

Learning and Teaching Showcase #8

Teaching innovation that leads to
student engagement, retention and success.

November 7, 2018

Presentation 6

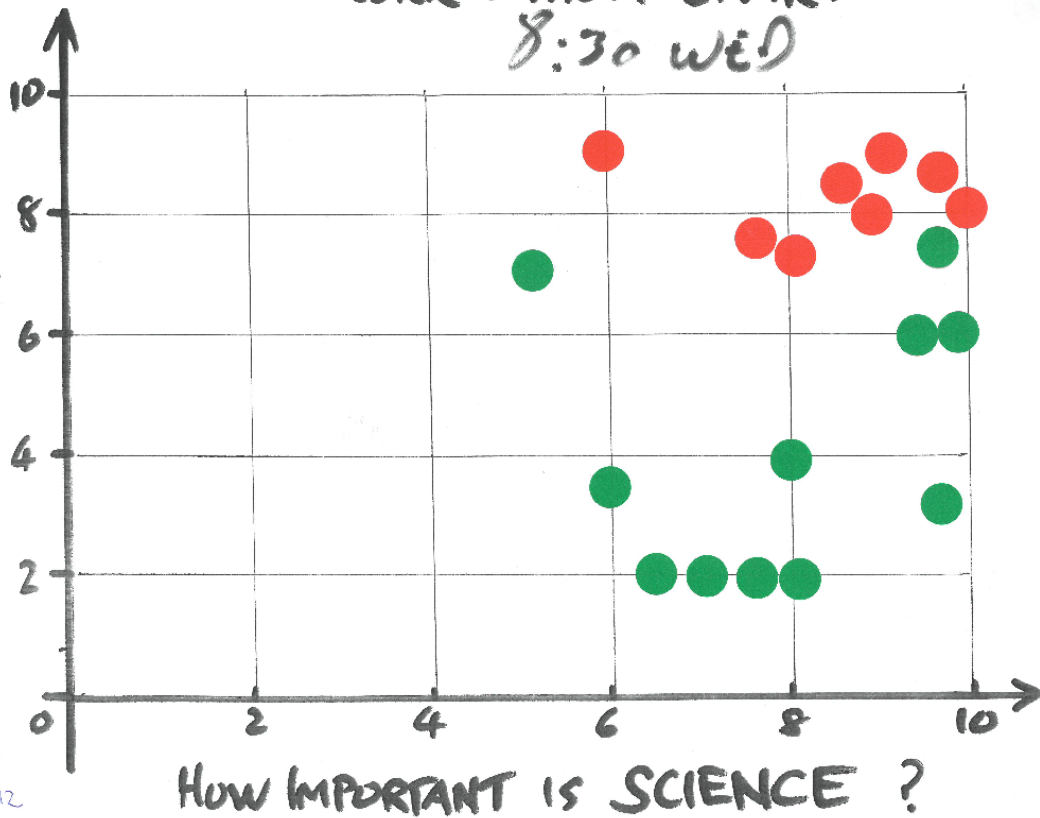
Embedding theory into practice by incorporating an inquiry model in Science Education

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School of Education

How confident do you feel
about Teaching SCIENCE?

😊 Week 1
😊 Week 12

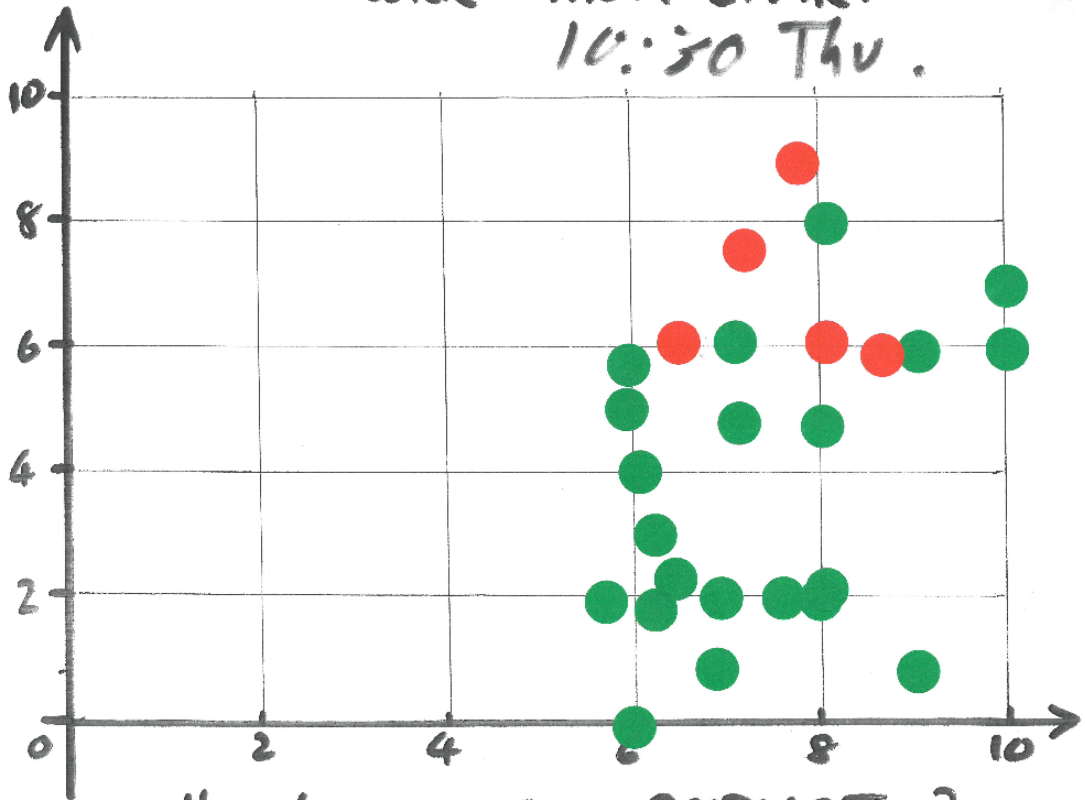
CORRELATION CHART
8:30 WED



How confident do you feel about Teaching SCIENCE?

WEEK 1
WEEK 12

CORRELATION CHART
10:30 Thu.



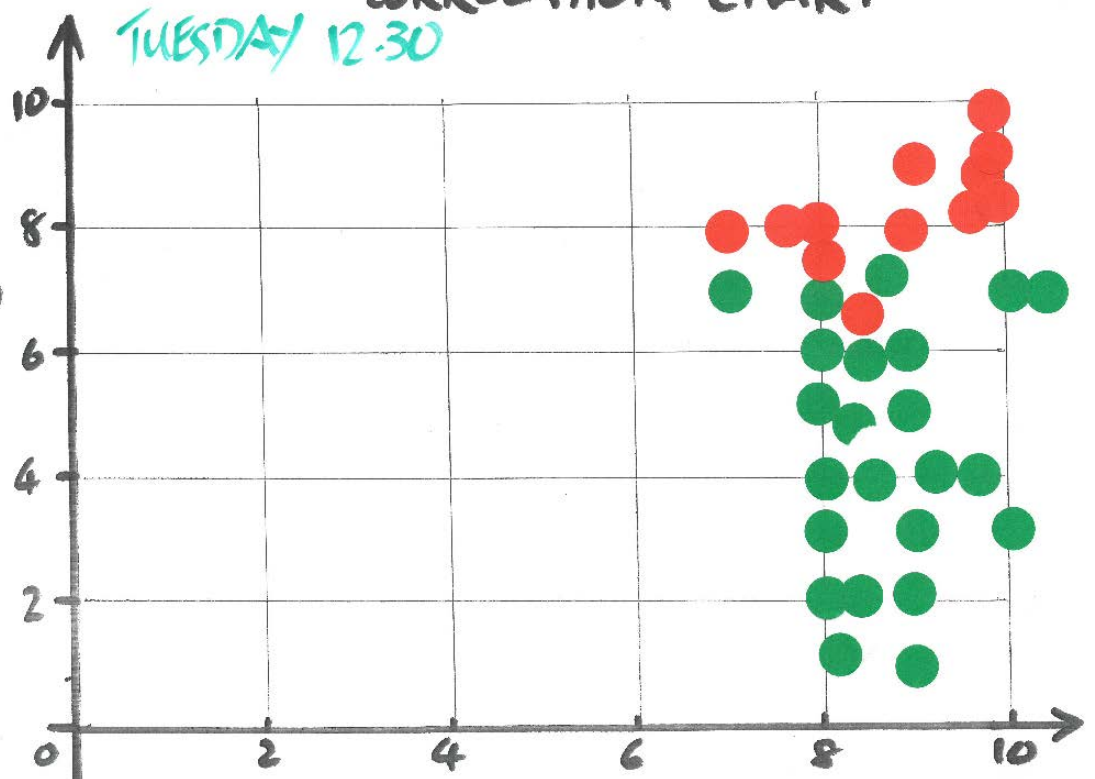
How important is science?

How confident do you feel about Teaching SCIENCE?

😊 WEEK 1
😊 WEEK 12

TUESDAY 12.30

CORRELATION CHART



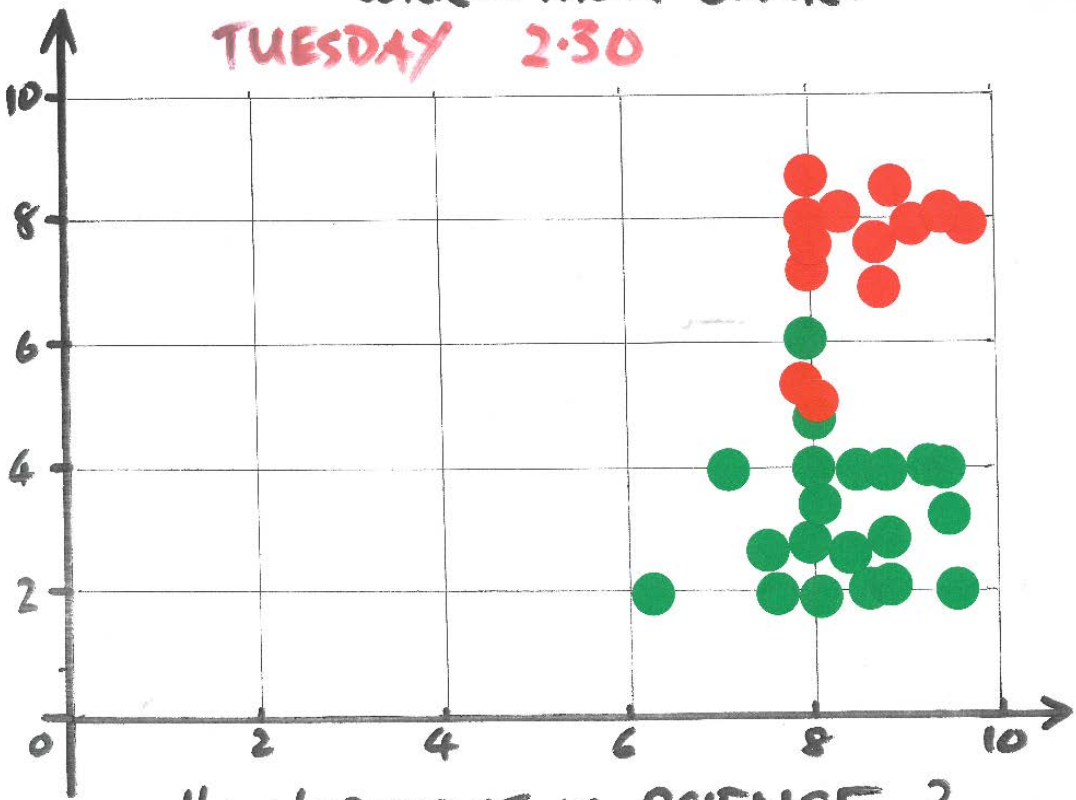
How important is science?

CORRELATION CHART

TUESDAY 2:30

How confident do you feel about Teaching SCIENCE?

● WEEK 1
● WEEK 2



How important is science?

5Es Inquiry Model

PHASE	FOCUS
ENGAGE	Engage students and elicit prior knowledge, Stimulate curiosity and raise questions, discussion
EXPLORE	Provide hands-on experience of the phenomenon. Explore and inquire into students' questions and test their ideas. Investigate and solve problems
EXPLAIN	Students develop scientific explanations for observations and explain their ideas to their peers. They represent their developing conceptual understanding through modelling and diagrams and explanations. Students link their ideas to current scientific explanations
ELABORATE	Extend understanding to a new context or make connections to additional concepts through a teacher-scaffolded / student-planned investigation or major project
EVALUATE	Students re-represent their understanding and reflect on their learning journey teachers collect evidence about the achievement of outcomes

REFERENCE: <http://www.bscs.org/bscs-5e-instructional-model>

Bybee, R., Taylor, J.A., Gardner, A., Van Scotter, P., Carlson, J., Westbrook, A., Landes, N. (2006). *The BSCS 5E Instructional Model: Origins and Effectiveness*. Colorado Springs,

The focus of our Peer Enhancement Project was to

- embed theory of the 5Es Inquiry Model of teaching and learning into practice in Science Ed
- use the 5Es as a vehicle to develop students' confidence in teaching science
- compare the outcomes when delivered to the on-campus group with the online group



Over the next 5 weeks the Weekly Task Journal questions will relate to different phases of the 5Es model with the context of **SOUND** as our theme.....

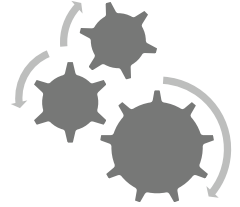
Phase 1: ENGAGE

- Can you make a wine glass sing?
- How is it that it can sing?
- Why can you hear it?
- What are 3 questions that might arise in a class discussion after seeing the singing wine glass demonstration as a stimulus /probe?

<https://youtu.be/jaeWycVwbqc>



the Week 4 Question (see Moodle)



5Es Phase 2: **EXPLORE**

Provide hands-on experience of the phenomenon. Explore and inquire into students' questions and test their ideas. Investigate and solve problems.

How would you set up multiple activities to allow your class to Explore the questions from last week? Try to come up with an activity for each question.

Exploring further.....

The Thunderous Coat Hanger, The Quacking Cup, The Rubber Glove Hooter,.....

Try these three activities yourself

What ideas might you expect from your students on how the unique sounds are produced in each of these three activities??

Week 5 Question

Phase 3: **EXPLAIN**

A) How do the the quacking duck / vibrating pipe / chiming coat hanger work?

How do you hear them?

What is the **science** behind these phenomena?

B) How would you set up your class so that peers could explain their ideas about these to each other?

C) How would you explain one of these ideas to your class?

This Week's Question.....

Phase 4 **ELABORATE**

Extend understanding to a new context or make connections to additional concepts through a teacher-scaffolded / student-planned investigation or major project

- How would you set up your class to investigate further / do a major project on some aspect of sound &/or music?

Eg Make an instrument / investigate how the ear works / investigate how we measure sound loudness / investigate how we measure sound frequencies....

WRITE ABOUT A PAGE for your inquiry into Sound and Music



This Week's Question.....

Phase 5 – the final phase in the 5Es sequence

Phase 5 Evaluate:

- As the final part of this series of questions about the 5Es (and music), how would you evaluate what the children in your class would have learned through the process?
- How will your students demonstrate their understanding and learning about sound and music?
- The assessment here should be about conceptual growth, meaning how has their understanding changed? This means that it might be worth looking back to the first lesson, to see where they have come from.

Come up with an outline of how you would assess this, what you might ask the children to do, and what evidence you might collect.

Student application of 5Es

The final assessment task in this course involved students developing a cohesive unit of work that utilized the 5Es as a framework



Quotes from the **Final Reflection** (Week 12):

The task set for students:

“Reflect on what you have learned during this course, and how the learning experiences may (or may not) have changed your approach to the teaching of science.”



On-campus student responses

Following are extracts from a selection of the many responses that specifically mentioned the 5Es



“Overall, I now have a lot more confidence to not only teach science in a fun, exciting and hands on way but I believe I now have more self-assurance to explain the science explanation that is super essential, through a lesson sequences such as the 5E’s model that was the focus through this course.”



“The 5E’s model has really changed the way I view and plan for lessons, it’s a very simple concept but one that seems to really make your lessons really clear cut and purposeful as everything fits within a scheme.”



“Using the 5E’s teaching model I have gained some experience in structuring sequential lessons in a way that creates interesting and meaningful context for students, explores concepts and encourages critical thinking skills, explains and elaborates on student’s current understandings and provides opportunities for reflection and assessment of student’s levels of understandings upon completion of a topic.”



“Being able to clearly see how the lessons flowed and how the 5 E’s were linked into the unit plan meant that there was no confusion about what we were learning, why we were learning it and what we needed to do in each assignment.”



Online student responses

- *Similar positive development of confidence and understanding of teaching of science*
- *Similar eVALUate data reflecting the above*
- *No specific mention of the 5Es*

The online students had the

- same videos
- same ppts and resources
- same 5E questions at the same time of course

- The online students did not have weekly **teacher initiated** discussion of previous week's 5E question.
- Instead they had a 'Weekly Discussion Forum' where they could raise **written** questions and seek clarifications.
- The interactions in this online forum were **initiated by the students and were optional**

What next for the 5Es?

A future direction for Science Ed online delivery will be to incorporate more discussion, sharing of ideas and associated feedback in the online environment, by....

- Promoting the online delivery as an online Professional Learning Community
- Development of further video clips that discuss and unpack each of the 5E phases as they are addressed in tutorial activities
- Setting up of 'Discussion Forums' on Moodle that require participation
- Adding another layer of teacher initiated feedback
 - Weekly 'Mail Bag' style video providing feedback on student contributions
 - Live video conference for participants
 - Prioritise written feedback to online students' weekly tasks (on-campus students always have the opportunity to ask questions in tutorials)

**Questions, comments,
suggestions**

