Hi, my name is Alis and I'm hear from Birmingham City University to talk to you about STEAM education. You might be more familiar with the acronym STEM which has been used to promote the subjects of Science, Technology, Engineering and Maths. STEAM takes those subjects and includes the arts to form a more holistic ideology. At BCU we have a investment in STEAM and really believe in it.

I'm going to be really honest with you here, until fairly recently I didn't know much about STEAM (I'm fairly new to BCU). But I've come to find that it aligns perfectly with my teaching philosophy and how I aim to teach my students. I teach on the Art and Design BA, a really interdisciplinary course that aims to give students a whole host of skills and tools to approach creative problem solving.
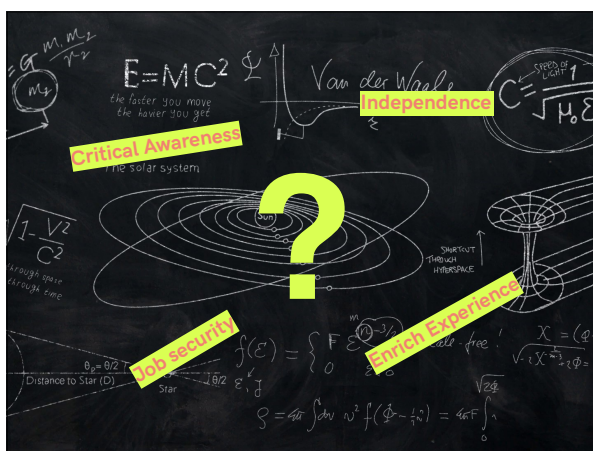
I know that the acronym of STEAM can be a real turn-off. And that things like this can seem like a trendy fad full of buzzwords that won't have real longevity. But I want to show you why I genuinely think the principles behind some of the fluff is really important. And to do that I'm going to take you back a bit.

This process got me thinking about what we aim to do as teachers. Why do we teach students the stuff we do in the way we do it?

Is it to make them independent? To make them critical of the world they live in or to enrich their experience of it? Is it, most immediately, to help them find employment? Are and should all those things be the same?

In short I try and prepare my students for the world of today.
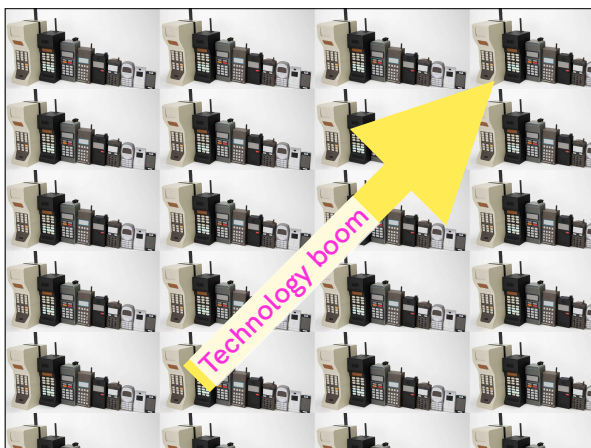
We live in interesting times. The job market has changed beyond recognition in the last 30 years. Be that through the meteoric rise of the internet, our shift to a knowledge economy or because more people study at degree level.
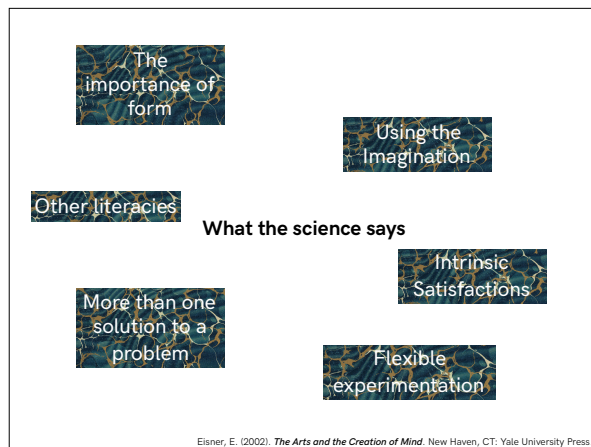
That's coupled with our resources being under ever increasing strain.

And that's just the problems of today. A harder question is how do we prepare our students for the world of tomorrow?

Tomorrows leaders will have to respond to a rapidly changing world. They will have to adapt to new technologies and find opportunities to advance them. They will have to understand how people form communities in a digital age, they will have to consider the ethical implications of societal changes. They will be challenged with global warming, migration and the cost of renewing infrastructure.

They will be shape-shifters, able to use every tool at their disposal to innovate and invent. They will be polymaths, driven by their curiosity and undeterred by the borders of subjects.

And at its heart, that is what STEAM is. Its about problem solving using every tool at your disposal.

STEAM is about problem solving. It is designed to help our children think across boundaries. To work in a natural and fluid way, perceiving the flaws in the systems around them and solving those problems without noticing which tool, skill or subject they are using to do so. Working in other words across disciplines.

Now I realise I may have just justified the STEM subjects in STEAM. Its easy to imagine that the world of tomorrow being built on science and technology, so why include the arts in this? For me its not just a vanity addition. I know you at Hillstone already excel in the arts, so I know I'm most likely preaching to the choir here but the inclusion of the arts has been proven to enrich the other subjects.

What the science says

The importance of form

Using the Imagination

Other literacies

Intrinsic Satisfactions

More than one solution to a problem

Flexible experimentation

Eisner, E. (2002). *The Arts and the Creation of Mind*. New Haven, CT: Yale University Press.

This is what the research says. The arts can teach our students that:

There can be more than one solution to a problem
All to often, we pose questions to our students that only have one answer. In reality, responses to problems are nuanced and variable depending on factors like, financial constraints, political implications, ethical considerations and retail viability. Of course there are times where cultural conventions need to be learned, such as spelling words but there is real value in varied solutions that are formed from careful consideration of multiple viewpoints.
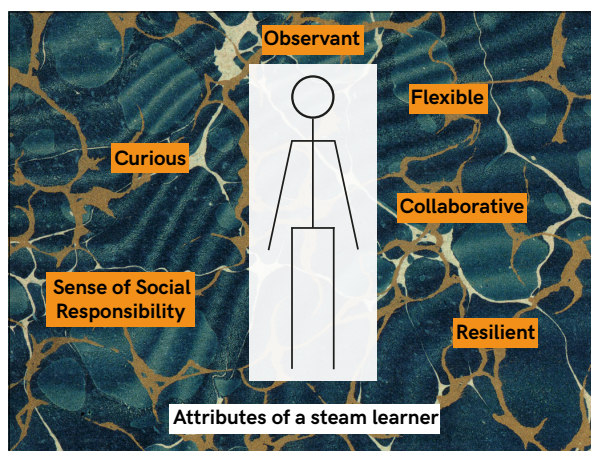
The importance of form
We tend to think of form and content as separate entities. However, the meaning behind the content is often shaped by the way it is delivered, its form. This intertwined relationship is at the heart of artistic pursuits but could provide academic subjects an awareness of how ideas are shaped and shared.

Using the imagination
This is an obvious one but bridging the gap between ideas, interpretations and subjects, requires ingenuity and agility of perception. An imagination also enables empathy, allowing students to embody anothers position in order to recognise problems in realities other than their own.

Intrinsic satisfactions
The arts encourages enjoyment of the process of learning. Rather than learning to pass exams or achieve benchmarks, the arts can teach our students to

Observant

Flexible

Curious

Collaborative

Sense of Social Responsibility

Resilient

Attributes of a steam learner

This translates to these attributes that STEAM aims for.

Now a lot o you already do much of this. I was completely blown away when I visited Hillstone a few months ago. I was particularly taken by your topic approach to learning. I think this is a great way to unite all the subjects and help rationalise why the students learn what they are.
I have a suggestion for a small change to this that would align it to a STEAM process for learning.

Frame all learning around the solving of a problem

That you frame all learning around the solving of a problem. This too directs all the teaching under one topic but it crucially gives the students the opportunity to do something with that they've learnt. To contribute to the solving of a tangible problem.
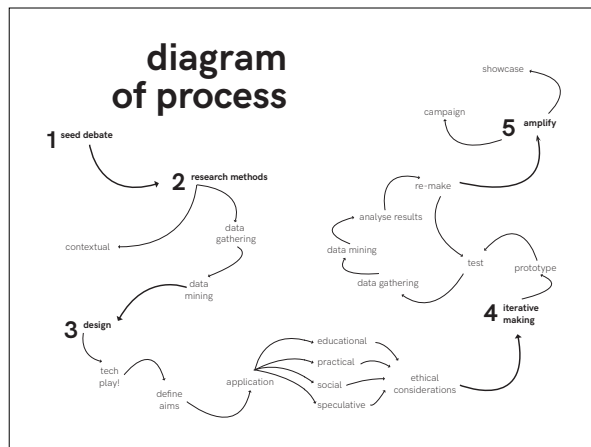
1. Perceive the problem

2. Research the problem

3. Designing a solution

4. Creating a solution

5. Presenting the project

I propose this happen in 5 steps:
1. Help the student to perceive the problem. Find out what the students already know and collectively pool a classes knowledge. This helps build critical thinking skills that bridge disparate information or different perspectives with pieces of information.
2. Researching the problem - This is where a lot of content driven subjects would centre their learning around the problem topic. Learning from enriched and academic perspectives alongside seeking out information for themselves.
3 & 4. Designing and creating a solution to the problem
5. Presenting the project. Also something you already do, but I think this ethos of showcasing a students work is so important to their engagement in the making of it.

diagram of process

1 seed debate
2 research methods
contextual
data gathering
data mining
3 design
tech play!
define aims
application
educational
practical
social
speculative
ethical considerations
data gathering
data mining
analyse results
re-make
test
prototype
4 iterative making
showcase
campaign
5 amplify

This is a squiggly version of what I've just said with slightly more detail.

contents

This suggested process and the research behind it is available in more depth in this manual.
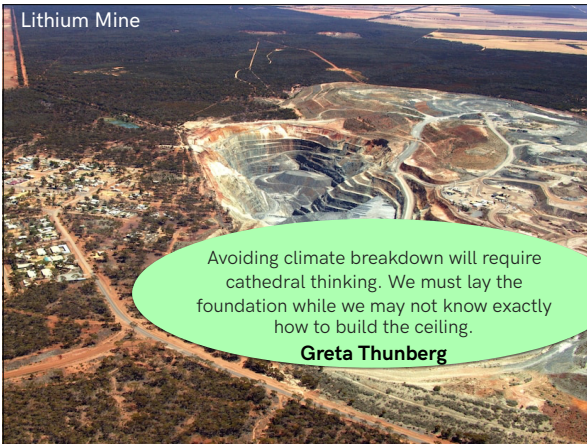
You've been very generous to lend us your Yr 5 group for a STEAM enriched project around the subject of

Climate change! Now this not only ties in well with their pre-existing topic 'power to the people' but is also important in its own right.

Lithium Mine

Avoiding climate breakdown will require cathedral thinking. We must lay the foundation while we may not know exactly how to build the ceiling.
Greta Thunberg

Not only is it an extremely pressing issue but it has also seen a surge of interest from young people. It has turned into a youth led movement. Greta Thunberg sums up the STEAM philosophy here well I think:

Now to grow our ambition for the project and for the student's ideas, we've teamed up with Little Inventors to help lead us in the climate change challenge. Little inventors have a wealth of experience realising young peoples inventions. I'm going to introduce you now to Chelsea who will explain a little more about who they are and the challenge we are going to set.

STEAM challenge in 30 Minutes

Each given a secret brief in an envelope.
teams of 4 complete and then each guess what each others challenge was

Span a large distance - floor to ceiling, wall to wall
change of viewpoint - create something that will alter the way you see the world
Make a chain reaction with at least three elements