Supporting students' academic literacy: a social semiotic case study in STEM disciplines

Laetitia Monbec, CELC

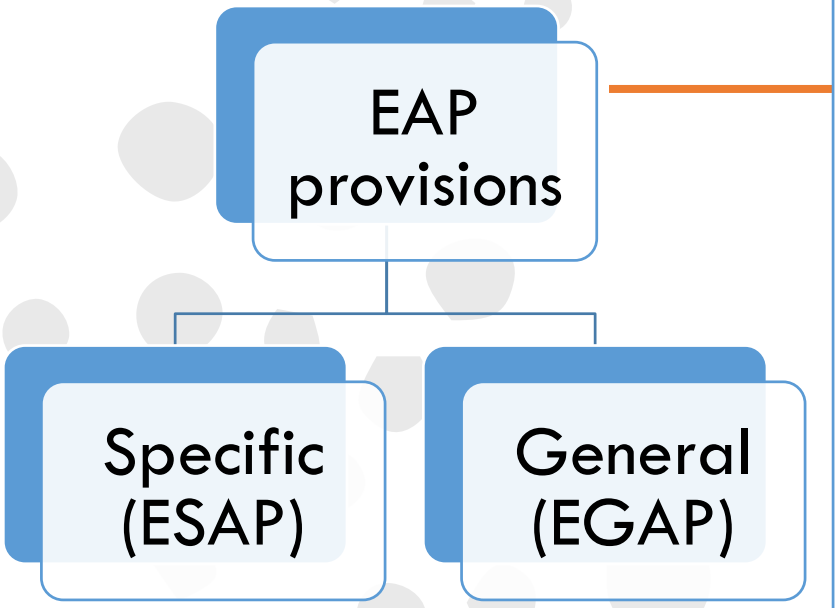
elclm@nus.edu.sg

“Most of us take language for granted- it’s a transparent medium in which we swim.”

University Pro Vice-Chancellor (Open University, UK, quoted in Coffin and Donohue, 2014)

- Description of the problem, the context and the study
- Description of the intervention
- Results
- Discussion
- Making language visible across the university

Context of the study



eg. English for Engineering students (Hyland, 2000; Nesi & Gardner, 2012)

- ES1103 English for Academic Purposes module
- 1500 students per year; 18-20 tutors
- Aim of EAP modules: to support students academic literacy skills **in** their undergraduate **programmes** (Hyland & Hamp-Lyons, 2002)
- EGAP: mixed-discipline groups → common core syllabus
- Research question: How does a systemic functional linguistics (SFL) approach to academic literacy **impact transfer** into the students' disciplines?

Design of the study

- Data: **students' *perception*** of the relevance of the module when writing their disciplinary assignment; ***a textual analysis*** of their assignment as well as the ***discipline lecturer's evaluation*** of the text.
- 12 students from Math, Life Science, Chemistry, Engineering
- 1 semester intervention. Data collection in the discipline the following semester.
- SFL and LCT coding to analyze the data.

EAP module design: social semiotic intervention

Systemic Functional Linguistics/Genre

Language is a meaning-making resource which is used to express four main areas of meaning (Halliday & Matthiessen, 2014):

a) the disciplinary field and

b) its logical relations;

c) the relation between the writer and the reader and the writer's evaluative stance;

d) the text organisation and flow

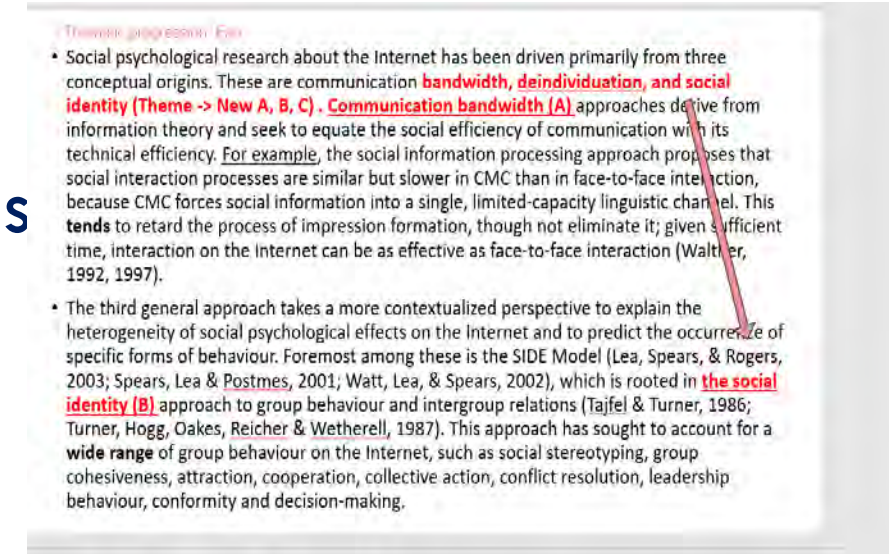
Learners engaged with an explicit and systematic knowledge of language resources (or toolkits)

4 linguistic toolkits for academic meaning-making	Resources	How your disciplines uses these:
To exp **To pac** **meani**		systems ures you ? In which part? (for example Appraisal is used in Biology articles abstracts and Discussion)
To express logical relations (field)	Clause complex CONJUNCTION	
To manage evaluation, persuasion and stance	Appraisal Engagement with sources (distancing & endorsing, reporting) Modality: hedging for tentative meaning	
To create a cohesive text (Monbec, 2018)	Macro and Micro cohesion; Thematic progression Macrotheme; hypertheme; general nouns, referencing pronouns, lexical cohesion, conjunctive adverbs	

Social Purpose and Genre → Individual word choices

Class activities: raising awareness

- Tutorial on each toolkit, and text deconstruction (sample academic texts)
- Student-led disciplinary text analys



- Social psychological research about the Internet has been driven primarily from three conceptual origins. These are communication **bandwidth, deindividuation, and social identity (Theme -> New A, B, C)**. **Communication bandwidth (A)** approaches derive from information theory and seek to equate the social efficiency of communication with its technical efficiency. For example, the social information processing approach proposes that social interaction processes are similar but slower in CMC than in face-to-face interaction, because CMC forces social information into a single, limited-capacity linguistic channel. This **tends** to retard the process of impression formation, though not eliminate it; given sufficient time, interaction on the Internet can be as effective as face-to-face interaction (Walther, 1992, 1997).
- The third general approach takes a more contextualized perspective to explain the heterogeneity of social psychological effects on the Internet and to predict the occurrence of specific forms of behaviour. Foremost among these is the SIDE Model (Lea, Spears, & Rogers, 2003; Spears, Lea & Postmes, 2001; Watt, Lea, & Spears, 2002), which is rooted in **the social identity (B)** approach to group behaviour and intergroup relations (Tajfel & Turner, 1986; Turner, Hogg, Oakes, Reicher & Wetherell, 1987). This approach has sought to account for a **wide range** of group behaviour on the Internet, such as social stereotyping, group cohesiveness, attraction, cooperation, collective action, conflict resolution, leadership behaviour, conformity and decision-making.

- Feedback on EAP writing: peer review, tutor feedback, self evaluation, consultations, rubrics

A. Task achievement. The writer provides:	4	3	2	1
(1) a clear, balanced and comprehensive response to all elements of the prompt				
(2) convincing development showing understanding of the complexity of the topic				
(3) a clearly stated stance (in the introduction, the evaluation and suggested solutions in particular)				
(4) integrated and relevant sources which are paraphrased, synthesized and/or summarized accurately				
B. Structure and development of answer. The writer provides:	4	3	2	1
(1) a generic structure appropriate to the task (introduction and expected stages: problem, solutions, evaluation)				
(2) a relevant introduction from general to specific with a focused thesis statement and clear scope				
(3) an appropriate conclusion relating back to the thesis statement and rounding off the essay				
(4) unified paragraphs with clear topic sentences				
(5) cohesion built through thematic progression, lexical cohesion and referencing				
C. Register and language. The writer provides:	4	3	2	1
(1) an academic and abstract tone (through the use of complex noun groups and nominalization)				
(2) a range of appropriate resources to evaluate and appraise ideas and sources				
(3) logical meaning relations through appropriate use of complex, simple sentences and conjunction				
(4) a text which is virtually free of syntax errors				
(5) a text that is virtually free of surface errors (for example tenses, SVA, use of article (a/the)				
(6) clearly documents the citations using the required format (APA)				

Results

12 participants:

Dr Strange (Math)	Yena (LS)	KALI	Ben	Reena	Lucy	Sobek	Julia	Walter (Chem)	Igor	Paul EEng	Jane EE
√	x	√	√	√	√	√	√	√	x	√	x

What transferred?

To express the field To pack dense and precise meanings from your field	Taxonomies Nominalizations **Noun groups** Verbal processes
To express logical relations (field)	Clause complex **CONJUNCTION**
To manage evaluation, persuasion and stance	**Appraisal** **Engagement with sources (distancing & endorsing, reporting)** **Modality: hedging for tentative meaning**
To create a cohesive text	**Macro and Micro cohesion:** **Macrotheme; hypertheme; general nouns, referencing pronouns,** lexical cohesion, **conjunctive adverbs**

Toolkit 4: cohesion

During the first weeks of university life, I started doing my assignments which only consist of computations and proofs. I had hard times completing it especially when I was asked to do proofs, **because I did not know how to apply my thoughts into words** that would be understandable by the readers. Meanwhile, **the thought that EAP mod was useless clang and I always considered it as a burden**. Things start changing when I saw that there is something applicable that I could derive from learning English. During week 5, the EAP mod Course Materials taught us that there were **3 main thematic progression patterns**. **This particular material turned out to be the answer of how to do proofs. I was satisfied because I was able to find out the implication of writing in mathematics even if during the EAP mod discussion, all things related with mathematics were considered as far transfers** . Lately, writing proofs are made easier for me by applying **pattern 2 of thematic progression** because **it would avoid gaps between steps** 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.**

Struggles to write proofs

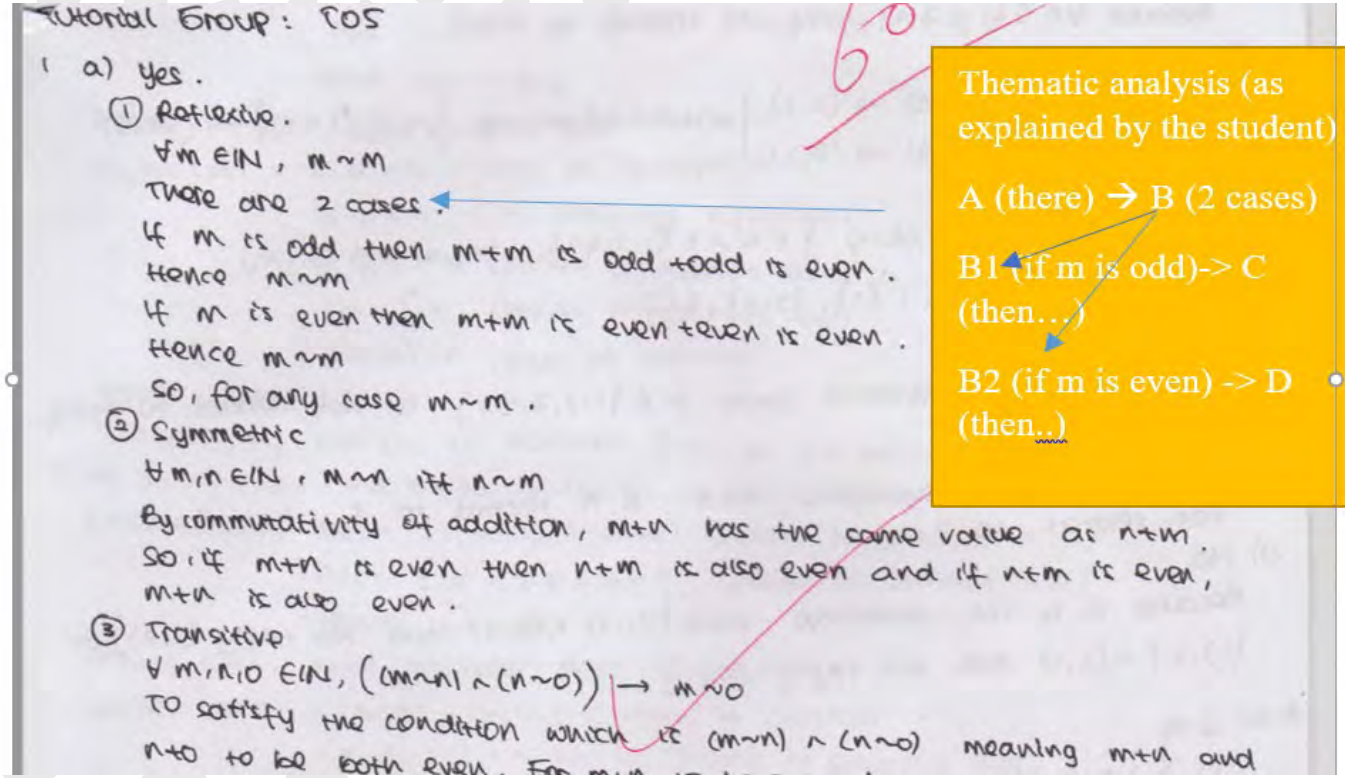
Thinks EAP mod is irrelevant (until week 5)

Learns about **thematic progression** patterns to develop cohesive informatio flow.

Applies this KAL in proof writing, despite the fact that all math writing is 'far transfer' from EAP mod.

Receives better grades.

Success story in a galaxy far far away. Dr Strange, a math student, reflects:



Dr Strange's proof writing exercise

Dr Strange, accessed from wikipedia

What is thematic progression?

All sentences start with a theme and end with NEW.
There are 3 thematic progression patterns: linear, zigzag, or fan.

Toolkit 3: Appraisal, modality

Transferred by 9 of the 12 participants

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

Walter's life science lab report (Year 1, Experiments in Chemistry)

Walter: *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.*
Lucy: *Like it suggests, you can't say IT IS because I'm also not sure, whether my interpretation is correct.*

- Analysis of context
- Deliberate use of the resources
- Awareness of the meaning they contribute
- Metalanguage is used to discuss language

Toolkit 1: Expressing the field

The toolkit consist of taxonomies (classification into parts, types..) and noun groups construction.

The initial Blastx search performed with default parameters excluding the models

Kalis' Life Science lab report

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

Lucy: I think it is easier to unconsciously write these noun groups, because it could be confusing"

Ben (LS Year 1) , 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.'*

Toolkit 1: Expressing the field

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+, thus regenerating NAD+ for another glycolysis pathway (Reece et al., 2012; Valvona et al., 2016).

Sobek's lab report noun groups

Sometimes I use a lot of noun groups…for example [pointing to his text] concentration of the enzyme

1. Tied to disciplinary content, learnt as technical groups/lexis
2. Not taught well: not enough samples from the discipline
3. Element of KAL that does not lend itself to visibility/awareness. (Sobek is not English L1 speaker , is he more used to semiotic awareness?)

Three students who did not transfer: why?

1. The contexts are too different

Yena (LS)	Igor (Chem)	Jane (EE)
X	X	X

"*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***." (Jane, EE)

For the science, the lab report, it's like different and ***I can't find the link****." (Yena, LS)*

"*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, CHEM)

2. Characterization of writing in science as 'straightforward'

Jane (EE) : *"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**."*

Igor (LS): "In Science we just don't write like that."

=> contrasting writing in Science with the EAP module context which becomes charged with evaluations such as '*complicated, extravagant, unnecessary*'.

Students dispositions to knowledge structure

Students who transfer

- Refer to knowledge

' *I learned …from the module*'

Dr Strange shifts from:

'*I considered EAP as a burden*'

to:

'*EAP 'course materials 'taught us that there were 3 main thematic progression patterns.*'

Students who do not transfer

- Downplay knowledge in EAP:

(Igor, LS) 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* ***minimize ambiguity*** *and not sounding like* ***beating about the bush.***

Students' Affiliation: the use of *we*

Students who transfer:

Use WE to indicate group affiliation to the Year 1 science undergraduate group.

WE + modal: *we have to; we're supposed to; we are asked to; we need to…*

Expert knower + commands:
Professors/lecturers/TA +
'*they ask, they say we can…; they tell us, they want us to*'

Students who report no transfer:

Use WE to indicate group affiliation to an expert disciplinary group:

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

Simple present + circumstantial group
In group norms

Conclusion

➢Research Question: How does a systemic functional linguistics (SFL) approach to academic literacy impact transfer into the students disciplines?

Brings disciplinary specificity into the academic literacy module

Positive for many STEM students (with the limitations seen): an SFL/Social semiotic curriculum aligns with science students' orientation to knowledge. Language can become less esoteric, less mystifying.

Challenging: Students' orientations to knowledge can be deep seated.

- Improve the EAP module, address orientations directly
- Embed academic literacy programmes
- Make Academic literacy consistent across the university

Institution-wide social semiotic approach

The 4 toolkits are theoretically-informed academic literacy tools which can be used in any discipline

Involves collaboration between academic literacy experts and disciplinary experts to 'tailor' to the discipline and to embed in the disciplinary modules/programmes

- Understanding the values (observations, assignment analysis, interviews with expert informant)
- Translating this into literacy knowledge
- Developing rubrics
- Developing materials to teach disciplinary specific academic literacy

Q&A

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