Daily</i>. Retrieved from <a href="http://www.businessnewsdaily.com/7103-no-degree-no-job.htm">http://www.businessnewsdaily.com/7103-no-degree-no-job.htm</a></p>	<p>articulate the argument. This is not always completely logical (the ‘Thus, to educate...’ sentence does not flow logically)</p> <p>Hypertheme is clearly linked to the macrotheme.</p>			<p>There are some instances of wrong register ‘for the sake of the argument’.</p> <p>Instances of lack of hedging ‘will’</p>
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## Disciplinary assignment

The lecturer comments rather negatively on the abstract: *'Overall this abstract is too general and does not pinpoint what exactly was covered in the experiments and the specific findings.'*

The text appears, to a non-disciplinary specialist, as very carefully structured (as the student himself explained in the interview). Macro cohesion and micro cohesion are deliberately developed through theme, thematic progression and lexical cohesion. From a language proficiency perspective, this student has made impressive improvements.

	Toolkit #1 to organize a text: Textual cohesion	Toolkit #2 to express logical links: Conjunction	Toolkit #3 to express the subject matter	Toolkit #4 to express evaluation and stance: Appraisal and Engagement
<p><b>Abstract</b> As Lactate Dehydrogenase (LDH) has many roles in many processes in a lot of species metabolic pathways, it is a potential target for many drugs and therapies (<a href="#">background</a>). One of its subunits, which is LDHA, has a lot of influences in those <b>pathways</b> (<a href="#">narrowing down on the enzyme under study</a>). Hence, <b>molecular cloning was used to multiply the LDHA gene and subsequently the gene can be expressed for many studies</b> (<a href="#">methods</a>). In the molecular cloning, a lot of verification <b>steps</b> was done employing several biochemical <b>techniques</b> (<a href="#">methods</a>). However, a single base substitution mutation is found and it is hypothesized that the mutation can cause the gene to express non-functional proteins (<a href="#">results and discussion</a>).</p> <p><b>Introduction</b></p>	<p>The macrotheme is in bold.</p> <p>General nouns 'pathways', 'steps' and 'techniques' to preview the text. Note that this was not particularly valued by the disciplinary lecturer who found the abstract vague.</p>	<p>The student uses a range of external conjunctions, especially in the methods section to indicate the experimental steps.</p>	<p>The text contains several technical and complex noun groups, and many instances of nominalisation.</p>	<p>The student uses a range of hedging devices.</p>

<p>Lactate Dehydrogenase (LDH) is an enzyme that is found throughout many species (Markert et al., 1975). This enzyme works in anaerobic metabolic pathway where this enzyme converts the final product of glycolysis, pyruvate, into lactate and oxidizing NADH into NAD<sup>+</sup>, thus regenerating NAD<sup>+</sup> for another glycolysis pathway (Reece et al., 2012; Valvona et al., 2016). To function properly, this enzyme formed a tetramer (Drent et al., 1996; Valvona et al., 2016). LDH has two most common types of subunits, which is LDHA and LDHB, where any combinations of subunits can form an intact enzyme and LDH in different tissues have different types of subunits combination that act as isoenzymes (Markert et al., 1975; Drent et al., 1996; Cobben et al., 1997).</p> <p>Lactate Dehydrogenase can be useful for medical purposes as elevated level of this enzyme might be an indicator of several disorders. It was reported that LDH levels in serum can be used to monitor patients with Progressive Multiple Myeloma Diseases (Teke et al., 2014). Another case is to monitor LDH level and its type of isoenzymes in bronchoalveolar lavage fluid and pleural effusions as a marker of lung disease (Drent et al., 1996). Furthermore, concentration of LDH in serum can be used to predict the survival of in-treatment patients with several types of cancer, including nasopharyngeal and brain cancer (Nieder et al., 2012; Jin et al., 2013). Lastly, one can characterize the kinetics of LDH in breast tissues to determine whether that tissue is normal or malignant (Talaiezhadeh et al., 2015).</p> <p>One type of LDH subunits, which is LDHA, is coded by LDHA gene (Chung et al., 1985). This type of subunit is unique as it has many other indirect roles arising</p>	<p>The student crafts clear hyperthemes, and uses deliberate thematic progression. For example LDH is thematised through the first paragraph to define the characteristics and the subtypes.</p>			
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<p>from its main known roles in anaerobic breakdown of glucose, including transcription factor, molecular chaperone, regulator of cell cycle and protein channel complex (Valvona et al., 2016). Due to its influence in many processes in the cell, LDHA could be a potential therapeutic target. Hence, LDHA and its translation product is vigorously researched and analyzed for its prospective uses.</p> <p><u>To make research purposes easier, scientists need to make copies of LDHA gene as many as possible.</u> One of the methods that can be used for this aim is molecular cloning. Molecular cloning is a technique that utilizes living cells to make exact copies for a fragment of nucleic acids (Hartwell et al., 2010). With this technique, a particular gene can be amplified as many as needed with the help of living cells.</p> <p>[...]</p> <p><b>Material &amp; Methods</b></p> <p>Total RNA Isolation</p> <p>TRIZOL reagent was added into NIH3T3 mouse fibroblast cells and stored at -80° C. Before used, the sample was thawed and incubated in room temperature. Chloroform was mixed into the sample and incubated in room temperature. Centrifugation was done afterwards. The aqueous phase was taken and incubated at 37° C with DNase I. Next, RNA was precipitated using isopropanol from the aqueous phase, and the liquid therefore discarded. The pellet was then cleansed with ethanol and dried. Lastly, the RNA was dissolved on RNase free water for further processing.</p> <p>Nanodrop Quantitation</p> <p>[...]</p> <p>Reverse Transcription</p> <p>[...]</p>		<p>Some conjunctive meaning is implied in the sequence of activity, but some external conjunctions are used to support the description of the experimental steps: 'before', 'afterwards', 'therefore', 'lastly'.</p>		
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ratio is very low and it has two peaks in the absorption spectra. Moreover, it seems that the first replicate has some DNA or protein contaminants as its 260/280 ratio is less than 2.0 (although it is can still considered close from 2.0). On the other hand, the second replicate has better purity than the first replicate as it has higher 260/280 and 260/230 ratios.  
[...]

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## **8.8 Julia**

### **Student profile**

Julia was brought up in a Mandarin speaking Singaporean family and feels more proficient in Mandarin, although it is English she uses the most in schooling and with friends. She sees English as useful but did not do well at school in the subject

### **EAP profile**

Cohesion Julia's reader response text displays many of the expected stages and some of the lexicogrammatical features covered in the EAP module. To note in relation to the EAP intervention is her control over macrotheme and hypertheme throughout.

Logical: Good control and fairly wide range. Many simple sentences (but these often contain complex noun groups (see below). A variety of hypotactic structures to express concession, condition, and time. No errors in the sentences.

Some examples of complex noun groups with a variety of modification. Several examples of nominalisations that are used as noun group heads:

- *The rising price of housing and cost of living in the country due to increase competition has also led to great discontentment amongst the public*

Some instances of hedging. One source is cited in-text

	Toolkit #1 to organize a text: Textual cohesion	Toolkit #2 to express logical links: Conjunction	Toolkit #3 to express the subject matter	Toolkit #4 to express evaluation and stance: Appraisal and Engagement
<p>In the article “Singapore’s Migration Dilemmas”, John West (2014) explains that <b>while</b> immigration aids in the growth of Singapore’s economy, it has increase social tension within the country and arouse <b>public dissatisfaction</b> towards the government’s immigration policies <b>Currently</b>, migrants in the nation includes both the skilled and less skilled labour. <b>The influx</b> of foreigners into Singapore has <b>created</b> anxiety amongst Singaporeans <b>due to an increase</b> in the jobs taken up by migrants. <b>The rising price</b> of housing and cost of living in the country <b>due to increase competition</b> has <b>also</b> led to <b>great discontentment</b> amongst the public. <b>However as</b> Singapore is accepting migrants into its land, many native born Singaporeans are migrating out of the country in search of more employment opportunities and greater freedom available in other countries. <b>While I agree with the author’s view that Singapore is facing a dilemma between accepting migrants into the country and reducing the number of foreigners in the nation, I do not fully agree with the downsides of migration he explained as they can be view as beneficial from other perspectives.</b></p> <p><b>Instead of</b> taking jobs of Singaporeans, the migrants have helped to fill up the unwanted empty <b>positions</b> in the society to ensure that the <b>society runs smoothly</b>. <b>Jobs</b> such as hawkers, cleaners and construction workers are not very popular among Singaporeans (Jeff Cuellar, 2014) and people who take up these jobs are <b>mainly the low-skilled migrants</b> in Singapore. <b>This is evident</b> by the number of foreigners serving us in hawkers and working at construction sites in Singapore. <b>The reason for this phenomenon</b> is that Singaporeans are not willing to take up these jobs which require long working hours and are <b>usually</b> less paid. <b>As a result</b>, foreign workers are needed to fill up their positions in Singapore and without them, food will not be conveniently served to us, our city will not be as clean and green and</p>	<p>Clear stages as required for the task. Macrotheme indicates the stance of the student.</p> <p>Hypertheme 1 shows the first argument in favour of immigration.</p> <p>A range of internal conjunction structures the supporting argumentation.</p>	<p>The student shows a fairly good control over clause complexing and external conjunction.</p>	<p>A good range of abstract noun groups and nominalisation.</p> <p><i>‘public dissatisfaction towards the government’s immigration policies’</i> (Adj+Nominalisation+ [Prep phrase ‘towards’ + possessive+N+N]).</p>	<p>Julia uses a range of evaluation, stance and modality resources to express her stance and tentative meanings.</p> <p>The description of the current situation is hedged through subtle use of resources: <i>mainly, usually, often</i></p>



<p>buildings will not be constructed.</p> <p><u>Similarly</u>, the same <u>issue</u> applies to the high-paid jobs in Singapore. John West (2014) explains that many Singaporeans are seeking for jobs overseas due to <u>factors</u> such as the love for the cultures, <u>environment and freedom in other countries</u>. <u>As such</u>, many highly skilled Singaporeans are not taking up the high-skilled jobs within their home country. As reported by the Straits Times, Singapore is experiencing a <u>shortage</u> of skilled workers in certain sectors of the <u>economy</u>. <u>The high-paid jobs</u> <u>often</u> require <u>a certain level of skills and qualifications</u> and not all Singaporeans have achieved them to be capable of taking up the jobs. <u>As a result</u>, companies have to seek for high skilled foreign talents to migrate to Singapore to fill up the empty positions left by Singaporeans to sustain the growth and development of the nation.</p> <p><u>Rather than having the skills for the job, the willingness to take up the jobs in Singapore is more crucial</u>. <u>If</u> Singaporeans refuse to take up the jobs, migrants will eventually be needed to fill their positions in the country. <u>Thus</u>, people should also look into the issue of Singaporeans not taking up the available jobs rather than just focusing on the competition migrants have brought in Singapore.</p> <p><u>Also</u>, though the author raise many issues regarding the disadvantages of migration, we <u>should</u> also look into the advantages of migration to <u>interpret and comprehend the issue of migration dilemma in Singapore</u>. <u>Other than</u> just voicing the dissatisfactions about the problems created by the migrants, we <u>should</u> consider the importance of these migrants in the country. Singaporeans <u>should</u> also make the effort to recognise <u>that</u> the issues raised are <u>not solely due to</u> the foreigners <u>but</u> also <u>due to</u> the attitudes and behaviours they displayed.</p>	<p>Second hypertheme links clearly to the previous paragraph through the general noun 'issue', and previews the content of the current paragraph.</p>	<p>Nominalisation: 'a shortage of skilled workers in certain sectors of the economy'</p>		
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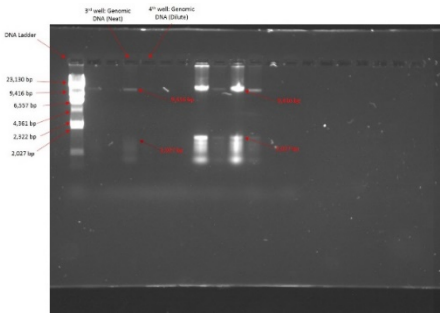
## Disciplinary assignment

The lecturer is rather negative about Julia's report. The first problem is that it does not follow the expected **stages** that allow the student to compare and contrast the two experiments. In fact, Julia's text is made of 2 separate mini reports, with the following stages:

Figure 1 ^ subtitle (not a developed legend) ^ Results ^ Discussion ^ Figure 2 ^ Results ^ Discussion ^ References ^

As a result of this structure, Julia misses one crucial requirement of the task: she provides no comparison and treats each case in isolation. Indeed, the interview revealed a thorough misunderstanding of the function and the associated stages of the report as she saw no need to compare the two experiments and found that treating them together would be confusing for both herself and her reader. Linked with this misreading of the text's purpose, the text contains only one instance of **hedging** because there is not interpretation.

But the problem, according to the discipline lecturer, goes further. This student is inconsistent in her discussion of the results: she describes the DNA strands in terms of size first, then in terms of shape creating a lack of logic in the explanations. The lecturer points to the student's use of the word 'shapes' rather than the technical term 'conformation' as a serious lack of precision. It is hypothesized that the lecturer might use the less dense, more commonsensical term 'shape' to explain the concept to students, therefore going down Maton's semantic wave. Julia, however, seems unable to go back to the technical term, which, as the lecturer explains, carries so much more technical precision and plugs into a web of scientific meaning that 'shape' simply cannot express.

<u>Agarose Gel Electrophoresis Report</u>	Toolkit #1 to organize a text: Textual cohesion	Toolkit #2 to express logical links: Conjunction	Toolkit #3 to express the subject matter	Toolkit #4 to express evaluation and stance: Appraisal and Engagement
<p>Results: Genomic DNA – 3<sup>rd</sup> (Neat) and 4<sup>th</sup> (Dilute)</p> <p><u>Figure 1: Genomic DNA</u></p> 	<p>The lecturer pointed to a big flaw in the staging of the text.</p>	<p>A range of external conjunctions.</p>	<p>A range of technical groups, and noun groups as well as nominalisations. But to note the lack of technicality on one of the key concepts of the lab report (see below).</p>	<p>There is little in terms of discussion of results in this report or interpretative meanings. There is also a lack of comparison of the two experiments.</p>

Observations: For our neat sample of the genomic DNA in the 3<sup>rd</sup> well, a DNA band of 9,416bp can be clearly observed and a DNA smear around the 2,027bp position can be faintly seen. The DNA bands observed are faint **as** no Polymerase Chain Reaction (PCR) is done and **thus** the genomic DNA is of low concentration and is not overly expressed. **Since the neat genomic DNA sample** is of low concentration, further dilution will lead to a sample of a much lower DNA concentration. **As a result**, for **our dilute sample** of the genomic DNA in the 4<sup>th</sup> well, no DNA bands are observed on the gel.

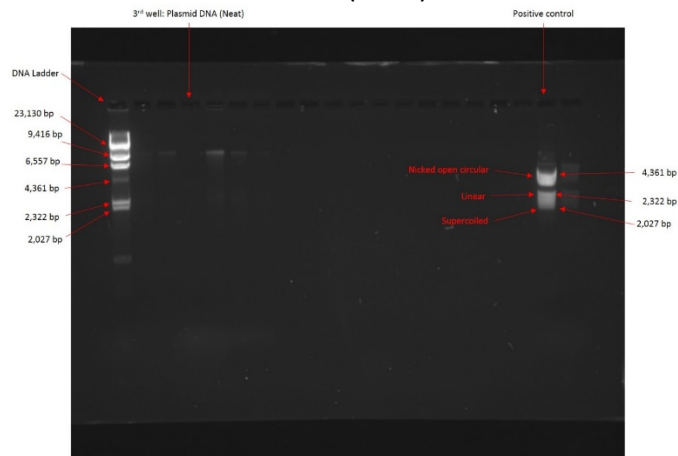
Discussion: Gel electrophoresis (a) is a technique to separate DNA base on their sizes and charges. The negatively-charged DNA will migrate from the negative to the positive electrode and get separated based on their sizes in which the smaller DNA fragments migrate faster and further away from the well thus showing visible bands on the gel (Westermeier, 2001). **The extracted genomic DNA used in this experiment contains DNA fragments of varying sizes. Thus when gel electrophoresis is carried out, smaller DNA fragments of sizes around 2,027bp experience less restriction along the gel and migrate further away from the negative electrode, producing the DNA smear at the lower end of the 3<sup>rd</sup> well as seen in figure 1.** DNA smear is observed **as** there are DNA fragments of various sizes that are close to one another. *The genomic DNA of size 9,416bp* is larger and thus move slower across the gel, producing a DNA band nearer to the well. **As a result**, the various different DNA bands are as observed for the neat sample of the genomic DNA as shown in figure 1.

If this is to be considered as the hypertheme, it does not represent the paragraph well, and it does not reflect the expected stages

This paragraph consists of an explanation of the beginning of the technique and a description of the results. It is not a 'discussion' of the results).

Some inaccuracies in syntax

## Results: Plasmid DNA – 3<sup>rd</sup> (Neat)



**Figure 2: Plasmid DNA**

Observations: No DNA bands can be observed for our plasmid DNA in the 3<sup>rd</sup> well as the DNA had flow out during the process of loading the plasmid DNA into the well of the agarose gel. However, using the positive control on the 19<sup>th</sup> well, we can observed DNA bands of the sizes 4,361bp, 2,322bp and 2,027bp.

Discussion: Similarly, the extracted plasmid DNA used in this experiment contain DNA fragments of varying sizes. When gel electrophoresis is carried out, the plasmid DNA gets separated based on their sizes, producing 3 DNA bands of sizes 4,361bp, 2,322bp and 2,027bp. The smaller DNA can be observed to have travel a longer distance than the larger ones since they experience less restriction along the agarose gel. The plasmid DNA can exist in a few shapes, nicked open circular, linear, relaxed circular and supercoiled. Supercoiled DNA is highly compact and experience less restriction along

Using the same approach as above, Julia describes the technique, as if in a Methodology paragraph.

*'in a few shapes', this should be 'conformation', a*

<p>the agarose gel while nicked open circular DNA is larger and experience greater restriction across the pores of the agarose gel. Linear DNA experience greater restriction than supercoiled DNA but lesser restriction than nicked open circular DNA through the agarose gel. As such, the supercoiled DNA move the faster along the gel followed by the linear DNA and lastly the nicked open circular DNA which migrates the slowest (Wink, 2006). Comparing the sequence of the speed of movement of the various shapes of the plasmid DNA with the observed DNA bands as shown in figure 2, it is likely that the DNA of size 4,316bp is the nicked open circular DNA, the DNA of size 2,322bp is the linear DNA and lastly the DNA of size 2,027 is the supercoiled plasmid DNA.</p> <p>References  Westermeier, R. (2001). <i>Gel Electrophoresis</i>. eLS: John Wiley &amp; Sons Ltd, Chichester.  Wink, M. (2006). <i>An introduction to molecular biotechnology: Molecular fundamentals, methods and applications in modern biotechnology</i>. Weinheim: Wiley-VCH. 768</p>			<p>denser term that connects to disciplinary meanings which 'shape' does not.</p>	
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Additional analysis for Julia:

Features	EAP Text	Discipline Text
Stages	Yes	Stages do not follow expectations
<u>Macrotheme</u>	yes	Not needed
<u>Hypertheme</u>	Present and generally well managed	Not effective. The hyperthemes do not follow the expected stages. Each figure is described in isolation. There is no discussion or comparison of the findings.
Cohesive features at paragraph level	A variety of cohesive devices (conjunctions, general nouns) are used effectively throughout	No change noticed. A good range and effectively used.
<u>Thematic progression</u>	Gaps between sentences are rare. Good thematic progression	No changes noticed
Clause Complex and logico-semantic relations	A range of simplex and complex. Hypotactic include conditional (if), concession (while), time (as)	A good range, as in EAP text and some embedded clauses
<i>Noun group and nominalisation</i>	Some nominalisations and complex noun groups (following due to, for example)	Some nominalisations, although no particularly complex noun groups are observed. Lack of technical precision (shapes vs conformation)
<b>Appraisal features:</b> Hedging	Some instances of hedging (usually, often).	One instance of hedging (it is likely), which may be due to the lack on interpretation in the text
<b>Reporting</b>	One additional source is used and in-text citation is well-managed	Two sources as cited
Endorsing and distancing	None	

## **8.9 Walter**

### **Student profile**

Walter is a Chemistry Year 1 student. He is Singaporean and was schooled in the city (all schools are English medium of instruction).

### **EAP profile**

Walter's initial EAP writing shows a typical profile for a Singaporean male student. He is a very good student, and probably was in high school too. However, two years in the military have made him lose writing practice. At the beginning of their tertiary studies, these students tend to repeat what they remember of the high school essay, which is often a non-sourced based argumentation with a hortatory style which means that the interpersonal resources used might be too emotional and judgmental, even moralizing. Walter goes as far as making religious references in his argumentation. Overall the transition the student is operating towards an academic register concerns all four toolkits. The hyperthemes are not all clear, the syntax is not completely accurate, the grammar is at times too congruent and the interpersonal resources, as was just described, may seem out of place for the expected register.

The deforestation problem solution essay topic	Toolkit #1 to organize a text: Textual cohesion	Toolkit #2 to express logical links: Conjunction	Toolkit #3 to express the subject matter	Toolkit #4 to express evaluation and stance: Appraisal and Engagement
<p>According to the Biblical scriptures, it is said that God tasked the first humans to be caretakers of the newly created Earth. Specifically, they were instructed to spread nature's beauty around the world. <b>If</b> hypothetically true, then <b>our actions over the course of recent centuries</b> seemed to be the undoing of such divine order. <b>One such</b> action is <b>deforestation</b>, or the removal of plants to make way for other human activities such as agriculture, industrialisation, urbanisation etc. In the past, deforestation was considered sustainable as the cleared areas were often recycled. <b>But</b> when the human population grows exponentially, space and other demands grows proportionally to it. <b>Thus</b>, sustainable deforestation wasn't able to keep up with the alarmingly increasing rate of needs. Unable to find <b>cost efficient sustainable alternatives</b>, humans turned to mass deforestation, which economically had a low cost compared to the large turn of profit it provided. However, the cost was not low as what it was thought to be. <b>It is evident that unsustainable deforestation has been one of the root causes of many of our complicated environmental problems we face today.</b></p> <p><u>Often seen in the media, global warming is one of the <b>most infamous</b> problems caused by deforestation.</u> Global warming is the increase in the Earth's temperature attributed <b>by</b> the emissions of greenhouse gases into the</p>	<p>The opening's register is not academic. Not dissimilar to a school essay tone.</p> <p>The macrotheme is not complete, it does not address the prompt precisely by stating the one problem that will be discussed.</p> <p>Hypertheme functions as the expected macrotheme</p>	<p>Some external conjunction and a fairly good control over clause complex although some syntactic errors do occur.</p>	<p>Some noun groups, and some technical groups as well as nominalisation. The grammar is in some places congruent when it could be less so.</p> <p>Unable to.., humans turned to mass deforestation...(this could be rephrased into a more academic, less congruent register).</p>	<p>The lexis, and the problematic control over modality show this student is still in transit between high school register (hortatory genres perhaps) which in this text shows through inappropriate religious vocabulary and moralising tone.</p>



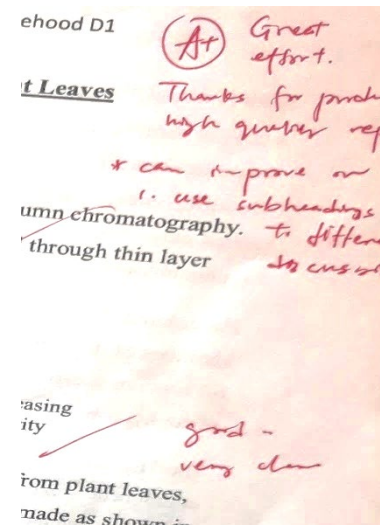
<p>atmosphere, trapping and preventing heat from escaping it. <b>It is known</b> that plants take in carbon dioxide <b>in order to</b> produce oxygen and food in photosynthesis. <b>However</b>, with <b>the rampant desecration</b> of natural vegetation from mass deforestation, less carbon dioxide is taken in by the trees, causing a spike of carbon dioxide concentration in the atmosphere over the course of the last century. <b>Combined with</b> other greenhouse gas contributors such as industrial plants and animal farms (which both are usually built on deforested land), <b>it estimated</b> that deforestation contributes 15% of global warming (cite). <b>In total</b>, global warming caused the Earth's average temperature to rise by 0.6 degree Celsius from 1901 to 2000(cite). <b>Even though</b> it is <b>considered minor to many</b>, such small <b>changes is more than enough</b> to disrupt the various balances of nature. <b>For example</b>, ice glaciers have been slowly melting <b>due to the increase in temperature, leading to</b> increased sea levels which in turn <b>lead to</b> submerging of Low lying habitable lands such as islands, <b>leading to</b> a destruction of wildlife and human livelihood. <b>Hence, the chain effects of global warming</b> are clearly catastrophic, and deforestation directly contributes to this phenomenon. With global warming having severe consequences becoming more worse over time, <b>we</b> are now in a race against time to find a way to curb it.</p> <p><u>In every two seconds an area comparable to a Football field is lost to a deforesting related act(cite).</u> <b>More often than not</b>, these damages are irreversible. In order to stop or at least slow down the frightening rate of</p>	<p>A range of internal conjunction to support the explanation.</p> <p>Unclear hypertheme</p>	<p>The cause effect chain in this segment could be clarified.</p>	<p>This segment shows a better control of academic register.</p>	<p>'rampant desecration' is a phrase laden with evaluative connotations which do not fit the expected register in an academic essay.</p> <p>Other examples of non-academic expression: 'more often than not'.</p>
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<p>losing our forests forever, we must stop the very practice of deforestation first through government regulation. By petitioning to the government for stricter regulation of deforesting related practices, we are able to save our flora and fauna. Presently, laws by many government bodies are currently in place in order to protect forests. Setting areas of protection for forests from deforestation or requiring loggers to plant back young trees in place of felled ones are some of the common laws placed. For example, Paraguay have reduced her rate of deforestation by at least 85% since an enactment of a law in 2004(cite) which was advocated by the World Wildlife Foundation (WWF) and its supporters. This suggests that the government and its people has a huge part to play in stopping the mass destruction of our nature.</p> <p>Even with the laws in place, it will still come with a myriad of other problems. Locals who depend their lives on logging will lose their jobs, which itself is another problem. Hence, laws are not the Long term solutions to stop deforestation. I believe that changing our thinking will be the ultimate solution. By being aware of the situation our world is in, such as understanding the causes and effects of global warming, we will start to think of the future generations that might not have a chance to see the creations of nature. Then, we can really truly appreciate nature and prevent our destruction of it.</p>				<p>Modality error with the use of a present simple tense to express a hypothetical result: 'we are able' should be ' we might be able to'</p> <p>Good use of hedging devise 'this suggests' Good highlighting of the link between the citation and the claim.</p>
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## Disciplinary assignment

Walter receives an A+ for this lab report with a few qualitative comments:

Walter shows excellent control of the four toolkits in this lab report and is, according to his lecturer, making all the valued meanings required for this assignment.



	Toolkit #1 to organize a text: Textual cohesion	Toolkit #2 to express logical links: Conjunction	Toolkit #3 to express the subject matter	Toolkit #4 to express evaluation and stance: Appraisal and Engagement
<p><b>Experiment 3: Isolation of Chlorophyll &amp; <math>\beta</math>-Carotene from Plant Leaves</b></p> <p><b>I. Aim</b></p> <ul style="list-style-type: none"> <li>• To extract <math>\beta</math>-carotene and chlorophyll from plant leaves.</li> <li>• To separate and isolate <math>\beta</math>-carotene and chlorophyll through common chromatography.</li> </ul>	Clear macrotheme (in bullet point form) and hyperthemes:	A range of external conjunction and good control over clause complexing.	The text is technical, uses a range of noun groups and nominalisation. Noun groups are often articulated with logical links expressed in the verbal group, typical of scientific discourse.	The student shows control over this resource, expressing tentative meanings in the discussion segment and making recommendations in the conclusion.

<ul style="list-style-type: none"> <li>• To qualitatively analyze the isolated <math>\beta</math>-carotene and chlorophyll through thin layer chromatography (TLC) and UV-visible spectroscopy.</li> </ul> <p><b>II. Results and Discussion</b></p> <p><u>By inspecting the chemical structures of the various components extracted from plant leaves, an ascending order of compounds in terms of their relative polarities can be made as shown in Figure 1. A relatively more polar compound than another means that the former is able to form stronger attractive intermolecular forces with other molecules of similar polarity than the latter. After column chromatography, TLC is performed to qualitatively analyse isolated compounds, labelled S2 and S3.</u></p> <p>[...]</p> <p><u>The TLC results reinforce the effectiveness of column chromatography, as the least polar component is expected to be eluted first, which is in this case, is <math>\beta</math>-carotene, with non-polar hexane as eluent.</u></p> <p>[...]</p> <p><u>S3 contains chlorophyll-b, pheophytin-a and pheophytin-b.</u></p> <p>From Table 1, the <math>\lambda_{\max}</math> for chlorophyll-b, matches to its literature value of 453nm. However, other labelled peaks in the spectra of S3 suggest the presence of more absorbing components such as pheophytin-a and pheophytin-b. For</p>	<p>A range of internal conjunctions which support the logical expression of the reasoning.</p>	<p>Examples of typical sentences from</p>	
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<p><b>example</b>, a peak of 407 nm, which confirms the presence of pheophytin-a, with a literature value of 408 nm, ‘overshadow’ the absorption peaks of chlorophyll-a, preventing its peaks to be explicitly shown in the spectra and become shoulders at 430 nm instead. <b>With that said</b>, chlorophyll-a was not found in S3 column in the TLC of Figure 2. <b>Thus</b>, with that result from along with the uncertain presence of chlorophyll-a from table 3, S3 does not contain chlorophyll-a. <b>Hence</b>, S3 contains chlorophyll-b, pheotynin-a and pheotynin-b from analysing the spectra, <b>further</b> confirming the results obtained in the TLC of Figure 2.</p> <p>There are <b>reasons</b> for not finding chlorophyll-a in S3. <b>Blunders include</b> not levelling the silica gel column properly, as this <b>may</b> cause chlorophyll-a to be eluted slower than expected, causing the eluted S3 liquid to contain less of it. <b>Also</b>, there <b>could</b> be insufficient amounts of S3 to be concentrated for TLC. <b>This resulted</b> in a very diluted spot, and chlorophyll-a was not seen</p> <p><b>III. Conclusion</b>  <u>β-carotene and chlorophyll were successfully extracted.</u>  <b>However</b>, they were not separated isolated as individual</p>	<p>The lecturer annotates this segment with ‘good correlation’</p> <p>General nouns are used to preview paragraphs.</p>	<p>scientific discourse: simple sentence.</p>		
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compounds through column chromatography. More eluents that cover larger ranges of polarity should be used to achieve this aim. Then through TLC and UV-vis spectroscopy, S2 was found to have  $\beta$ -carotene, while S3 contained chlorophyll-b, pheotynin-a and pheotynin-b. While chlorophyll-a was not found in S3, explanations were given to account for its absence despite it being found in S1.

**IV. References**

## **8.10 Igor**

### **Student profile**

Igor is a Singaporean, English and Chinese speaking student. He was schooled in the city.

### **EAP profile**

Igor starts the EAP module with a fairly typical control over academic language resources. Just like Walter, he is writing in a register that is reminiscent of a high school essay, which is non evidence-based. This shows in the interpersonal meanings especially with occasional use of evaluative language or lack of hedging which are not appropriate for academic meaning-making. There are also some small accuracy errors and syntax is not completely under control. Structure is very clear and well managed.

	Toolkit #1 to organize a text: Textual cohesion	Toolkit #2 to express logical links: Conjunction	Toolkit #3 to express the subject matter	Toolkit #4 to express evaluation and stance: Appraisal and Engagement
<p>Due to the increasing demand for food, raw materials and land, forests around the world <b>has</b> been cleared at a <b>frightening</b> pace in order to create land for agriculture, farming or even commercial developments. In fact, according to the statistics provided by greenpeace.org, a forest of the size of a football pitch is lost every two seconds due to logging or destructive practices!</p> <p><b>One problem caused by deforestation is the change in climate, or global warming.</b> It occurs due to an increase in greenhouse gases ( such as carbon dioxide ) present in the atmosphere due to</p> <ol style="list-style-type: none"> <li>1. logging of ancient forests - the millennia-worth of carbon stored within the forests are released as carbon dioxide when logged, as mentioned by greenpeace.org</li> <li>2. human activity – from operating machinery to burning of fuels for energy ( and even breathing to live! ), even more of carbon dioxide is released to the atmosphere</li> <li>3. process of deforestation itself – previously carbon dioxide can be removed by trees via photosynthesis, giving out oxygen in return, which is essential for life. However with more and more forest being cleared, the greenhouse gases lingered in the atmosphere , which causes climate change.</li> </ol> <p><u>And global warming has been a serious problem right now which its <b>effects</b> can be felt by everyone – the melting polar ice</u></p>	<p>Overall the text is structured as expected. The macrotheme highlights the main problem to be discussed.</p>	<p>A range of external conjunctions are used. Clause complex is not completely mastered.</p>		<p>These resources are sometimes used appropriately but others create a tone that is more reminiscent of a high school essay, another genre such as a hortatory genre.</p>



<p>caps which increases sea level, threatening to sink coastal cities and islands alike ; extremely hot and dry seasons that are unprecedented, causing heat strokes and other heat related health problems ; and even a reduction in biodiversity as certain species of animals and plants die off as they are unable to adapt to the change in weather. As such, global warming is an issue we should be giving attention to, or we will suffer in the future.</p> <p><u>As we can see, the impact of global warming should not be undermined and we should take measures to mitigate the problems.</u> Since global warming is attributed by mainly deforestation, my suggestions will be tailored in order to counter these.</p> <p><u>Firstly, deforestation is due to high demand for paper products, if we can reduce the demands for such products, there will be lesser need for clearing the land.</u> For paper products, we can encourage people to adopt the 3R's – to REDUCE the usage of paper by printing double sides or not printing at all ; to REUSE, making art and craft from scrap paper or scrapbooks for continued usage ; and RECYCLE the paper products all together.</p> <p><u>Also, deforestation is rampant due to illegal logging and ignorance, as mentioned by greenpeace.org, as China is the second largest consumer of wood products and most of its imports are likely acquired from illegal/ignorant logging from Indonesia, Papua New Guinea and Congo.</u> In my opinion, I feel that we can reduce China's demand for wood by suggesting alternatives for wood, such as replacing wood furniture with metals or melanin etc. And to deal with the irresponsible loggers, perhaps the respective country's authorities could</p>	<p>The first hypertheme introduces the impact with a general noun 'effects'.</p> <p>The transition to the solutions is clearly labelled. General nouns are used ('suggestions') to predict the whole segment.</p> <p>Internal; conjunction: 'firstly', 'also', 'lastly' are used to structure this segment.</p>			
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<p>implement tighter control on logging such as licensing only certain loggers to log a predefined area of forest <b>in order to</b> limit the extent of deforestation, and <b>also</b> to educate on the negative impacts of deforestation to improve awareness among the general public.</p> <p><b>Lastly</b>, <u>deforestation is also <b>due to</b> clearing land area for developments such as agriculture and farming.</u> Land is cleared in other to make way to grow crops and rear animals such as cows. I suggest to perhaps maximise the activity in the area such that there is lesser need to clear even more forests, this can be achieved by advanced farming techniques such as vertical farming or hydroponics, which improves the productivity per square meter of land and allows more production over an area of land compared to traditional farming methods. Hence governments <b>may</b> try to educate and equip their farmers with the tools and knowledge on such advanced farming techniques to improve the productivity of the farmers. <b>Hence mitigating the need to clear more land for commercial use as they are maximising on their land use as well as developing vertically as well.</b></p> <p>With such <b>solutions</b> I <b>believe</b> we can reduce the impacts caused by deforestation, <b>after all we only have one Earth to live in and it will be a tragedy for us – the most intelligent life form on the planet – to run the planet into ruins.</b></p>		Fragment		<p>The last sentence's tone is not academic. It recalls a hortatory genre, perhaps a text that would appear in a magazine. In an academic essay, this tone sounds out of place.</p>
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### **Disciplinary assignment**

There was no feedback from the lecturer on this lab report as Igor was unwilling to send me this information. Igor simply said that this was awarded a B+. A B+ means that the report is just below average.

What seems clear from the student's lab report below is that the transition from high school register to university academic writing is not completely achieved yet. There are some clear improvements from the EAP module such as the ease the student uses the technical vocabulary of the discipline, the way he structures the text at a macro level. However, logical meanings and interpersonal meanings are still emerging. Some elements recall the high school essay register, and the lack of control over clause complexing means logical relations are difficult to follow at times.

<b><u>Preparation and Spectrophotometric Analysis of Copper(I) Iodide</u></b>	Toolkit #1 to organize a text: Textual cohesion	Toolkit #2 to express logical links: Conjunction	Toolkit #3 to express the subject matter	Toolkit #4 to express evaluation and stance: Appraisal and Engagement
<p><b><u>Abstract</u></b></p> <p>Copper (I) Iodide (CuI) is synthesized via a reaction between Copper (II) Sulfate Pentahydrate (CuSO<sub>4</sub>.5H<sub>2</sub>O), Potassium Iodide (KI) and Sodium Thiosulfate (Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>). The resulting solution is a mixture of CuI precipitate along with various impurities. The CuI precipitate is extracted by a series of centrifugation and decantation with different solvents. The crude CuI product is then dried in a warm water bath. A small sample of crude CuI is then taken, using techniques of UV-VIS spectrophotometry and application of Beer's Law, the mass percentage of Cu in the crude CuI is calculated to be 44.74%.</p> <p><b><u>Aims</u></b></p> <ul style="list-style-type: none"> <li>• To synthesize crude CuI using CuSO<sub>4</sub>.5H<sub>2</sub>O, KI and Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> as starting materials</li> <li>• To obtain a dry CuI solid via a series of centrifugation and decantation with ethanol first, then diethyl ether as the solvents.</li> <li>• To determine the mass percentage of Cu in the crude CuI, using the techniques of UV-VIS spectrophotometry and Beer's Law.</li> </ul> <p><b><u>Introduction</u></b></p>	<p>The macrotheme is expressed in the Aims section with bullet points statements</p>		<p>Many technical groups and nominalisation</p>	<p>There are still some uses of interpersonal resources which do not seem to fit in a scientific lab report.</p>

CuI is characterized as an off white, fine powdery solid with a molar mass of 190.45g/mol. It dissolves sparingly in water ( $K_{sp}$ :  $1 \times 10^{-12}$ ) but dissolves readily in ammonia. Generally it is air-stable but it decomposes slowly in the presence of light to form elemental copper and iodine. Despite being classified as hazardous to both humans and environment with the hazard codes of GHS05, 07, 09, it has various useful applications such as cloud seeding, mercury detection and even as a catalyst for some organic reactions, thus it is of great interest to synthesize CuI for its beneficial use. [...]

**Procedure**

**1: Synthesis of CuI**

2.00g of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  is weighed and transferred into a 50-mL beaker. 10mL of deionized water is then added to dissolve the salt and form a blue solution. A stir bar is added into the solution and is labeled as Solution 1. Then, 1.33g of KI and 2.18g of  $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$  is added to a separate 50-mL beaker and dissolved in 10mL of deionized water; the solution is labeled as Solution 2. On the stirring Solution 1, Solution 2 is added drop-wise at room temperature over 10 minutes until no further reaction is observed and CuI is precipitated out. Then the stir bar is removed. 20mL of deionized water is added to the suspension, the dense CuI precipitate is allowed to sink for 5 minutes after and the excess water is decanted using a pipette. The process is repeated two more times, once with water then by ethanol. The processed

External conjunctions are used in the methodology section But the tense used is the simple present which is not usual for a methodology section)

crude CuI is then transferred to a 50mL centrifuge tube with 10mL of ethanol, the beaker is rinsed twice with 2mL of ethanol and the washings are added to the tube as well. The CuI tube is sent for centrifugation at a setting of 6000rpm for 30 seconds, ensuring the centrifuge machine is properly counter-balanced. After the first centrifugation, the supernatant is decanted and 14mL of ethanol is added again into the tube, the solids are re-dispersed into the solvent and are sent for another centrifugation run followed by decantation. This process of centrifugation-decantation is repeated two more times using 8mL of diethyl ether as the solvent. After the final centrifugation, the tube of CuI product is placed in a warm water bath of 60 Celsius to dry the product of residual diethyl ether. The product is labeled as Crude CuI.

[...]

### Results and Discussions

Upon extracting the crude CuI from drying the diethyl ether, the purity of the CuI appears to be rather high as its appearance is a white powdery solid as per the literature description of CuI. From the calculations, the limiting reagent in the synthesis of CuI is  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  (refer to appendix) and the crude product percentage yield has been calculated at 114.38%, this value is valid as the product obtained is not pure CuI but crude CuI, so is highly probable that the crude product contains trace amount of impurities which in

External conjunction 'upon' which seems out of place in a scientific lab report, invoking a narrative genre (this is probably, in the eyes of the lecture, a small matter). Several instances of syntax errors

Use of interpersonal resources here which recall a narrative 'appears to be rather..', 'as per the literature'

<p>turn gives a yield of more than 100%. Comparing the calibration graphs obtained from 2 sets of standard solutions, namely CPZ 1-4 and Cu 1-4, Cu1-4 will provide more unreliable values as the absorbance values of all four concentrations are very close to zero, hence it is susceptible to random errors such as the background noise of the instrument which results in small fluctuations in the absorbance readings, however this fluctuation will contribute greatly to the random error as the value of absorbance is very small (~0) hence resulting in an unreliable calibration graph. The graph of CPZ 1-4 on the other hand has high, distinct peaks of absorbance; the higher values of absorbance will in turn reduce the uncertainty in the readings due to fluctuations, giving rise to more reliable results. The molar absorptivity of CPZ-S at 600nm is calculated to be <math>1.6157 \times 10^4 \text{ L mol}^{-1} \text{ cm}^{-1}</math> while that of Cu-NH<sub>3</sub> at 640nm is <math>-45.39 \text{ L mol}^{-1} \text{ cm}^{-1}</math>. Actual Cu-CPZ molar absorptivity at 600nm is <math>1.6 \times 10^4 \text{ L mol}^{-1} \text{ cm}^{-1}</math> and that of Cu-NH<sub>3</sub> at 640nm is <math>77 \text{ L mol}^{-1} \text{ cm}^{-1}</math>. By comparing the results of CPZ-S obtained versus actual data, the identity of the aqueous ion can be ascertained as the cupric cuprizone complex as it has a unique value of <math>\epsilon</math> at 600nm and the values are quite close. However due to the fact that the obtained value and the actual value do not match, it is also an indication that there might be impurities present which interfere with the absorption readings, or due to the random error arising from background noise. The same conclusion cannot be drawn from Cu-NH<sub>3</sub> however as the value of <math>\epsilon</math></p>		<p>(run-ons- here in red)</p> <p>Run-on sentence. The logical development is difficult to follow, partly due to the run-on sentences and the repeated use of 'as' to introduce explanations.</p>		<p>The use of 'will' is problematic in this segment because it is unclear if the intended meaning is a future or a factual element (in which case a present simple would work better).</p> <p>A clearly expressed tentative interpretation 'there might be impurities'</p>
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<p>at 640nm is negative, which arises from the random error of the background noise being too great and hence the data obtained from Cu-NH<sub>3</sub> is too unreliable to make a conclusion. Thus, only Cu-CPZ calibration graph is used to compute the mass percentage of copper in the CuI product, the value obtained is 44.74%, higher than its expected theoretical percentage of 33.37%. This figure indicates that there are impurities present within the CuI product and the impurities are copper containing such as copper compounds CuX (where X is unknown) which X has a lower atomic or molecular mass than iodine, thus copper having a larger contribution by mass. It could also be due to the water bath in the drying step not completely removing the solvents which leave trace amounts of copper salts and copper complex ions present in CuI, which the copper also forms a complex with the cuprizone added during the preparation for UV-VIS analysis. A possible improvement to improve the yield is to dissolve the CuI in NaI or KI to form [CuI<sub>2</sub>]<sup>-</sup> ions, by diluting the solution with water, CuI is precipitated again. This method of dissolution and re-precipitation is a traditional way used to purify CuI, thus increasing the CuI yield.</p> <p><b><u>Conclusion</u></b>  In conclusion, crude CuI is synthesized from CuSO<sub>4</sub>·5H<sub>2</sub>O, KI and Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> and after several steps of decantation and centrifugation; a white powdery dry sample of CuI is obtained with the mass of 1.67g, which is higher</p>		<p>Run-on</p> <p>The student has little control over syntax, making the content of the report actually difficult to follow as clause complexing affects the logical meaning making.</p>		
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than the expected theoretical mass of 1.46g. Sending the sample for UV-VIS analysis and utilizing Beer's Law allows us to determine the amount of copper present in the CuI product and the results indicates that the impurities are copper-containing as the mass % of copper in the sample is 44.74%, which is higher than the expected 33.37%. Fortunately the absorbance value of the CPZ-S is recorded as 0.874A which is still within the range of values of A which Beer's Law of linear relationship holds and the graphs show a very strong linear relationship ( $R^2=0.9898$ ) hence despite the concentration of copper present in CPZ-S is obtained via extrapolation of the best fit line, it is safe to say the results are still reliable and overall the synthesis of CuI is a successful one.

## **8.11 Paul**

### **Student profile**

Paul is an Engineering student from Myanmar. He explains his experience learning English in a text written at the beginning of the EAP module:

#### **My English learning journey**

I am [Paul]. I am from Myanmar. I feel that learning English is not easy. Since English is not an everyday language in Myanmar, I did not get any chance to practice English. I always communicated my friends, my teachers, my parents, and my relatives in Burmese when I were in Myanmar. Moreover, in Myanmar, students are trained to accept whatever teacher teaches them. They do not have chance either to express their opinion or to raise questions not only in English class but also in other classes like Maths, and Science. Therefore, my parents decided to send me to Singapore to pursue tertiary education after my high school.

Before I came to Singapore, I spent one and half year to improve English four skills. Among four skills, in contrast to reading and speaking, I like writing and listening because I like to construct beautiful English sentences and I like to watch Science fiction movies. In addition, I like to read electronic books and programming books. After I had been trained for one and half year, I sat for the International English Language Test System (IELTS) exam.

I joined Polytechnic in 2010 and NUS in 2013. In my tertiary education, English language writing styles that I familiar are listing, Taxonomic report, and compare and contrast. Finally, I have difficulties in using prepositions correctly and I have never written reflection or reader response kind of writing.

### **EAP profile**

Paul's writing shows some lack of control over grammatical accuracy (some of the problems are in red in the text). Errors are present in tenses, syntax and word choice but the meaning is rarely impeded, and the writing is fluid. An impressive achievement for a student who was never schooled in English until attending university. The difficulties related to the toolkits are that Paul's command of conjunction is emerging and that his grammar tends to be congruent at times (but not always), and that he is not yet confidently using the appraisal and modality toolkits to express tentative meanings. He seems to have good control over macro structure with clear macrotheme and hyperthemes and general good flow of information. A further point is that he seems to misunderstand the sources he is paraphrasing. This could be due to weak reading skills and comprehension.

	Toolkit #1 to organize a text: Textual cohesion	Toolkit #2 to express logical links: Conjunction	Toolkit #3 to express the subject matter	Toolkit #4 to express evaluation and stance: Appraisal and Engagement
<p>(Shearlaw, 2013) discusses about the benefits that migration brings to developing countries. More and more people leave their homes to seek for comfortable weather, easy to assess foods and better job opportunities. As a result, remittances from migrants and returning of talented people back to their home are important for developing countries to rebuild nations after war. In addition, while there are problems such as discrimination related to human mobility, United Nations conducts a dialogue on how migration can help to reduce poverty as well as to achieve the nation's destiny. Lastly, human mobility can enrich the world economy which is claimed by Michael Clemens from the centre of global development. I agree the fact that migration brings positive impacts to the home country. However, I think not only home countries but also host countries experience advantage and disadvantage due to people movement.</p> <p>One of the positive impacts of foreign immigrant in host countries is that influx of foreigner can boost host country's economy. Today, Singapore is regarded one of the highest incomes per capital countries (Bueno, 2013). One of the reasons that Singapore changes from third world country to first world nation is foreign labors. After its independence, it is difficult for Singapore to sustain and develop its economy with its small population. Thus, lion city lightened its immigration policy to attract foreign labors from its neighboring countries. As a result, more and more people from Malaysia, India, China, and Thailand have been coming to Singapore to find job since</p>	<p>Unclear use of 'as a result'. The use of internal conjunction here does not clearly support the summary of the original text.</p> <p>Clear macrotheme</p> <p>Very clear hypertheme linked to the thesis.</p>	<p>The use of conjunction is not always well managed.</p> <p>The 'while' logical connector is unclear to relate the two propositions.</p> <p>'more and more people' is indicative of</p>	<p>Paul uses a range of fairly simple noun group constructions. Some instances of congruent grammar which could be revised for a better academic register.</p>	<p>The student does not use any hedging in this text. There are problems with the use of sources which are either misunderstood or misrepresented.</p>

<p>1968 (Hui, 1997). <b>Statistics</b> shows that manufacturing sector employed large number of foreign labors with 46% followed by construction sector possessing 20% of guest workers in 1980 (Hui, 1997). <b>Beside</b>, in 2011, <b>69% of job vacancies are occupied</b> by the foreign professionals (Bueno, 2013). <b>Furthermore</b>, not only Singapore, United Kingdom also receives profits from new arrivals. <b>Study</b> finds that UK's capital has been increased since year 2000 <b>because</b> compare to average Briton, <b>new comers from European Economic Area countries</b> are happy to pay significant amount of taxes despite receiving less benefits (Migrants contribute 25bn to UK, study finds, 2013)</p> <p><b>On the other hand</b>, <b>like everything in our life</b>, <b>there are negative effects due to migration which should not be neglected</b>. <b>One of the drawbacks</b> of influx of migrants in destination countries is that crime rate goes up when more foreign nationals come into countries. A study conducted in year 2006 <b>confirms</b> that <b>whenever the population</b> of immigrants from socioeconomic distress communities rises, crime rate goes up (Immigration and crime, 2015). In Netherlands, <b>serious crime cases</b> such as robbery, murder and so on are <b>committed by 63% of young migrants</b> (Immigration and crime, 2015) <b>(unclear stats here)</b>. <b>Likewise</b>, in Germany, <b>the numbers of crime cases</b> committed by migrant youths are larger than German teens (Immigration and crime, 2015). <b>Moreover</b>, <b>the influx of Chinese and Africans migrants</b> multiplies the crime rate in Japan (Immigration and crime, 2015).</p> <p><b>To sum up</b>, <b>although</b> human mobility has its merits, <b>negative impacts of people movement cannot be avoided</b>. <b>Therefore</b>, proper counter <b>measures</b> related to migration <b>should</b> be taken into consideration, so that the influx of foreigner will benefit both economy and citizens in home and receiving countries.</p>		<p>a congruent grammar (not very problematic for this text).</p> <p>'new comer...are happy to pay..', is congruent and could be made more abstract and prewise through nominalisation.</p> <p>'63% of young migrants' indicates a lack of control over the noun group (or possibly a misunderstanding of the source)</p>		<p>An aspect related to integrating sources is that the student has used Wikipedia but seems to have distorted the meaning of the information on the page.</p>
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## Disciplinary assignment

Most of the assignment is composed of schematic diagrams. The table following concerns the texts that is used to discuss the diagrams. Paul reported that the lecturer was happy with the report and had not made any comments on the text but had commented on the graphs only.

The text shows a staging pattern as: diagram<sup>^</sup>description<sup>^</sup>interpretation. Internal conjunction helps signal the stages (a reference to the graph is made, then 'however' to highlight parts of the results, and finally 'therefore' to explain and interpret the results). Errors in syntax are still present, but the text is otherwise well structured. The grammar is less congruent than the EAP text showed.

	Toolkit #1 to organize a text: Textual cohesion	Toolkit #2 to express logical links: Conjunction	Toolkit #3 to express the subject matter	Toolkit #4 to express evaluation and stance: Appraisal and Engagement
<p>EE2032 Lab 1: <b>Designing an analog passive Butterworth filter</b></p> <p>[...] The blue graph represents the 1<sup>st</sup> order lowpass filter and the red graph represents the 2<sup>nd</sup> order lowpass filter. Both graphs have the same cut-off frequency (159.0mHz) which is the frequency at which the magnitude value reduces to 0.707 of its maximum value. However, from the figure, it can be seen that higher order lowpass filter which is in red has sharper rolls off than lower order lowpass filter. Therefore, the higher order lowpass filter can reject more unwanted signals than lower order lowpass filter.</p>	<p>The lab report provides a title and a series of figures, some of which are described.</p> <p>The macrothème is represented in the title.</p> <p>The hyperthème shows the purpose of the paragraph to describe the graph.</p> <p>'Therefore' clearly signals the interpretation of the results and works in conjunction with 'however'.</p>	<p>External conjunction is not widely used. Sentences tend to be constructed with clause simplex. Instances of fragment.</p>	<p>A range of technical noun groups.</p>	<p>Paul uses 'can' to interpret the results.</p>

From the marker 1 (m1) in above figure, frequency at which the peak of the filter is at 399.0MHz. Therefore, center frequency is 399.0MHz. From the figure, it can be seen that the lower frequency, fL, at which the peak value reduce to around 0.707 is at 389.0MHz and the higher frequency, fh, at which the peak value reduce to around 0.707 is at 409.0MHz. Therefore, the passband of the bandpass filter is 20MHz (fh – fL).

[...]

In above figure, the Y-axis uses the magnitude in dB scale and the X-axis use the frequency in log scale. From the figure, it can be seen that the frequency at which the magnitude value drops to -3dB of its maximum value is 400MHz. To calculate the rolls off rate at transition state, 2 points (m2 and m3) are picked up along the transition region.

$$\text{Slope} = (-83.892 + 23.899) \text{ dB} / (10^{10}\text{Hz} - 10^9\text{Hz}) = -60\text{dB/decade}$$

The text continues with the same pattern of diagram^description^ interpretation

Fragment

## **8.12 Jane**

### **Student profile**

Jane is a Singaporean student and was schooled in the city, therefore in English. She also speaks Mandarin. She is an Electrical Engineering student, in Year one.

### **EAP profile**

Jane produces a text which does not completely answer the prompt. She writes a hortatory genre with use of 'we' and 'have to' to encourage the reader to take action. Overall, her grammar is quite congruent in the EAP text, with many 'people' doing things rather than abstract entities being discussed. Her control over macro structuring is fairly effective. She does not use any in-text citations and it is unclear what sources she uses beyond the reference to Greenpeace Asia.

	Toolkit #1 to organize a text: Textual cohesion	Toolkit #2 to express logical links: Conjunction	Toolkit #3 to express the subject matter	Toolkit #4 to express evaluation and stance: Appraisal and Engagement
<p>According to Greenpeace East Asia, an area of forest the size of a football pitch is lost to logging or destructive practices every two seconds. Our greedy human practices are causing our forest to be depleted at an alarming rate and if we continue ignoring this issue, it could lead to disastrous consequence such as destruction of homelands. In order to clear the forest for our activities, native tribes living there are forced out of their homelands. In addition, the trees are homes to many wildlife animals and with massive tree loss, these animals lose their habitats which can eventually lead to wildlife extinction.</p> <p>Hence, it is important that we start looking for solutions before we reach to the point of no return.</p> <p>A possible solution is for governments to implement stricter regulations relation to deforestation. According to Greenpeace, China is the world's second largest consumer and importer of wood products and with the lack of awareness and high rates of illegal logging, the wood imported to China are mostly likely from illegal sources. Hence with stricter regulations, less countries will import wood from illegal sources where the wood may be harvested from protected areas. Also, there are some unscrupulous industries in petrochemicals that release their waste into the river causing the soil around to be infertile</p>	<p>The macrotheme is bolded. It seems to answer the prompt which requires for one consequence of deforestation to be discussed. The rest of the text however develops the solutions rather than the problem (this may be the type of problem/solution essay Jane wrote at school, which is also indicated by her use of internal conjunction)</p> <p>The text moves to the solutions stages too early. the disappearance of homelands is not developed.</p> <p>Clear hypertheme pointing to a solution.</p>	<p>Jane uses a range of external conjunction, sometimes expressed in the verbal group.</p>	<p>Noun groups and nominalizations are used.</p> <p>The grammar is often congruent and becomes even more so in the last few paragraphs with an increase in use of personal pronouns.</p>	<p>This is a direct quote, not a paraphrase. No in-text citations beyond the reference to Greenpeace East Asia.</p> <p>Lack of hedging here and use of 'will' for a hypothetical result.</p> <p>Use of 'mostly likely' and 'should' to indicate tentative</p>



<p>and tress and plants cannot grow. Heavier penalties <b>should</b> be given to deter <b>these companies</b> form doing such things.</p> <p><b>Secondly</b>, there is a need to create awareness to <u>shift the mindset of the people</u> . Many do not <b>feel the immediate effect of deforestation</b> and <b>is</b> hence indifferent to this issue. <b>However</b>, <b>we</b> all need to realize that if <b>we</b> do not play our part in fixing this problem, we will suffer the consequence.</p> <p><b>Thirdly</b>, we have to change our harmful way of <u>living</u>. <b>Recently, I read</b> an article regarding the truth of <b>our</b> clothes donation. <b>According to the article</b>, the supply has outweighed the demand in used clothing. In America, <b>people</b> now buy five times as much clothing as they did in the 1980s. <b>This suggests</b> the trend of over consumerism in the developed countries. <b>If people could</b> change this habit and try to consume less, less tress would need to be cut down to generate electricity to produce these consumer goods.</p> <p><b>Lastly</b>, <b>incentives can</b> be given to encourage <u>companies to make their business greener</u>. Companies <b>can</b> adopt <b>greener methods of production</b> and <b>can</b> focus on re using and recycling items to reduce deforestation. A simple effort such as using less paper or recycling paper <b>can</b> reduce the number of trees that needs to be cut down.</p> <p><u>In conclusion, deforestation can lead to adverse problems</u> such as the destruction of homelands and we have to start solving this problem before the damage is <u>irreversible</u>. Some of the solutions possible are to implement stricter rules and regulations, create awareness</p>	<p>Hypertheme is clear.</p> <p>Hypertheme</p> <p>Final hypertheme indicated by internal conjunction 'lastly'</p>		<p>'we all need to realize' reflects another genre, hortatory.</p> <p>Examples of congruent grammar: 'people now buy...'</p> <p>'If people could change...'</p>	<p>and recommendation meanings.</p> <p>Shift between inclusive 'we' and 'people'.</p> <p>'Recently, I read an article': this shows the student is writing a high school essay and has not yet developed an academic register. The tone becomes very personal here 'I', 'our'.</p> <p>Good use of hedging 'this suggests' to interpret the data provided.</p> <p>Problematic use of 'can' to express a suggestion/recommendation. 'can' is also used to express the hypothetical result of the suggestion. This should be hedged to show tentativeness.</p>
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to shift mind-set of people, change our lifestyle and give incentives to encourage business to go green.				
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## Disciplinary assignment

Jane did not communicate the feedback from her lecturer on this. It is interesting to observe that the grammar is still showing congruence, even in a disciplinary text where perhaps the context could trigger the student into deploying a less congruent one. This indicates that it may be Jane's repertoire which is not yet at the incongruent stage. In year one, and for the type of lab report shown below, this may be acceptable.

The resources used in the lab report below are quite similar to the ones in the EAP text, for a genre which overall provides similar requirements: analysing a problem and making suggestions.

	Toolkit #1 to organize a text: Textual cohesion	Toolkit #2 to express logical links: Conjunction	Toolkit #3 to express the subject matter	Toolkit #4 to express evaluation and stance: Appraisal and Engagement
<p><u>Summary</u>  By estimating the operation time and power consumption of the various electrical appliance at home, we can determine the energy needs of our home. Based on our findings, we found that the air condition contributed for the most energy consumption as it has the longest operation time, we have also identified ways to reduce our energy consumption. By studying the luminous efficiency of the various lamps in the market, we found that LED lamps are the best lamps that will reduce energy consumption. By studying the usage pattern of the heating and cooling appliance at home, we found that heating appliances although have shorter operation time, it requires high power consumption due to the long continuous usage, A block diagram is also included to explain how our system gets energy.  [...]</p>	<p>The text starts with a summary which acts as an abstract of the report. This was analysed in the body of the thesis.</p> <p>The thematization of WE is indicative of a difficulty for the student to discuss abstract entities.</p>	<p>Jane uses a range of external conjunction and logical link expressed in the verb group.</p>	<p>A range of noun groups, some nominalisations (dead metaphors such as 'consumption')</p>	<p>Use of 'we'  A few instances of hedging and modality to indicate recommendation.</p>

Which loads contribute for the most energy consumption? Why?

Air conditioner; estimated 91 KWh Per day. A total of 24 working hours(per day) across 2 units with power draw of 3500W. Compared to the usage of other high Wattage appliances such as the electric kettle of 0.7 hours with power draw of 3000W. The difference in the usage durage of high power draw appliances result in the above observation where the air conditioner results in the greatest energy consumption.

Discuss ways to reduce your energy consumption.

- Go out and have fun.
- Share AC during the day instead of switching on all the AC units.
- Purchase newer & more energy efficient appliances.
- Turn off electric appliances when not in use.
- Use the fan instead of the air-conditioner.
- Share the same room(?) as the other people (save on AC units and light)
- Use appliances together whenever possible (eg. wash clothes, make breakfast together)

[...]

(a) Evaluate the best lamp that will reduce the energy consumption

Types	Overall luminous efficiency
Incandescent lighting	2.4 - 5.1%

Compact fluorescent lamps	8 - 11.45%
LED	0.66 - 22%
Arc lamp	4.4 - 11.4%
Gas discharge	12-29%

Data taken off Wikipedia

LED lamps. Luminous efficacy is a measure of how well a light source produces visible light. LED having one of the highest luminous efficiency thus use the least energy compared to the other lamps at same brightness.

Although Gas Discharge lamps are also one of the most efficient, they emit coloured light (non-white) for example, yellow light, which may not be ideal for use at homes.

[...]

(a) Suggest a plan of use and type of appliance that reduces energy consumption

Since the air condition contributes to the most energy consumption, we could reduce the number usage hours of the air condition and use a fan instead. Also, we could increase the set temperature of the air condition to reduce energy consumption.

Use of We as theme

Jane uses Wikipedia as a source for the energy consumption. the in-text citation is not formatted.

Effective use of concessive clause and hedging.