



EGUsphere, author comment AC2
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Reply on CC1

Philip J. Heron and Jamie A. Williams

Author comment on "Building confidence in STEM students through breaking (unseen) barriers" by Philip J. Heron and Jamie A. Williams, EGU sphere,
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Thanks for the review, Prof King. We outline our response below:

This is a really cool idea and I've been following it on social media. I'm glad to see such a nice clear writeup on your project along with some best practices. I only have a few minor comments, mostly along the lines of expanding some of your thoughts. I think about these issues a lot in my own intro STEM course for STEM students, so I could not help adding a few words of support along the lines of encouragement.

Thanks Prof King!

With regard to creating a neutral environment, do you have any thoughts for those of us who are trying to teach in a university setting? I still remember (quite fondly) a class I had in college where the professor (after the formal lecture at the chalk board) sat on the front edge of the desk and simply 'talked' to the class about experiences and ideas. The fact that I vividly remember this 30+ years later tells something about how personally engaging it was. That is an example that worked for me but that was an upper division course and I was already a STEM major.

Phil Heron response: This is something that I have been dealing with myself, now that I am more involved in university level teaching. One thing that is becoming clear to me is that teaching in any level is more about personality than performance, in that I am bringing more of my personality into teaching than trying to mimic any 'set' lecturer behaviours. For instance, I recently taught a field class where I would regularly bring in insight from my own previous experiences, or add more historical context to field sites. These are things that are interesting to me, and hopefully to the students – allowing for (slight) meanderings rather than rigid topics.

However, this may be more difficult in a seismology classroom than when you are walking in fields for a week. My rule of thumb now is to build in more relatable activities into courses, which has come from teaching this prison course. Creating relatable content will help students engage – and we need to be creative in how we can make material relatable.

This is a really great point, Scott, that has got my mind racing. The fact that you remember this from 30+ years ago stands out!

Jamie Williams response: The actions of the professor all those years ago acted to flatten the power dynamic, which may have helped to promote a more collegiate learning environment.

It would help to clarify if you could expand a bit on 'Plain Speak'. Is there a citation to the 'Plain Speak' idea? I have read that some introductory science courses actually introduce more vocabulary than a first semester foreign language course so I tend to agree with you (I don't seem to have the reference to the statement above). I personally think there needs to be a balance here because the "Upgoer V" challenges, for example, while fun actually can force someone into such strange vocabulary that I feel they obscure rather than enlighten. Where is the balance? What is your experience? I would find some examples of 'Plain Speak' worthwhile to help my thinking. For example, in some AGU outreach literature they suggest avoiding using the term 'mantle' yet even my third graders Earth Science class introduced the idea of a crust, mantle, and core.

The way we approach Plain Speak/Plain Language is to make it as easy as possible for a student to follow the material. In our prison classes, we are conscious that the students learning experience could be quickly derailed by not understanding a technical word (and not having the confidence to ask for clarification). Academic papers can be very limiting to non-experts, so we use plain language summaries (such as The Conversation) to stimulate the scientific discussion. We can edit the paragraph to give this concrete example:

*A positive step was to implement 'Plain Speak' English for universal accessibility, **which meant using language and design strategies that make texts easier for target audiences to understand and use (Mazur, 2000; Garwood, 2014). In practice, this means not using technical words without a proper introduction. An example for discussing different types of volcanoes would be to avoid using the word viscosity in the initial comments, opting for 'runny' or 'thick' until low and high viscosity can be scaffolded in (Berk and Winsler, 1995).***

The impact of applying plain language from the start of a course is to allow students to be clear on the content immediately when it is presented, rather than not being unable to understand a technical work and potentially derailing the learning experience. Applying plain language has been beneficial in the medical profession when communicating care to patients (Warde et al., 2018; Sagi et al., 2021) and we create accessible content through using plain language summaries of scientific research (such as the online magazine The Conversation). We also follow up with taking into consideration who and what was rewarded and prioritised in interactions with students (e.g., are we celebrating getting a correct answer or for asking question of clarification?).

A reference we found useful was the Introduction to Dr Garwood's PhD thesis on plain language https://uwspace.uwaterloo.ca/bitstream/handle/10012/8401/Garwood_Kim.pdf;sequence=3.

Our experience in teaching this course in prison is to watch the students and be quick to explain any word you think may have not landed. For many students, they will not speak up to ask a clarification, so to be vigilant (admittedly, watching body language is very difficult online, however).

Your point about discussion questions with no right or wrong answer is a good one. I have been using this in my online course to engage the students and for them to think more broadly about the topics and share in a non-threatening setting. I find that works well in my online course. I get 80-90% participation whereas in class it would always be the same 3-4 people speaking up.

Fantastic, we need some data on this to share more formally. Potential paper?