

‘STEM-ulated’ Youth Workers

Examples of STEM sessions developed by staff at The Prince's Trust

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Version 1

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*“STEM leads to an enquiring mind...
this training has inspired me.
I'm questioning things, I'm enthused
and I'm desperate to deliver some
sessions myself!”*

The Prince's Trust Youth Worker,
after attending STEM training

*“I don't really like science to be honest,
but I love experiments!”*
Girl aged 11

The Value of STEM

Science, technology, engineering and maths (STEM) are enabling. They enable people to make sense of the world around them, they enable people to make informed decisions, and they enable people to pursue a wealth of exciting and fruitful career opportunities.

Science should be something that young people firstly appreciate and enjoy, and then use to build knowledge and skills that may empower their futures – whether by aiding decision making about health and technology or by acting as the foundation for their training and employment.

We believe that all young people should have the opportunity to enjoy science in a way that is relevant to them.

Yet we recognise that many young people, and especially those from relatively low socioeconomic (disadvantaged) backgrounds, can find STEM subjects challenging and unengaging at school. But there are myriad opportunities to

engage with STEM, and engaging with STEM outside school can support personal and social development, as well as building confidence in these subjects in school.

Traditionally youth workers tend to use sports, the arts and outdoor activities to engage with disadvantaged young people and the youth sector has developed broad expertise in these areas. However, youth workers often lack the confidence to deliver STEM subjects.

We want to empower and enable youth workers to include STEM activities within their programmes, thereby engaging and enthusing these young people with STEM.

This report contains details of a few of the STEM sessions run by The Prince's Trust Fairbridge staff after training from experts in informal science learning. We hope to see increasing numbers of youth workers including STEM activities within their programmes for young people in the future.



Tracing the Tees

Middlesbrough Fairbridge Team

Objectives

- A six day course (including two night residential) to explore the River Tees and gain a better understanding of the state of the environment.
- Participate in rebuilding fishing platforms at Preston Farm Nature Reserve, walk along the lower Tees and visit Bowlees Nature Reserve
- Complete water quality surveys, bug surveys and a bat survey with Tees Valley Wildlife Trust

Throughout the course the group carried out a number of OPAL (Open Air Laboratory) surveys to identify, quantify and highlight environmentally deprived areas. This included carrying out a bat survey and water quality surveys in two parts of the River Tees to identify differences in water quality and the species that live there.

The bug survey tied this all together by assessing how the invertebrate populations were faring in habitats close to the river. The young people carried out their bug surveys in three different habitats and learnt why certain species lived in particular habitats and why some might prefer wetter areas than grassy areas.

The group helped build fishing platforms, which focus anglers on one section of the riverbank, thus reducing disturbance of the whole riverbank. We also discussed the damaging effects of invasive species such as Giant Hogweed and Himalayan Balsam on local nature reserves.

Successes and lessons learned

We found that this was a really engaging project. All of the young people gained the John Muir Award Discovery Level and were given the opportunity to showcase their art work and a short film we produced of the project at a celebration event.

Our surveys showed that the section of the River Tees closer to the source was more species rich than at Preston Farm. We discussed why each part of the river differed, and pollution and industry were the most popular answers. All this helps Tees Valley Wildlife Trust gain a bigger picture of the state of the environment.



Young people on The Prince's Trust Fairbridge programme working alongside staff from Tees Valley Wildlife Trust

Seriously Scientific!

North Manchester Fairbridge Team

Objectives

- To link in with Manchester Science Festival 2015 events and our local Science Centre/Museum
- To engage both age groups in STEM through the use of fun and innovative activities
- To further develop personal/social/life skills already promoted at Fairbridge

To link in with the Festival we planned a full week of STEM related sessions. Under 16's were invited in to solve a murder mystery in the centre, introducing them to the principles of Forensic Science which many of them have watched on TV shows like CSI.

Over 16's were invited in for a Halloween-themed session about Zombies, which included a "Zombie Breakout" task, similar to the many "Escape Room" facilities which are appearing across the country and are increasing in popularity. This required them to use maths and problem-solving amongst other skills to avoid being "infected" by our zombies, to find items required for a Zombie Apocalypse Survival Kit, and to escape the building in an allocated time frame.

Both age groups also had a day out at the Manchester Museum of Science and Industry which had a range of special events and activities running throughout the week.

Successes and lessons learned

The sessions were well received with both age groups fully engaged and enjoying their visits to the museum where they could try various hands-on activities which always works well with our young people. We hope to plan more visits to MOSI and other local museums on our programme soon.

Following this week, the "non-classroom/school" and fun approach to delivering STEM content is something which we will continue to use as this appears to be a medium through which we can better engage the types of young people referred to our programme yet still promote STEM topics, skills and careers.



Under 16's investigating fingerprints as part of their introduction to Forensic Science.

ARUP Engineering Challenge

Liverpool Fairbridge Team

Objectives

- Explore aspects of STEM relating to structural engineering
- Plan and communicate ideas to peers
- Review lessons learned and identify links with life situations

The young people were introduced to ARUP services before enjoying a presentation from an ARUP engineer exploring the role of engineering within building. This was followed by a discussion where they could explore the topic further before using their learning to attempt the tower challenge.

The goal was to create a tower built from spaghetti and marshmallows. To make a successful tower, the young people needed to explore the weaknesses and strengths of different shapes as well as the varying properties of the different building materials. The engineers were on hand to discuss the importance of foundations and the impact of the different weights and strengths of the materials on the tower.

Afterwards the young people were able to review the activity and discuss whether they had followed their initial design ideas or adapted the plan as they went along and learnt more about the materials.

Successes and lessons learned

The session was a success and all the young people enjoyed the practical aspects of the task. It was also interesting for them to hear the career paths of the different engineers. However we might restrict the number of personal stories next time in favour of more time explaining current routes into engineering.

Having the engineers present challenged the young people to think more deeply about aspects like the foundations, which they hadn't fully considered. ARUP also offered a two week placement for any suitable and interested young people in the future.



Young people from Fairbridge building their spaghetti and marshmallow tower

(Un)natural Disasters

Kennington Fairbridge Team

Objectives

- Individual research & mini-presentation
- Group discussion – consider human impacts & interventions
- Hands-on Science – simulate a natural disaster in pairs

Staff talked about earthquakes as an example of a natural disaster including where they are common, recent examples e.g. Nepal, Japan, whether anyone in group had experienced a real one or the earthquake simulator at Natural History Museum. Introduced relationship between natural disasters & humans – we cannot prevent natural disasters but can plan & prepare for them (risk mitigation).

Each young person named a natural disaster then researched their natural disaster on tablets and made notes – what, how/why/when, effects, example, planning/mitigation & video clip.

Young people informally presented their natural disaster to group, followed by questions and group discussion about the human impacts and interventions relating to natural disasters. They created unnatural volcano, oil spill & tsunami in pairs, then showcased their experiment to group.

Successes and lessons learned

From the start, the group were very open to discussion so we set them the task of each researching a natural disaster. We helped the young people make notes and asked if they felt comfortable talking through their natural disaster & video clip to the group. We were impressed that each young person managed to give a mini-presentation.

In pairs the young people simulated a natural disaster, independently following instructions & experimenting. We provided the young people with materials that we had found around the centre using other STEM activity resources e.g. film canisters. This worked well apart from our attempt at recycled homemade tsunami gravel – we will buy fish tank gravel next time.



Young people from Fairbridge demonstrating their unnatural volcano

Money Matters And So Does My Health

Salford Fairbridge Team

Objectives

- To prepare and cook a tasty meal that doesn't have lots of expensive ingredients and using foods that young people may not have tried before.
- To understand that parents don't have never ending pockets of money and the reality of bills
- For the group to realise why we don't allow energy drinks at the centre and the effects it has on the body.

The session incorporated a number of activities that could be delivered as stand-alone sessions or as part of a full day. The first practical session was around young people beginning to understand the amount of money their parents had to pay in bills and how much they may have left to pay for other things.

We then moved onto making lunch where the group were able to prepare pasta carbonara and see how they can make a healthy and tasty meal without spending a lot of money.

The final part of the session gave the young people an opportunity to physically see how much sugar is in the energy and fizzy drinks that they love and why we don't encourage it as a breakfast choice!

Successes and lessons learned

This was a really good session enabling young people to make a lot of realisations through practical and fun activities. They remained engaged and interested throughout encouraging staff to deliver this type of session more often.

The group learnt about where money goes and were challenged to think about the amount of money they expect from parents. The activity around sugar in drinks was a really visual way of challenging perceptions and making the group think about what's happening to their body.

C - "I learnt how much sugar is in different drinks"

E - "I learnt what council tax is actually used for"



Young people on Fairbridge discussing priorities

Wacky Races

Newcastle Fairbridge Team

Objectives

- Engineering: Young people work together to come up with a working track, including bridges and tunnels, discussing angles of bridges, why some work better than others. Also discussing how tunnels work and support needed.
- Science: Explore which surfaces the cars work best on and why they work better on different surfaces. Different surfaces will be needed to give cars enough speed to complete bits of the track.
- Maths: Group calculate average lap times

The main objective of the day is to build a massive racetrack fit for remote control cars around the centre using a wide variety of random resources. Put the group into pairs and depending on size of the group, split the track into sections, putting down sellotape as a square to mark the start/end of sections and assign each section to a pair, explain that the sections will all interlink and create a much bigger racetrack.

Each pair was asked to include at least 1 tunnel and at least 1 bridge but you can vary what you want built. I let the young people use remote control cars to test bits of their track to ensure it works. I gave the young people around 45 minutes to build the track. Once the track is built, pairs take it in turns to race around the track, using both times to get an average team score.

Successes and lessons learned

The session was a big success as the young people were engaged throughout and had a lot of fun. If the session was repeated, I would pre-print pictures of bridges/tunnels and discuss how they work. Allowing the group to get stuck in enabled staff to wander round initiating discussions on why certain things may or may not work.

Parts of the track were too complex so slowed the lap times. Next time I would ask the groups to test their part of the track more thoroughly.

It was great to review the day and highlight all the STEM attributes they had used.



The wacky races track developed by the young people

D.I.Y. Medieval Trebuchet

Dundee Fairbridge Team

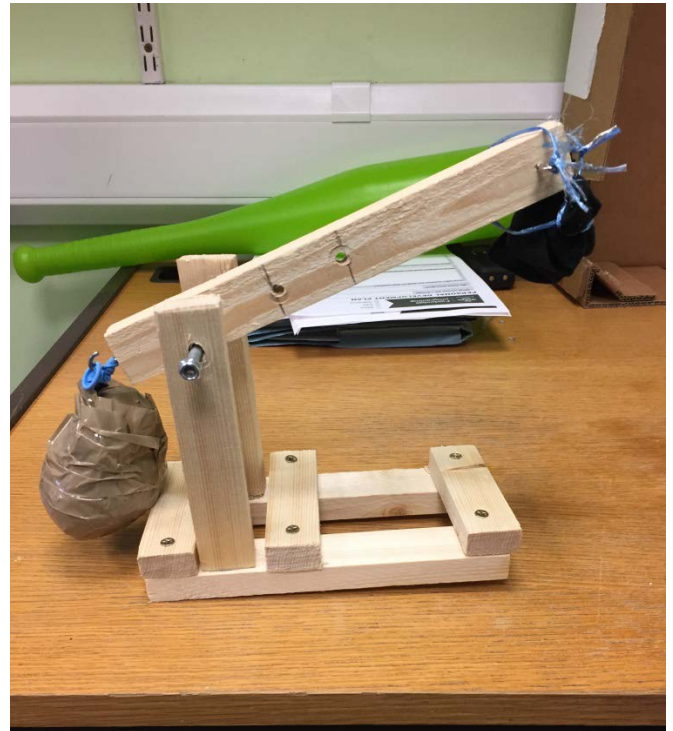
Objectives

- A 1 day course providing under 16's a chance to construct their own trebuchet and to learn about the history of and science behind building trebuchets.

The young people were given all of the materials they needed and a list of instructions on how to make their trebuchet. However they had to use their maths skills to measure and cut their lengths of wood and use elements of physics to figure out how heavy to make the counterweight to fire the projectile (water balloons).

Successes and lessons learned

On the whole the activity was well received and the young people engaged well. The STEM element worked well and the young people really got in to trying to figure out how to make the counterweights more effective. In the end we only had maybe two trebuchets that actually worked, and we had to change the projectile that we were firing (originally water balloons, but then changed to a sponge ball) due to time constraints. We would definitely run the session again.



A trebuchet constructed by the young people on Fairbridge

Stop Motion Animation

Belfast Fairbridge Team

Objectives

- Build confidence when using technology e.g. cameras and animation software
- Practise following instructions and asking appropriate questions in order to complete a task
- Explore their own creativity to tell a story or express an idea

Young people were given the opportunity to create their own short, stop motion animation videos. Working in small groups or on their own they spent time looking at different techniques and styles of animation before deciding on their preferred technique. Those less confident in their artistic ability were able to use Lego characters or toy figures and create a backdrop that suited their story line. Others used time lapse technology to capture their art work progressing or drew their own in a flip book style.

The young people captured their work using DSLR cameras and *Istopmotion* or *Claymation* software. They edited their work, changing the number of frames per second to speed up or slow down their work and remove unwanted frames. Some participants downloaded their own Claymation app to their smart phones and used this, enabling them to keep their own animations and use it again in the future.

Success and lessons learned

Everyone completed a short animation by the end of the session. However there was no time to add sound to the shorts. This would have added an extra creative and technical challenge to the session and improved the final piece.

I would like to run the session as a two day course to allow the young people more time to explore ideas, change their techniques if they wanted to and allow time to add sound to the final pieces. The course could potentially link to the presentation skills unit of the P.D.E. Qualification if young people showcased their creations at the end of the course.



Young people developing their animation

Next Steps – Get Involved!

“The Wellcome-funded STEM training has had a significant impact on our staff, enhancing not only the Fairbridge programme, but supporting Trust-wide understanding of the relevance and importance of STEM skills and opportunities for our young people.”

Martina Milburn, Chief Executive of The Prince’s Trust

You can read more about our support for the youth sector, in our report ‘STEM-ulating’ Youth Workers¹ Please get in touch if you are interested in collaborating as we are currently exploring potential partnerships and want to meet new organisations working in this area.

We are offering more training for youth workers, facilitating cross-sector relationships and ensuring sufficient support and resources are available for new projects.

For more information or to discuss a potential collaboration please contact:

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The Prince’s Trust staff member explaining their ‘Seriously Scientific!’ STEM collaboration with the Manchester Science Fair and the Museum of Science and Industry.

¹ The Wellcome Trust, February 2016, ‘STEM-ulating’ Youth Workers bit.ly/1PNdMwA

