Engage Teacher Conference

Turn curiosity into achievement research and reflection in the curriculum

Guidance and resources for teaching the secondary curriculum while allowing students to complete their own research and reflective practice.

Ruth Mackay
Education Officer, British Science Association

Engage Teacher Conference

Engage

Welcome, please be aware:

- Talks are recorded
- You can ask questions in the chat throughout
- There will be time for questions at the end

Turn curiosity into achievement: research and reflection in the curriculum

Ruth Mackay, Education Officer

British Science Association

Session Aims

- To introduce CREST Awards as a framework for curious and reflective research led by young people
- To highlight resources from BSA to support implementation of CREST Awards into your schools to develop curiosity and reflection
- To share an overview and the learnings from the ‘CREST Awards impact report’
- To share an overview and the learnings from the Gastby funded ‘Project work in the curriculum’ evaluations
- To highlight ‘Top tips’ for implementing this teaching approach in your classrooms

STEM Attributes by nustem

Exploring the characteristics, or attributes, needed by people who work in STEM

Collaborative	Hard-working	Organised
Committed	Imaginative	Passionate
Communicator	Logical	Patient
Creative	Observant	Resilient
Curious	Open-minded	Self-motivated

Which of these characteristics do you think are most valuable for your young people?

→ Choose your top 3 and pop them in the chat

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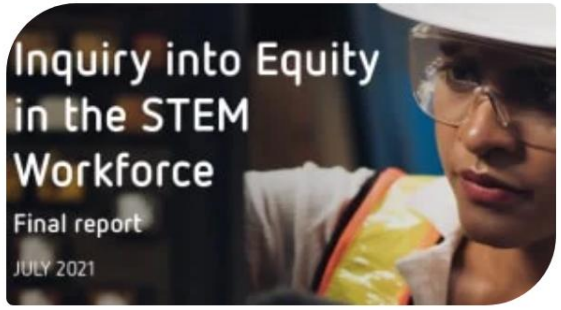
Committed	Imaginative	Passionate
Communicator	Logical	Patient
Creative	Observant	Resilient
Curious	Open-minded	Self-motivated

Introduction to the British Science Association (BSA)

Our vision is a future where science is more relevant, representative and connected to society.

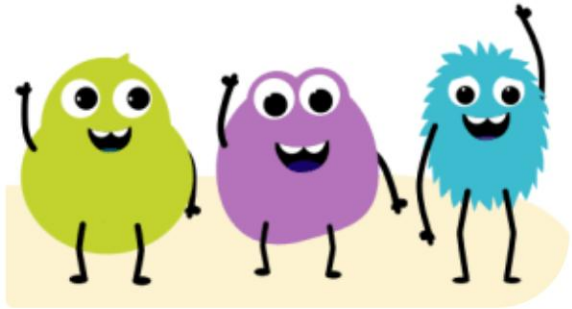


All-Party Parliamentary Group on Diversity and Inclusion in STEM

We run the All-Party Parliamentary Group on Diversity and Inclusion in Science, Technology, Engineering and Maths (STEM). Find out more here.

British Science Festival

Europe's longest standing science festival, the British Science Festival featuring over 100 events, installations, performances and workshops exploring topics across the scientific spectrum.



British Science Week

British Science Week is an annual celebration of science, technology, engineering and maths.

At the BSA We want to see more people, especially those from currently underrepresented groups, feel that science is relevant to their lives.

To achieve this, we:

— Provide engagement activities that effectively reach and engage underserved audiences with science, and use these activities to understand and disseminate good practice.

— Enrich young people's experience of science in a way that encourages more of them to see science as relevant to their lives and to study/work in science.

— Partner with communities to enable them to conduct, influence or apply science and research in their work with their audiences.

CREST Awards

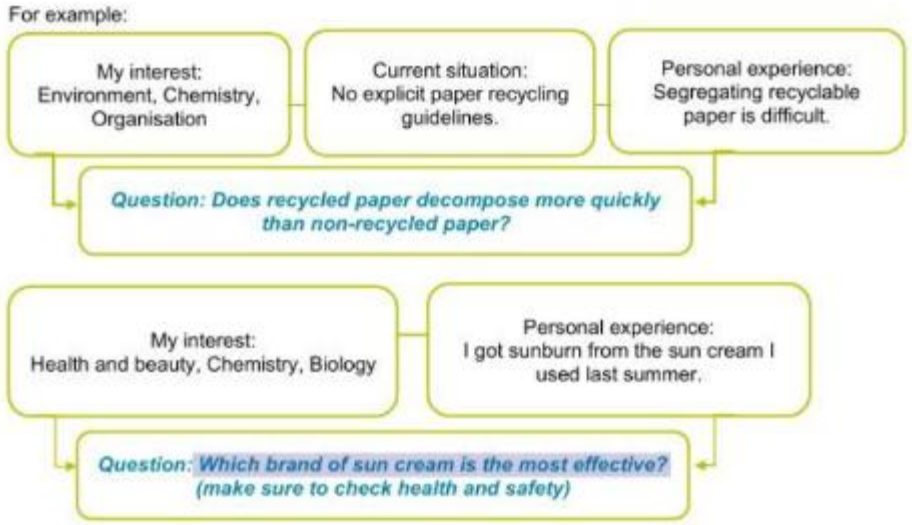
- STEM engagement scheme for 3- to 19-year-olds
- Framework and resources to support enquiry and project-based learning
- Flexible delivery (in curriculum, enrichment days, STEM Clubs)
- Recognition for all learners – certificates for achieving the Awards

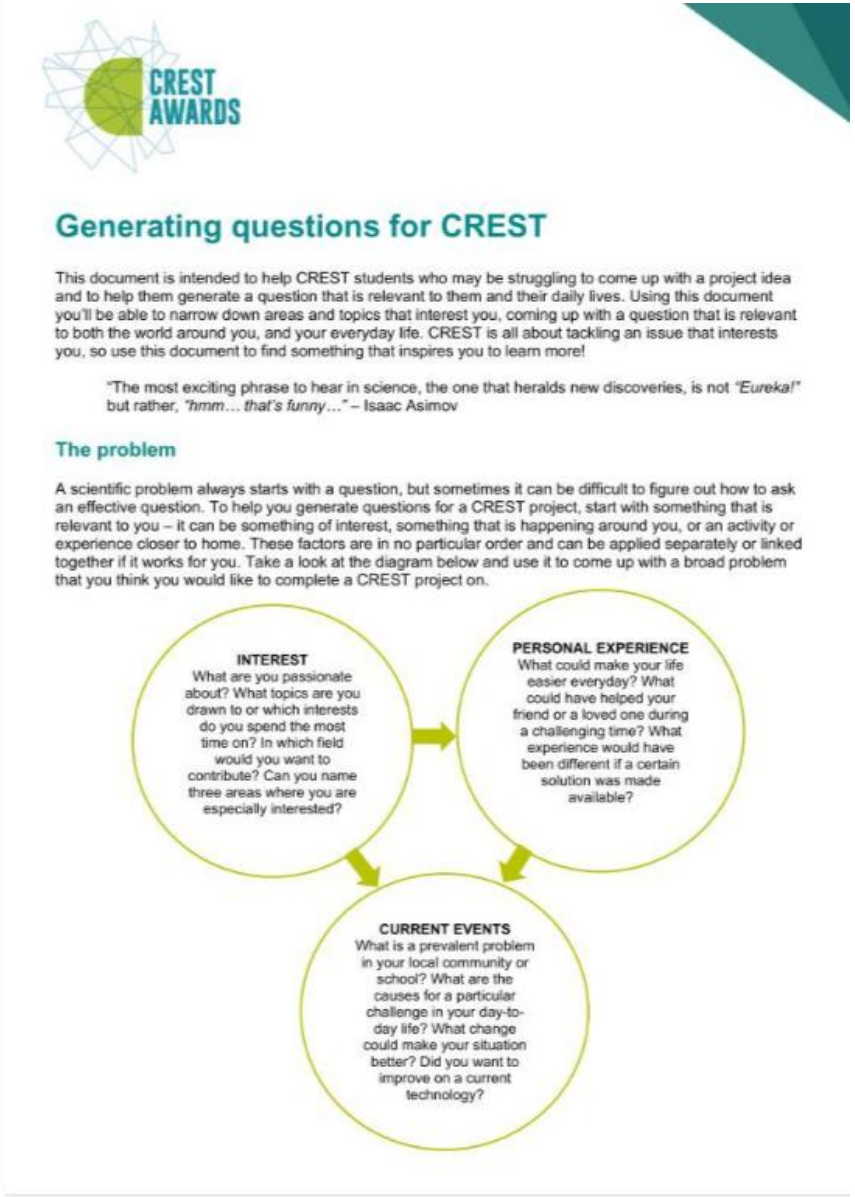
Turning curiosity into achievement: Real CREST project questions

- Can soggy crisps be made crispy again?
- How does a slinky defy gravity?
- Can Red Bull really make you fly?
- “To eat or not to eat?” – the five second rule
- Does time fly when you are having fun?
- Is there a science behind baby-holding?

How to embed curiosity: Question generation for CREST

For example:





Generating questions for CREST

This document is intended to help CREST students who may be struggling to come up with a project idea and to help them generate a question that is relevant to them and their daily lives. Using this document you'll be able to narrow down areas and topics that interest you, coming up with a question that is relevant to both the world around you, and your everyday life. CREST is all about tackling an issue that interests you, so use this document to find something that inspires you to learn more!

> "The most exciting phrase to hear in science, the one that heralds new discoveries, is not *'Eureka!'* but rather, *'hmm… that's funny…'*" – Isaac Asimov

The problem

A scientific problem always starts with a question, but sometimes it can be difficult to figure out how to ask an effective question. To help you generate questions for a CREST project, start with something that is relevant to you – it can be something of interest, something that is happening around you, or an activity or experience closer to home. These factors are in no particular order and can be applied separately or linked together if it works for you. Take a look at the diagram below and use it to come up with a broad problem that you think you would like to complete a CREST project on.

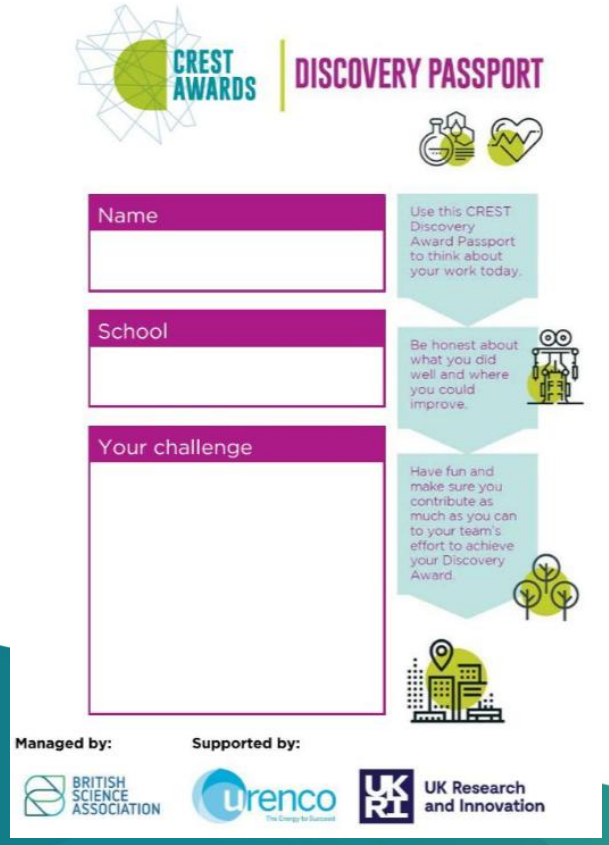
How to embed curiosity
Science Museum: Powerful questions

What are young people in your classes interested in?

Make a list of everything your young people are interested in – what's relevant to their lives right now?

Curriculum content

How to embed reflection: Discovery and Bronze workbooks


CREST AWARDS | DISCOVERY PASSPORT

Name

School

Your challenge

Use this CREST Discovery Award Passport to think about your work today.

Be honest about what you did well and where you could improve.

Have fun and make sure you contribute as much as you can to your team's effort to achieve your Discovery Award.

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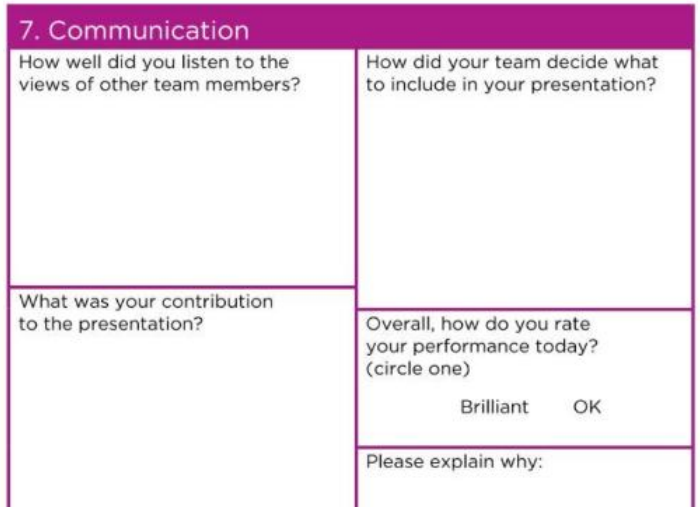

7. Communication

How well did you listen to the views of other team members?

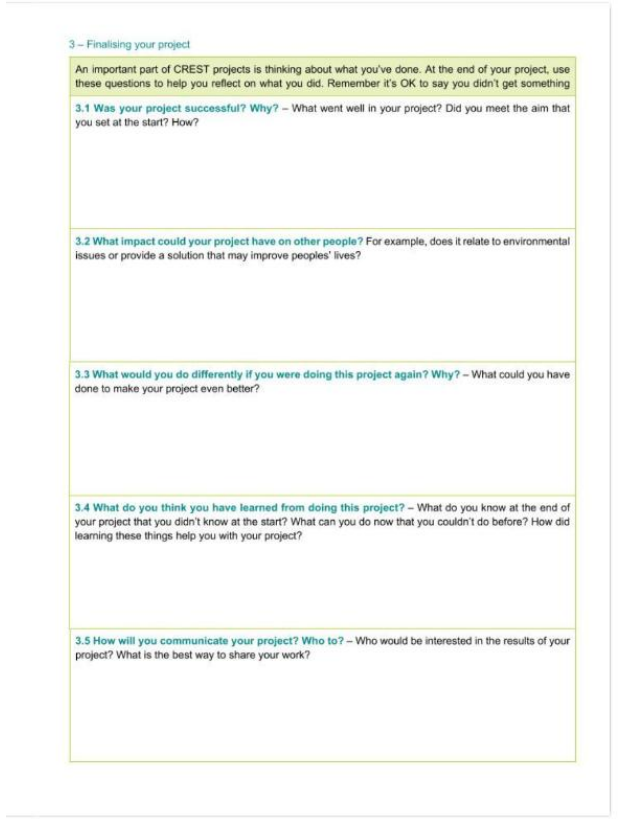
How did your team decide what to include in your presentation?

What was your contribution to the presentation?

Overall, how do you rate your performance today? (circle one)

Brilliant OK

Please explain why:


3 – Finalising your project

An important part of CREST projects is thinking about what you've done. At the end of your project, use these questions to help you reflect on what you did. Remember it's OK to say you didn't get something

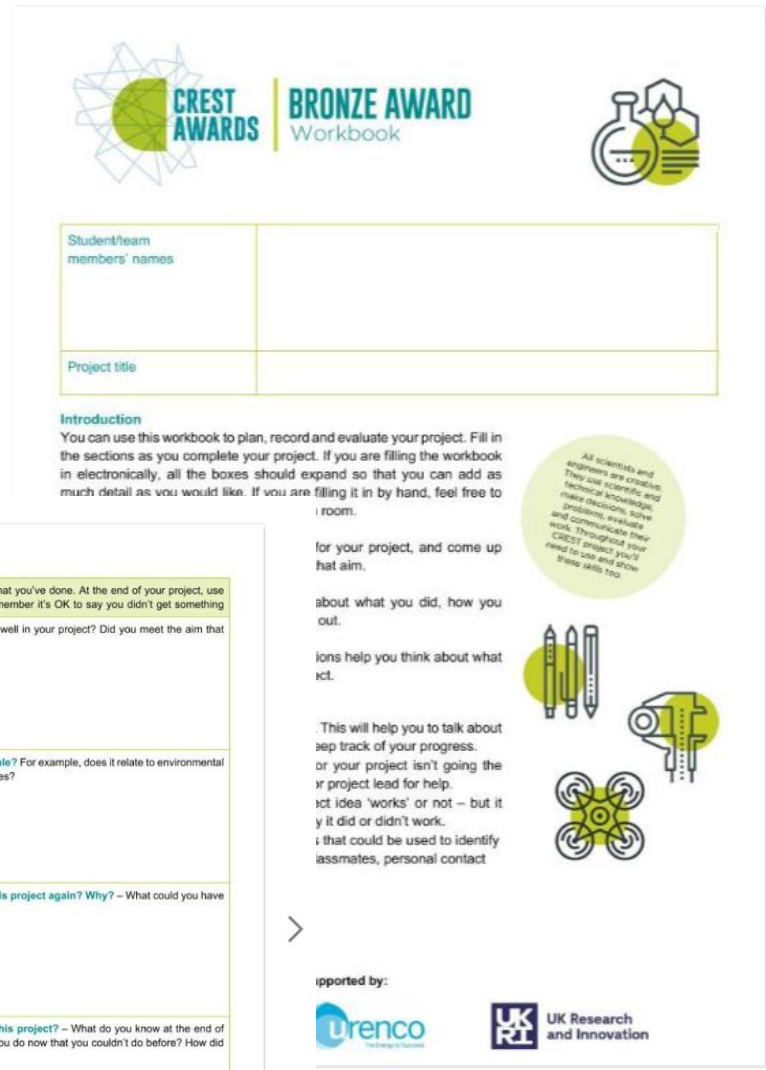
3.1 Was your project successful? Why? – What went well in your project? Did you meet the aim that you set at the start? How?

3.2 What impact could your project have on other people? For example, does it relate to environmental issues or provide a solution that may improve peoples' lives?

3.3 What would you do differently if you were doing this project again? Why? – What could you have done to make your project even better?

3.4 What do you think you have learned from doing this project? – What do you know at the end of your project that you didn't know at the start? What can you do now that you couldn't do before? How did learning these things help you with your project?

3.5 How will you communicate your project? Who to? – Who would be interested in the results of your project? What is the best way to share your work?


CREST AWARDS | BRONZE AWARD Workbook

Student/team members' names	
Project title	

Introduction

You can use this workbook to plan, record and evaluate your project. Fill in the sections as you complete your project. If you are filling the workbook in electronically, all the boxes should expand so that you can add as much detail as you would like. If you are filling it in by hand, feel free to

room.

for your project, and come up hat aim.

about what you did, how you out.

ions help you think about what ct.

This will help you to talk about eep track of your progress. or your project isn't going the r project lead for help. ct idea 'works' or not – but it y it did or didn't work. that could be used to identify assmates, personal contact

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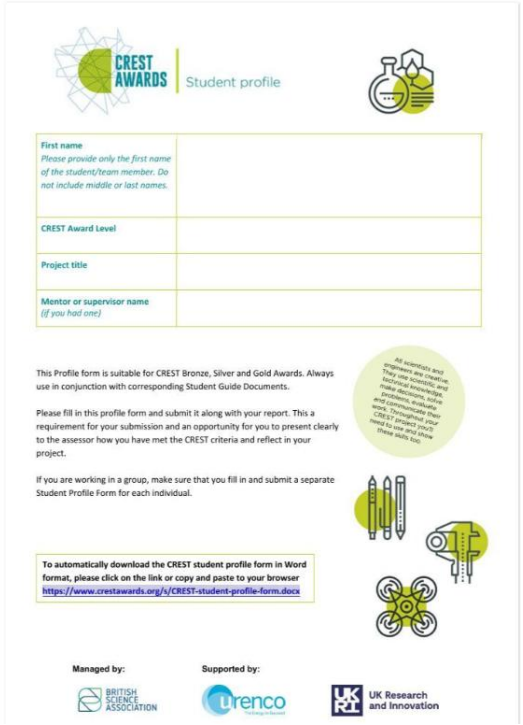
How to embed reflection: Silver and Gold CREST student profile form



CREST AWARDS Student profile

First name *Please provide only the first name of the student/team member. Do not include middle or last names.*	
CREST Award Level	
Project title	
Mentor or supervisor name *(if you had one)*	

This Profile form is suitable for CREST Bronze, Silver and Gold Awards. Always use in conjunction with corresponding Student Guide Documents.

Please fill in this profile form and submit it along with your report. This a requirement for your submission and an opportunity for you to present clearly to the assessor how you have met the CREST criteria and reflect in your project.

If you are working in a group, make sure that you fill in and submit a separate Student Profile Form for each individual.

To automatically download the CREST student profile form in Word format, please click on the link or copy and paste to your browser
https://www.crestawards.org/s/CREST-student-profile-form.docx

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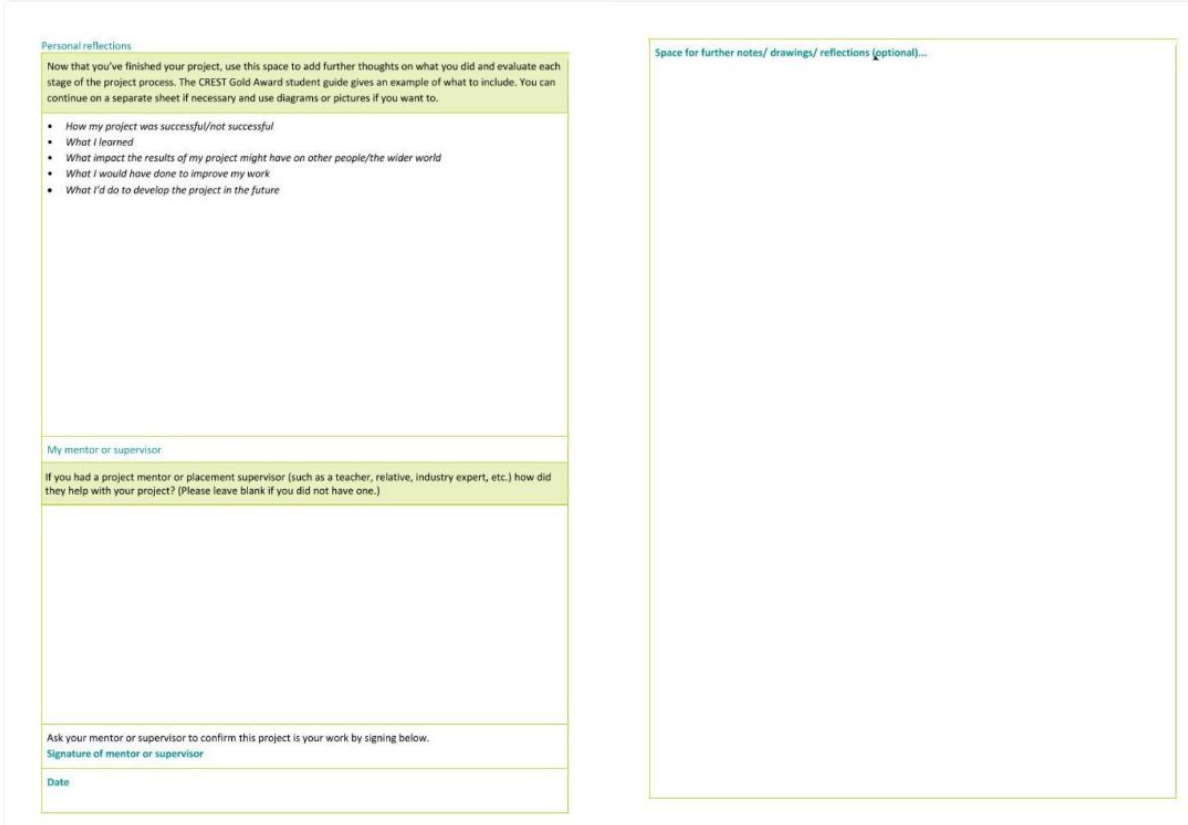


Personal reflections

Now that you've finished your project, use this space to add further thoughts on what you did and evaluate each stage of the project process. The CREST Gold Award student guide gives an example of what to include. You can continue on a separate sheet if necessary and use diagrams or pictures if you want to.

- *How my project was successful/not successful*
- *What I learned*
- *What impact the results of my project might have on other people/the wider world*
- *What I would have done to improve my work*
- *What I'd do to develop the project in the future*

My mentor or supervisor

If you had a project mentor or placement supervisor (such as a teacher, relative, industry expert, etc.) how did they help with your project? (Please leave blank if you did not have one.)

Ask your mentor or supervisor to confirm this project is your work by signing below.

Signature of mentor or supervisor

Date

Space for further notes/ drawings/ reflections (optional)...

CREST Criteria

3.1 The student made logical conclusions and explained the implications for the wider world

3.2 The student explained how their actions and decisions affected the project's outcome

3.3 The student explained what they have learnt and reflected on what they could improve

4.2 The student made decisions to direct the project, taking account of ethical and safety issues

4.3 The student showed creative thinking

4.4 The student identified and overcame problems successfully

Criteria	Where do you show this in your report or project record?	Your notes to the assessor (optional)
1 – Planning your project		
1.1 You have set a clear aim for the project and have broken it down into smaller objectives	*Example: Page 2, paragraph 5*	
1.2 You have explained a wider purpose for the project		
1.3 You have identified a range of approaches to the project		
1.4 You have described your plan for the project and why you chose that approach		
1.5 You have planned and organised your time well		
2 – Throughout your project		
2.1 You have made good use of the materials and people available		
2.2 You have researched the background to the project and acknowledged your sources appropriately		
3 – Finalising your project		
3.1 You have made logical conclusions and explained the implications for the wider world		
3.2 You have explained how your actions and decisions affected the project's outcome		
3.3 You have explained what you have learnt and reflected on what you could improve		
4- Project-wide criteria		
4.1 You have shown understanding of the science behind your project, appropriate to the Award level		
4.2 You have made decisions to direct the project, taking account of ethical and safety issues		

Why do CREST?

An overview and the learnings from the CREST Awards Impact Report and Gastby funded ‘Project work in the curriculum’ evaluations.

CREST Awards impact report 2021/22

Students

- Enhance research, communication and teamworking skills
- Build independence and resilience
- Gain employability skills
- Improve GCSE grades
  - ❖ Improvement of half a grade in GCSE science; up to 2/3 of a grade for students eligible for FSM
- Gain confidence
- Develop their STEM identities

> **(This project) has given me more confidence, as it is physical proof that you can achieve something.**
> *George, student from Lighthouse School in Leeds*

CREST Awards impact report 2021/22

Teachers

- Provide practical science activities that are linked to the national curriculum, so can be run in lessons
- Provide free resources plus additional support for schools who need it most
  - ❖ Engage network
  - ❖ Buddy scheme
  - ❖ Grants plus free CREST Awards

> **I think it brings a new sense of curiosity and discovery to students who have not been afforded the chance to really engage in science.**
>
> *Secondary school teacher, 'Machines of the future' pilot project participant*

Gastby funded
‘Building project work into the curriculum’

What did we aim to do in this project?

CREST Awards is the British Science Association’s education scheme that inspires young people to think and behave as scientists and engineers. It does this by providing pupils with the opportunity to do their own STEM-related projects, often within curriculum time. CREST is supported by UKRI and Urenco.

The ‘CREST: Building project work into the curriculum’ project was supported by the Gatsby Charitable Foundation. Its intention was to encourage more schools to use open-ended student projects within the formal curriculum, and for this to have a positive effect on students.

Attainment in science

Attitudes towards science

Employability skills

Aim: to pilot & evaluate the use of CREST projects to deliver curriculum subject areas & To develop guidance based on these pilots that would

- Improve confidence of teachers to run project work in curriculum time
- Disseminate ideas and best practice
- Be based in evidence

Timeline

Sept 2019 - July 2020
Pilot programme with 10 schools conducted by consultants Apogee Education Learning & Development [AELD].

April 2021
Guidance pack published informed by pilot programme.

April - Sept 2021
Promoted pack with PR and communications campaign, and inhouse BSA promotion.

April 2021 - ongoing
Advocacy work to raise awareness of the approach and the resource.

June 2022
Evaluation
- Survey: 93 responses
- Qualitative interviews:
  - 13 school staff,
  - consultant from AELD,
  - member of BSA staff.

Pilot findings:

- Improved student motivation (and teacher satisfaction)
- A wider view of the scientific methods, leading to less ‘cookbook’ practical work and a more realistic impression of how scientists work
- Increased independence and resilience
- Sometimes initial delivery time was increased, but student retention of knowledge and skills was higher- didn’t need to revisit as much
- Teachers extended investigations beyond an individual lesson to effectively sequence and retrieve procedural knowledge
- Greater equity of access to project work for all students- not just those who stayed for after school clubs
- Reduced the number of hours outside the curriculum for teachers and technicians

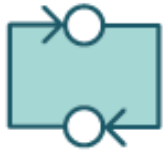
“Using the CREST Award helped the students link lots of different skills and content together through a context rather than standalone lessons. It
took approximately two more lessons than my normal route through this topic but students’ understanding and skills improved more.”
Sarah, STEM coordinator

The guidance pack

TOP TIPS

for successful implementation

Choose an open-ended investigative project which is closely linked to your current curriculum. Tweak or expand what you already do.



Have a planned teaching route through the project, with any links to examination board specific criteria, e.g. CPAC, PAG, BTEC.

Consider the procedural and content knowledge students require before they start planning in order to be successful.

Plan to use homework and student independent study as part of the project time, e.g. research and report writing.

Encourage students to write up as they go along, rather than write a full report at the end of the project.

Encourage the students to use the workbook (Bronze) and student guides (Silver and Gold). This will help to structure the writing and ensure the criteria are considered.

Do not underestimate the guidance students need in writing up their projects, particularly at KS3.

Take it slowly – try it with one class and work through any teething problems.

Encourage preliminary work to enable students to adapt their method and let them run with their ideas first before stepping in (provided they are safe).

Make use of the CREST criteria from the beginning; 11 out of the 15 criteria need to be met to achieve the Award.

Make local contacts with universities, workplaces and STEM ambassadors to help act as mentors, particularly for Gold Award projects.

Familiarise yourself with the assessment criteria during the planning stage, particularly 'implications for the wider world'.

Celebrate achievement with a CREST certificate

- Celebrate students' achievements
- Boost their confidence
- Raise their aspirations
- Raise the profile of STEM in school
- Involve parents and carers

Next steps

- Download the guidance pack on building CREST into the curriculum
- Check out CREST Awards Resource Library for free resources
- Sign up for the Engage conference talk, 'Get funded! Explore STEM grant opportunities for schools' Thursday, 12 June
- Apply for an Engage grant

https://www.crestawards.org/engage

- Look out for our new website launching in the Autumn term!

THANK YOU
Any questions?

crest@britishscienceassociation.org

BRITISH SCIENCE ASSOCIATION

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