

Are we giving undergraduates
enough guidance about how to
read research papers?

Dr Trevor Day

Director of Consultant Fellows

Royal Literary Fund

at the Advance HE STEM Conference, Birmingham, UK, 31 January 2019



In a recent survey of 100 scientists and engineers, only about 40% reported being taught how to read research papers or other technical documents when they were at university or college (Rogers, 2015)

Activity 1.

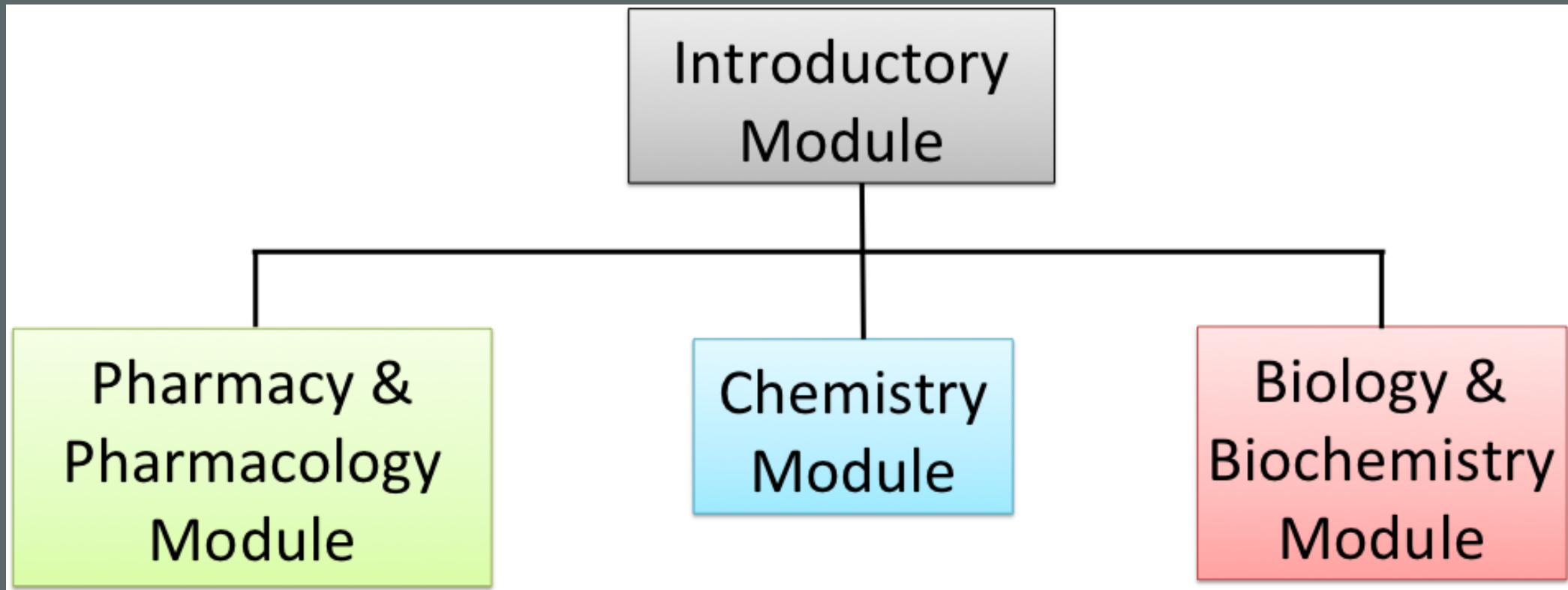
- a) Think of three assignments that undergraduates in your discipline undertake that involves reading research papers
- b) How do you expect them to read research papers in each case? Which parts? In what order? What do you expect them to extract?
- c) Do you encourage them to read from paper or onscreen?



At the University of Bath we designed *Evaluating Scientific Research Literature (ESRL)*, an online resource for biological science, chemistry and pharmacy & pharmacology undergraduates (Day et al, 2015; Letchford et al, 2017)

We involved postgraduates in the design and undergraduates in the testing. We interviewed the lead authors of the research papers we explored in the resource.

Evaluating Scientific Research Literature (ESRL)



What did we discover?

There is no single good way to read a scientific paper

It depends on:

- the purpose of the task
- the nature of the material
- the reader's previous experience and their familiarity with the field
- to some extent, the reader's personal preferences

Hubbard and Dunbar (2017 p1) concluded that

‘individuals at different career stages valued different sections of scientific papers, and skill in reading the results section develops slowly over the course of an academic career. Inexperienced readers found the methods and results sections of research papers the most difficult to read, and undervalued the importance of the results section and critical interpretation of data. These data highlight a need for structured support ...’

So, how can we better help undergraduates develop their reading skills?

Activity 2.

You have been given either a first year task or a final year task that requires undergraduate students to read this paper

- a) What guidance would you give to students about how to read the paper and extract information
- b) How would you give students this guidance?



Some conclusions

1. Many science educators give students insufficient guidance about reading (Coil et al, 2010). When we give it, we may have different views about how this is best done.
2. The way we read papers is likely to be very different from the way students read papers (Hubbard and Dunbar, 2017)
3. I propose that to maximise development of this key transferable skill we need to step into students' shoes, see it from their perspective, and give them specific guidance. We should also accommodate, as far as possible, that different students having different learning needs and preferences.

Cited references

Coil, D., Wenderoth, M.P., Cunningham, M. and Dirks, C., 2010. Teaching the process of science: faculty perceptions and an effective methodology. *CBE—Life Sciences Education*, 9, 524–535.

Day, T., Letchford, J., Corradi, H. and Rogers, T., 2015. Devising an online resource to help undergraduate science students critically evaluate research articles. *Journal of Academic Writing*, 5(2), 1–19.

Dori, Y.J., Avargil S., Kohen, Z. and Saar, L., 2018. Context-based learning and metacognitive prompts for enhancing scientific text comprehension. *International Journal of Science Education*, 40(10), 1198–1220.
<https://doi.org/10.1080/09500693.2018.1470351>

Hubbard, K.E. and Dunbar, S.D., 2017. Perceptions of scientific research literature and strategies for reading papers depend on academic career stage. *PLOS ONE*, 12(12): e0189753.
<https://doi.org/10.1371/journal.pone.0189753>

Letchford, J., Corradi H. and Day, T., 2017. A flexible e-learning resource promoting the critical reading of scientific papers for science undergraduates. *Biochemistry and Molecular Biology Education*, 45(6), 483–490.

Rogers, B., 2015. Reading lessons for scientists. *Education in Chemistry*. <https://eic.rsc.org/analysis/reading-lessons-for-scientists/2010065.article>