



Language for science: How does an EAP university module help?

by Dr Vasanthie Padayachee

*College of Agriculture, Engineering and Science (CAES),
University of KwaZulu-Natal, Durban, South Africa.*

“Options, practices and possibilities of EAP and ESP practitioners”

University of Crete, Heraklion, Greece.

20 - 23 September 2019

The BSc4 Augmented Program offered at the University of KwaZulu-Natal

Purpose

- Undergraduate first year university entry for science students
- Entry preference to ESL students
- Extra time for degree completion
- Module content and outcomes as per mainstream studies
- Extra tuition – supplemented by additional lectures, practical sessions and small group tutorials
- Compulsory first year modules: Biology, Chemistry, Mathematics, Physics, Life Skills, Communication in Science

An Academic Literacy module *for science students?*

- Articulate the link between language and content
- Interact and engage with academic scientific texts
- Teach relevant literacies for science discourse
- Facilitate the acquisition of discipline-specific literacies in science
- Demonstrate the use of the conventions and discourses
- Produce texts within science disciplines
- Apprenticed into various disciplines
- Become academically literate in science

The rationale for Communication in Science (SCOM)

- Functions as an Academic Literacy module
- Develops proficiency in academic writing: EAP
- Purpose: teach scientific genres: ESP
 - Report writing, academic essays, scientific posters and oral presentations
- Described as a content-based language module
- Inducts students into the scientific writing community of practice
- Exposes students to scientific literacy and grammar for science
- Facilitates process writing
- Revised as per cohort, performance, disciplinary / student needs

How is academic literacy contextualized?

The Academic Socialization Model (Lea and Street, 2006)

- Acculturation into disciplinary and subject-based discourses and genres
- Acquire the ways of talking, writing, thinking, and using literacy that typified members of a disciplinary or subject area community
- Presumption that the disciplinary discourses and genres are relatively stable
- Ground rules of a particular academic discourse - learnt and understood, ability to reproduce these unproblematically

Disciplinary Literacy

- Situates literacy as an integral part of content
- “Transforms students into disciplinary insiders” (Shanahan & Shanahan, 2012)
- “Use of reading, reasoning, investigating, speaking, and writing required to learn and form complex content knowledge appropriate to a particular discipline.” (McConachie & Petrosky, 2010)
- “Simultaneous engagement with disciplinary content (core concepts) and disciplinary habits of mind (reading–writing, viewing–representing, listening–speaking, thinking–reasoning, and problem-solving practices consistent with those of content experts).” (Fang, 2012)

Theoretical Framework: New Literacy Studies

(Street, 1984; and Gee, 1990)

➤ Literacy is

- Viewed as a social practice
- Context-dependent
- About knowledge; the ways in which people address reading and writing are themselves rooted in conceptions of knowledge, identity, and being
- Embedded in social practices, such as ... a particular educational context and the effects of learning that particular literacy
- Dependent on those particular contexts

Discourses and Literacies

Disciplinary discourse

“embracing a variety of *modes* such as spoken and written language, mathematics, gesture, images (including pictures, graphs and diagrams), tools (such as experimental apparatus and measurement equipment), and activities (such as ways of working – both practice and praxis, analytic routines, actions, etc.)” (Airey and Linder, 2009).

Discipline-specific literacies in science

- problem solving
- procedural fluency
- concept mapping
- quantitative literacy
- paraphrasing
- visual-graphical literacy
- objective reporting
- summarising
- data analysis

The language of science

The language of science is dense, concise, conceptual, objective, authoritative.

Unpacking the language of science is exacerbated by the nature of science texts:

- nominalisation
- grammatical patterns
- lexical density
- technical words vs non-technical words
- scientific register
- metalinguistic / metacognitive verbs
- genre structures
- academic discourse

Areas perceived as challenging in science

- reading technically complex texts
- detecting linguistic and semantic clues in science texts
- extracting relevant content
- presenting content coherently
- structuring scientific reports
- deciphering word problems
- carrying out procedures
- explaining solutions succinctly and accurately
- interpreting quantitative literacy
- using logical reasoning as opposed to memorizing
- explaining visual-graphical representations

Disciplinary specialists' responses to teaching language in science ...

- *“Language in science? Never thought of that!”*
- *“If you’re talking about spelling errors, I do correct those.”*
- *“My job is to teach science content, not language.”*
- *“I am not trained to look at language in science.”*
- *“It sounds useful but I don’t have time.”*
- *“I guess that’s where the language lecturer comes in.”*

Academic literacy specialists' responses to teaching language in science ...

- *“Language and content should not be seen in isolation.”*
- *“Language in science is not just about spelling and grammar.”*
- *“Language and literacies are certainly not the same.”*
- *“The academic literacy module is not just about fixing grammar errors.”*
- *“Language in science is needed to read, comprehend, do, write and speak science ... in the different disciplines.”*

How does SCOM address the challenges of language in science?

- Exposure to the conventions and discourse of science
- “Knowing science (scientific understanding), doing science (scientific inquiry), talking science (scientific discourse)” (Lee and Fradd, 1998)
- Make literacy practices explicit
- Apprentice students into literacy practices
- Transfer of acquired literacies

How does SCOM facilitate the transfer of literacies to science disciplines?

- Choice of content/curricula aligned to science disciplines
- Timing of assessment tasks
- Assessment criteria satisfy disciplinary requirements
- Consultation on topic choices
- Combined assessment tasks
- Jointly addressing students' challenges in literacies in science
- Workshops informing disciplinary specialists of EAP: philosophy, pedagogy, outcomes
- Cross-disciplinary research

Focal areas in transfer

Become members of a discipline

- “immersion” (McKenna, 2009)
- “engagement” (McKenna, 2009)
- “acculturation” (Bartholomae, 1985)



“Learning the standards of practice or learning how to become a participant in academic practice.” (Morrow, 1994)

SCOM as a vehicle of transfer

- Teach *for* transfer
- Learn *to* transfer
- Provide a context for literacies
- Make rules and conventions overt
- Engage in self-regulated learning

The way forward ...

- Shared responsibility of academic literacy
- Academic literacy is not perceived as imparting decontextualized skills
- Academic literary classroom facilitates the acquisition of literacies *in science for science*
- Context and language are viewed as co-constructed: the context helps shape the use of language and the language choices help shape the context
- Conscious active transfer of literacies from the academic literacy lecture to the science lecture

References

- Airey, J. and Linder, C. 2009. A Disciplinary Discourse Perspective on University Science Learning. Achieving Fluency in a Critical Constellation of Modes. *Journal of Research in Science Teaching*, 46(1), pp. 27-49.
- Bartholomae, D. 1985. Inventing the university. In Rose, M. (ed.) *When a Writer Can't Write: Studies in Writer's Block and Other Composing-Process Problems*. New York: Guilford. pp. 273-285.
- Fang, Z. 2012. Language Correlates of Disciplinary Literacy. *Topics in Language Disorders*, 32(1), pp. 19-34.
- Gee, J. P. 1990. *Social linguistics and literacies: ideology in discourses*. The Falmer Press: London.
- Gunel M., Hand B., Gunduz S. (2006). Comparing student understanding of quantum physics when embedding multimodal representations into two different writing formats: presentation format vs. summary report format. *Sci. Edu.*, 90(6): 1092-1112.
- Lea, M.R. & Street, B.V. 2006. The "Academic Literacies" Model: Theory and Applications. *Theory into Practice*, 45(4) pp. 368-377.
- Lee, O. & Fradd, S. H. 1998. Science for All, Including Students From Non-English-Language Backgrounds. *Educational Researcher*, 27(4): 12-21.

References

- McConachie, S. M. and Petrosky, A. R. 2010. *Content matters: A disciplinary literacy approach to improving student learning*. San Francisco, CA: Jossey-Bass.
- McKenna, S. 2009. Cracking the code of academic literacy: An ideological task. In Hutchings, C. and Garraway, J. (eds.) *Beyond University Gates: Provision of Extended Curriculum Programmes in South Africa*. Proceedings of the January 2009 Rhodes University Foundation Seminar. pp. 8-15.
- Morrow, W. E. 1994. Entitlement and achievement in education. *Studies in Philosophy and Education*, 13, pp. 33-47.
- Padayachee, V. 2014. *On making sense of science discourse: the role of a foundation programme in a South African University*. Unpublished PhD thesis. University of KwaZulu-Natal.
- Shanahan, T. and Shanahan, C. 2012. What is disciplinary literacy and why does it matter? *Topics in Language Disorders*, 32(1), pp. 7-18.
- Street, B. 1984. *Literacy in Theory and Practice*. Cambridge: Cambridge University Press.

**THANK YOU FOR YOUR
TIME AND ATTENTION**