Engage Teacher Conference

The power of project work in the curriculum

Join this session for guidance, ideas and resources that will help you deliver the curriculum in ways that boost student motivation and attainment, whilst potentially saving you time in the long run.

Maria Rossini,
Head of Education, 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

Powerful Projects: Deliver the curriculum with added benefits for you and your students

Maria Rossini

British Science Association

Session Aims

- 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
- To start the planning process

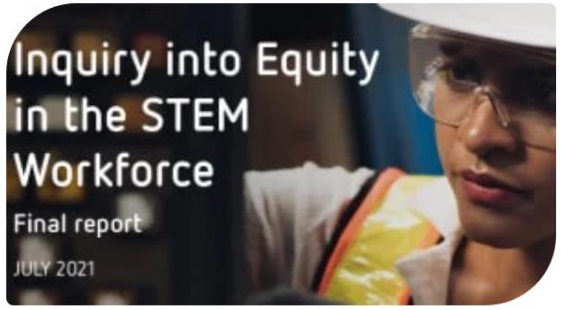
What about you? What are your aims for this session?

How confident are you facilitating project work?

On a scale of 1-10 (1 being least confident, 10 being most confident)

Introduction to the British Science Association (BSA)

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

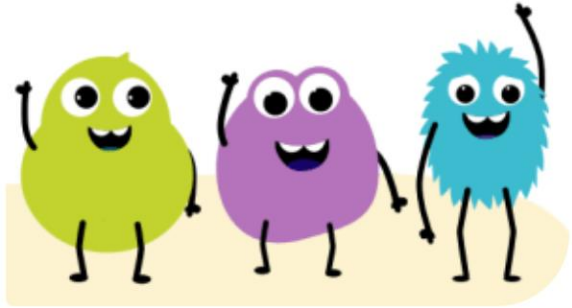


All-Party Parliamentary Group on Diversity and Inclusion in STEM

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.

— 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 5- 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

Engage

A community of teachers in schools in challenging circumstances who share ideas, access inspiring resources and apply for grants to help bring science, technology, engineering and maths (STEM) to life for all young people.

- **Network**
- **Grants to cover CREST fees plus up to £300 for resources (open now!)**
- **CPD (annual free conference)**
- **Priority offers (eg free kit boxes this year)**

Powerful projects: 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?*

Remember back- how confident were you facilitating project work? Does the score change with an after school club vs curriculum classes?

What best affects that confidence? – chat & feedback?

An overview of our research

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

Timeline

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.

The Pilots (2019-2020)

We worked with Apogee learning to support 10 UK schools to run investigative projects in curriculum time.

The projects included in the scope of the pilots were:

Open-ended – an investigation for which there is no predetermined outcome (Gatsby, 2017). In this pilot, as in the work carried out by Dunlop et al. (2019), projects "that are open in at least one of the six dimensions, problem/question, theory/background, procedures/design, analysis of results, communication of results and conclusions, identified by Buck,Bretz and Towns (2008), are considered open-ended."

Extended – spread across one or more weeks (Gatsby, 2017).

Investigative – tasks in which students design an experiment to test a given question, carry it out and interpret the results,

all within a fixed time period (Gatsby, 2017).

Within the curriculum – taking place during science lessons, student non-contact time and work experience, without

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

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.”

The guidance pack

crestawards.org

Impact

Benefits

There was evidence of benefits which support AELD's findings of May 2021, and other areas of note.

Benefits for students

- Improving **motivation** by making science more **relevant** and **fun**, generating **pride.**
- Developing **independence** and **resilience.**
- Developing **communication skills** and building **relationships** with other students and with staff.
- Providing a more **realistic impression** of how scientists work.
- Knowing that there is **not necessarily a correct outcome** to practical work.
- **Extending investigations** beyond an individual lesson in order to effectively sequence and retrieve procedural knowledge.
- **Valuing practical work** as a learning experience in itself.

Benefits for staff

- Having **motivated** students.
- Developing **positive relationships** with pupils.
- Potential to **reduce extra working hours** happening outside of curriculum time.

*It opened their eyes that **a science project can be fun.***

*We really noticed a shift, because they could **see what the point of chemistry was** when they started to apply it. You get those **light bulb moments** where you connect those bits of abstract theory, to something they can practically see and it makes sense.*

*The troubleshooting and the thinking 'why is not working?'. They were the moments when I thought, actually **this is really, really worth it.***

*It gives me **time to talk to students individually**, to find out more about them and **what drives them.***

Impact

Current use

Over the four project years (from 2018-2019 to 2020-2021)

The **number of CREST grant applications** for projects happening in the curriculum increased. ↑

The **proportion of all CREST projects** happening in the curriculum rose from **44% to 62%** ↑

The **proportion of Bronze Awards** happening in curriculum time, rose from **52% to 70%** ↑

The approach is being used to:

- extend practical based assessments,
- scaffold open-ended student projects.

There were examples of **creative cross-curricular projects**, connecting STEM subjects and beyond.

*The **earlier we can really engage** them with science the better. Definitely, **contextualising** the science and doing it as a project in the lessons is going to help, so we are trying to **embed it more as a routine.***

Key Stage 3 - the **most popular time** for this approach - less exam pressure, more flexibility.

Key Stage 4 want / need to focus on exam content.

At Key Stage 5 there is more time available again.

Helps **engage and motivate** KS3 pupils - could support future engagement with science / CREST.

Good fit with **BTEC Level 3.** Some success overlapping with **Extended Project Qualifications.**

Future use

56% of respondents said they were **likely to deliver** CREST in the curriculum in the future.

30% of respondents said they were now **more likely than before to deliver** CREST in the curriculum in the future.

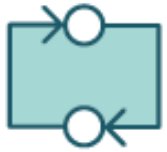
Future work is most likely to be with 11-14 year olds, with some plans for KS5.

Schools are building the approach in to their planning for the year ahead. Staff shared examples of ways in which they were **making space in curriculum time** for this to happen.

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'.

Powerful questions

What are young people in your classes interested in?

In pairs- Make a list of everything your young people are interested in – whats relevant to their lives right now?

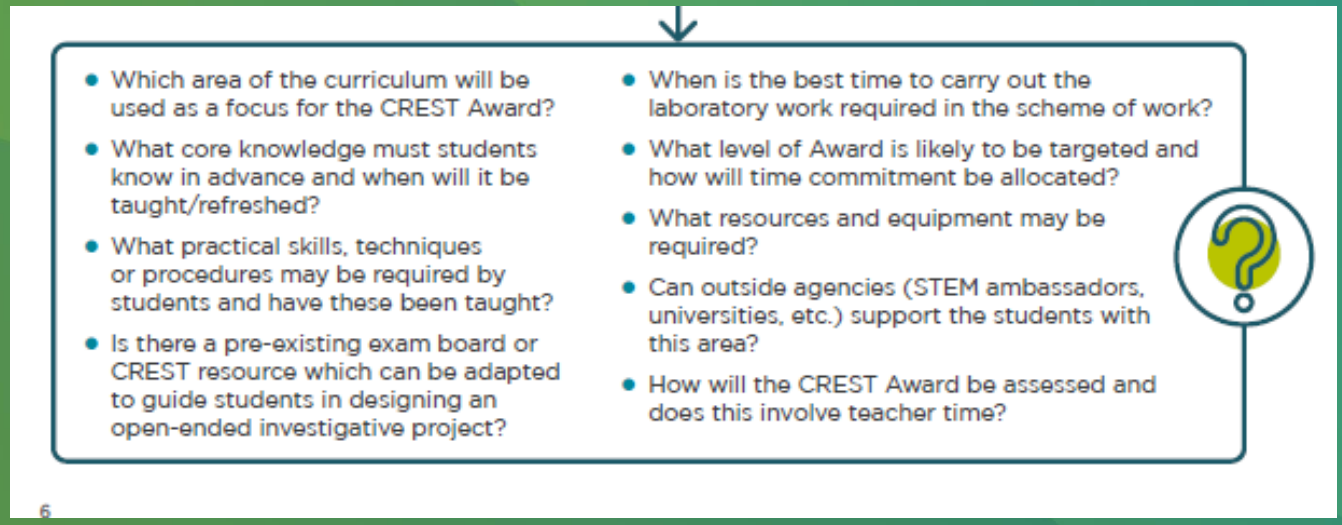
Content

Make your own powerful questions

1. Pick a year group you think would benefit from more project work
2. Note down a curriculum topic you are due to be teaching them later this year
3. List as much of the curriculum content as you can
4. Now- draw lines between the curriculum content and your ‘hook’ list
5. Do any potential questions emerge? Any angles you hadn’t thought of? Could any be extended into a project?

Task- taking it further

1. Share with person/people next to you.
2. Pool ideas: You might develop the powerful question, or share any existing project resources around those curriculum areas? Look for existing CREST resources.
3. Be ready to share 1 powerful project idea: which year group? What content? What's the question? Maybe cover some of the below:



- Which area of the curriculum will be used as a focus for the CREST Award?
- What core knowledge must students know in advance and when will it be taught/refreshed?
- What practical skills, techniques or procedures may be required by students and have these been taught?
- Is there a pre-existing exam board or CREST resource which can be adapted to guide students in designing an open-ended investigative project?
- When is the best time to carry out the laboratory work required in the scheme of work?
- What level of Award is likely to be targeted and how will time commitment be allocated?
- What resources and equipment may be required?
- Can outside agencies (STEM ambassadors, universities, etc.) support the students with this area?
- How will the CREST Award be assessed and does this involve teacher time?

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Next steps

Download the guidance pack

Check out www.crestawards.org for resource ideas

You may be eligible for an ‘Engage’ grant to help purchase kit for your CREST projects, and to cover the Award fee costs. Go to www.crestawards.org/engage to find out more

THANK YOU
Any questions?

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Engage Teacher Conference

Thank you

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