Open Inquiry with CREST

Engagement in Science for all students

COVENANT CHRISTIAN SCHOOL

For Christ's Crown & Covenant

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Open Inquiry:

Students **design** and **complete**

a scientific **investigation**

to **discover** and **report** on

the **effect** of **changing one aspect**

of an experiment

(the outcome is unknown)

Why ?

- Australian Curriculum Science
  - Content descriptors 1/3 inquiry skills
  - Achievement standards ½ inquiry based

- Extension 2017-18 Science Fair

- High external standard

- Encouragement Awards

Why CREST ?

- Australian Curriculum Science
  - Content descriptors 1/3 inquiry skills
  - Achievement standards ½ inquiry based
- Extension 2017-18 Science Fair
  - High external standard
  - Encouragement Awards
- Inspired by Colin Price
  - CREST

Creativity in Research, Engineering, Science and Technology (CREST)

Education Program

- support and resources for teachers
- develop students' skills in **questioning, researching** and **problem-solving**
- deepen students' understanding of **scientific concepts** and **procedures**
- complete **inquiry-based projects**
- achieve **awards**

How?

- Prepare
  - Sign up to CREST Online
  - Resources – read, summarise
  - Science scope and sequence - adjust
  - Assignment instructions, timeline
  - Goals

- Begin
  - Students CHOOSE inquiry
  - Bronze or Silver (10/30 hrs, innovation)

What happened ?

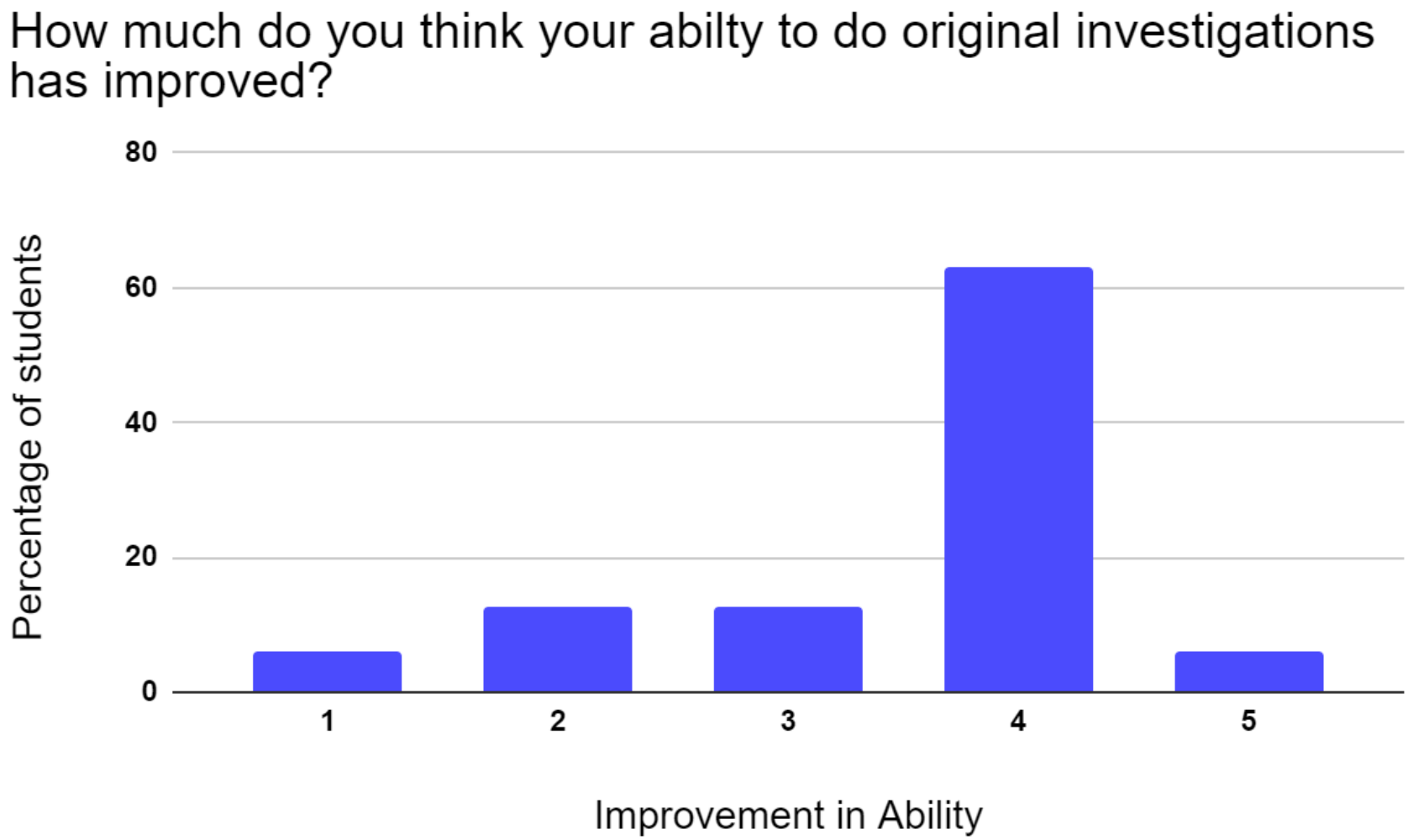
- Effective and Rewarding
  - Highly engaged – own interest area

"The topic was fun and I would highly recommend doing crest"

"I enjoyed crest more than regular science work"

What happened ?

- Inquiry Skills development



What happened ?

- Effective and Rewarding
  - Highly engaged – own interest area
  - Inquiry Skills development
  - Perseverance
    - ✓ complete projects
    - ✓ meet the standard
  - Sense of achievement and satisfaction
  - Celebrate!

Celebrate!

17 Bronze Awards ▪ 5 Blue Awards

Reflections

Challenges

- ? Skills for consolidating standard
  - Scaffolds

➢ Scaffolds – Google doc. templates

Scaffolding

Results and Observations (Conducting, Collecting Data, Representing Data)

Record your data in a table. (Don't forget to include headings for each of your table columns.) You can also record your results using words and sentences, by drawing diagrams, taking photos or videos, or using digital devices.

What problems did you have and how did you solve them? If you adjusted your procedure, you could explain the changes you made.

Can you communicate your results using a graph? If it is appropriate to do so, create a graph. Draw your own axes and label them. Give your graph a title.

Explaining your results

What happened to the dependent variable when you changed the independent variable? Write in paragraph format to describe and interpret the results by identifying general trends and patterns.

Reflections

Challenges

- ? Skills for consolidating standard
  - Scaffolds
  - feedback

Section B: Science Investigation Checklist

Student Names

The teacher is to date and initial each box as feedback is given, progress made, and the task completed. The Bronze CREST Award Science Investigation Evaluation Rubric describes the three standards that may be demonstrated in each criterion.

Key for Standard met: A=Achieving, C=Consolidating, B=met some element(s) of Achieving

Activity	Notes or feedback for student	Standard
Planning	More detail is needed for your plan - specify what you will do each day; when and how you will make your measurements; how you will set up different light sources. Exactly what are the lights? Incandescent or led and how many watts? 20/3 LF Your hypothesis and justification only mentioned two colours - so perhaps your hypothesis needs revising? Have you prepared for recording your results? 25/3 LF Have you worked out how you will set up the different coloured lights? How often you will make your measurements? 02/04 LF A step is needed here to explain exactly how you will set up the lights, and this may mean more equipment is needed which will have to be added to your list. How much water will you put on the seedlings - they may not need it every day - but it is important to keep this variable (amount and frequency of watering), the same for all plants. How often will you measure the seedlings and at what time of day? How many days will you keep doing the experiment? 07/04 LF You have made a start to your recording table. Which other columns will you need? Do your columns have headings? 09/04 LF You have described your procedure adequately to enable repetition. 10/04 LF	C
Conducting	You began to do your investigation but encountered problems with setting up the lights. You may need to do further research or ask adult advice to find a feasible	B

Reflections

Challenges

- ? Skills for consolidating standard
  - ➢ Scaffolds and feedback
- ? Ability – differentiation
- ? Unequal partnerships
- ? Silver CREST
  - x Topics
  - x Replicable
  - x Final report

Silver Award!

2nd Physics SEAACT Science Fair

Nuclear Physics mentor

Action Plan

- Develop students' inquiry skills
  - 11 areas identified
- Prepare Yr 7 for open inquiry
  - Logbook, templates, rubrics
- Manage CREST workload
  - Minimise written feedback
- Silver projects
  - Screening and mentors

CREST is BEST!

Questions ?

Acknowledgement & Thanks

CSIRO

AIS ACT
Association of Independent Schools of the ACT Incorporated

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Students Thoughts

"I think doing CREST was a really good opportunity to learn for myself on how to create my own investigation and improve it.

While doing the assignment I found it very helpful to actually look at all the small details of the rubric to get exactly what is needed to be done, which I think will be helpful to do for other assignments."

"this was a challenging task to do but worthwhile I think we should do this again"

Students Thoughts

"I like [CREST] … it made me understand more about what is takes to be a scientist and what scientists need to do during an experiment and how difficult it is"

"From this project I learnt that using exercise in a scientific experiment is difficult as the results would be subjective to each individual. This also taught me how to properly execute a formal scientific investigation."