

## Socratic approach for unlocking creative potential in undergraduate research students

Wenfa Ng

Novena, Singapore, Email: [ngwenfa771@hotmail.com](mailto:ngwenfa771@hotmail.com)

### Conflicts of interest

The author declares no conflicts of interest.

### Author's contribution

The author developed and implemented this pedagogical idea, and wrote an abstract preprint to share his thinking on this issue with the academic community. The educational idea was developed during my time as a master's student at the Department of Chemical and Biomolecular Engineering, National University of Singapore.

### Funding

No funding was used in developing this pedagogical idea and writing this preprint.

### New in this version

Language and syntax was improved.

### Abstract

The final year research project aims to introduce undergraduates to scientific research as well as encourage them to think creatively and critically about problems from different angles. However, most courses in earlier parts of the curriculum focus on well defined problems with clear answers; thus, a huge gap exists between a research project's desired educational outcomes and the students' preparation. As a result, students experience significant difficulties in handling ambiguities (i.e., no defined answers) inherent in research, which leads to lack of motivation or trepidation at their projects. Is the above due to students' lack of creativity? Or does it have more to do with the difficulty of sparking students' imagination? One possibility for igniting students' imagination and fascination for their chosen research topic is in using common lab observations and experiences to unlock students' creative potential. In this abstract preprint, I describe a simple pedagogical tool for helping ignite creative and critical thinking processes in students. Specifically, the Socratic approach of question and answer, used in guiding students to answer their own questions rather than having answers provided to them, helped initiate, in the students, deductive and inductive thinking processes critical to tackling any research problem. This also helps increase students' self confidence in problem solving. More importantly, the tentative steps taken in independent thinking also helped debunk their misconception that there exists a single correct answer for every research question. Collectively, through simple pedagogical tools such as question and answer, students can be guided to explore different perspectives in problem solving; thus, improving their creative and critical thinking skills.

**Keywords:** critical thinking, research project, final year project, Socratic approach, question and answer,