

## **Digital makerspaces provide a creative place for young people to develop STEM curiosity.**

With funding from the Young Stem Leaders Programme, two pilot makerspaces projects were set up with the projects being run by the local groups and the impact of the projects evaluated by YouthLink Scotland.

The youth groups that took part were The Citadel in Leith, Edinburgh and Universal Connections in Douglas, South Lanarkshire.

The primary purpose of the project was to promote the relevance of YSLP to the youth work sector.

In each location a small group of young people worked with a youth worker to develop a makerspace. Each group had £1k to invest in the project, however they chose.

YouthLink Scotland set up an evaluation of the project and the findings are gathered here.

Overall the project showed:

- The relevance of digital makerspaces for the youth work sector.
- The relevance of the Young STEM Leaders Programme as a programme to use in an informal learning setting (while noting the need to develop training for youth workers and a less formal approach that suits the youth work setting).
- The value of a youth work approach in creating a space where young people can develop an interest in STEM.
- How youth-led approaches to creativity stimulate innovation and different approaches.

### **True Creativity – Ben’s story**

It was fun learning new things when we worked together on the Young Stem Leader project. I enjoyed doing the experiment activities. It opened my mind up to new things around science.

Our youth worker helped us learn too. It always felt like our work together had a structure and he was really patient and good at explaining things. Sometimes stuff went wrong, but we got a better understanding by trying things out. And when we worked with the younger ones we helped them do that too. I saw how being leaders brought out our capabilities.

We decided on an idea to make an Arcade cabinet. I enjoyed working together as a team to agree on the design – we had to use our brains and imagination to come up with ideas. I learned I’m not as stupid as I thought! And I saw that when we put our minds together we can be truly creative.



## About the makerspace projects

### Getting started

Both groups chose to use Innobox, a method developed by Verke in Finland to help young people use design thinking in their planning. This approach provided a framework for the young people to explore creative ideas and decide on the approach they wanted to take.

### The Citadel Project

The young people chose to renovate a space at the centre to turn an art room into a makerspace.

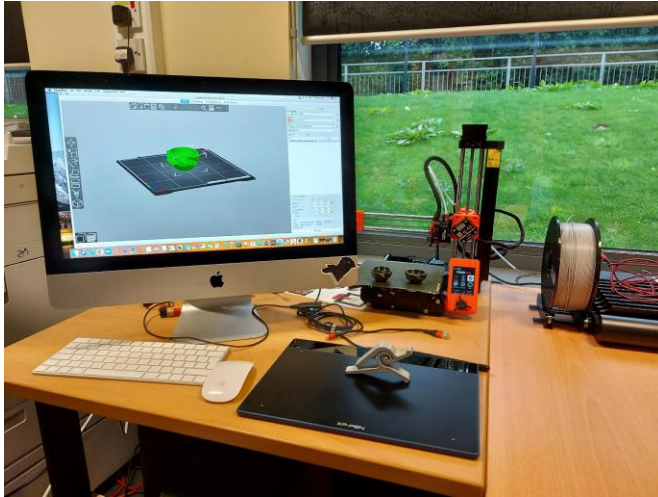


Watch the video to find out more

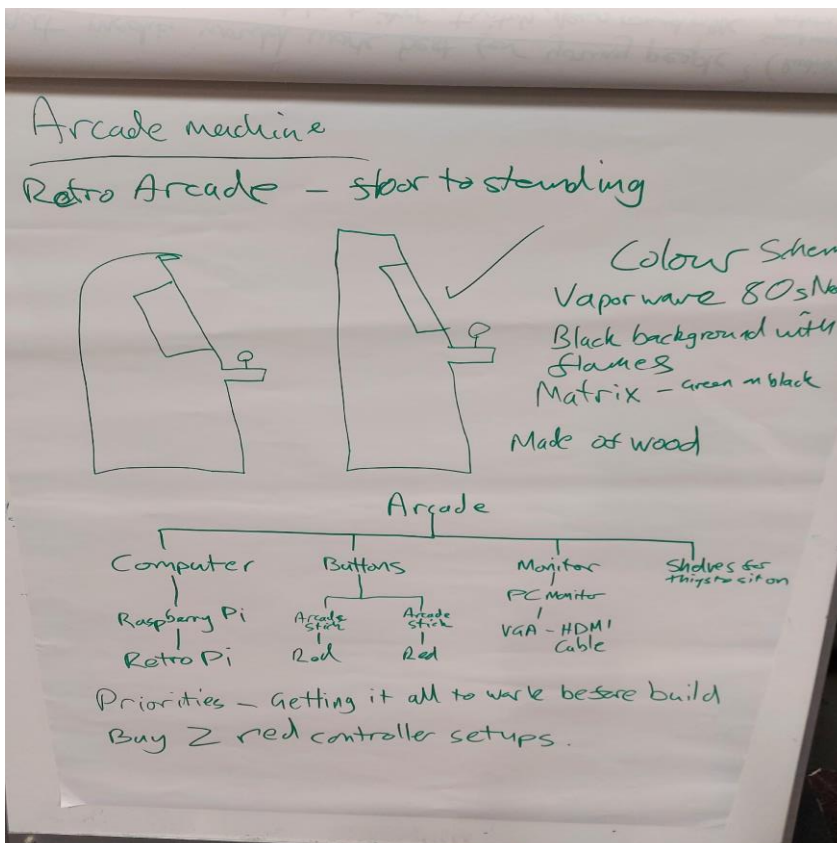
[Case Study: Citadel Youth Centre](#)

## The Universal Connections Project, Douglas

The group created a makerspace in the corner of a room, complete with a 3D printer.



Working together they designed and built a games arcade, using the new resources.





## Fresh Insight – Steven’s story

This experience has changed my perception of what STEM is. Before, I just thought of it as ‘school science’ but as I got into it, it opened my eyes to the practical nature of the STEM stuff – and having our own makerspace has meant we’ve been able to keep expanding our knowledge and confidence about what’s possible. I see STEM everywhere now – I’m always thinking about how we can integrate it into our work. I want to get other youth workers engaged too.

I’m pretty new to running STEM activities with young people – it was outside my ballpark of experience with young people - so things like the 3D printing, I was learning alongside the young people. I really enjoyed that, but my learning here wasn’t just in the delivery of new activities. To meet the requirements of the Young Stem Leader Award, I also became more disciplined about setting aside regular time with the young people to help them articulate the skills they were developing and consider what they were learning about themselves – and each other. I think, as youth workers, we sometimes we get caught up in the practical tasks with young people. This experience reminded me of the value of reflective space and time to make sense of what we are learning.

## Young People's Perspectives

### Participant information

- 10 young people took part in the process – 5 in each location
- Age range 11-16. Citadel group was girls only.
- Each makerspace had a different focus, responding to the different interests of the young people. Citadel group focused on creative arts. Universal Connections group chose to build an arcade cabinet.
- Based on baseline questionnaires, completed by all participants, it's clear that all those who took part had an existing interest in STEM.
- However, at the beginning of the projects, fewer than 50% of those who joined the groups said that they would feel confident to lead STEM activities

### Summary of feedback

Young people's motivation for joining the group:

- Friends were doing it
- Wanted to learn new skills
- Gaining an award would be good addition to CV
- *"The general spirit of the idea"*

What young people said they learned and how:

- *"Opened my mind up to new things around science"*
- Team work skills – more awareness of impact on others in a team – for example giving and receiving feedback - and then working to put things right
- Creative skills – thinking up new ideas and new ways of doing things using Innobox and *"we had to use our brains and imagination to come up with designs"*
- Making mistakes and learning from them – e.g. *building a boat session. We learned how the mechanics worked first time and made it better*
- Supporting and encouraging others, especially when leading activities with younger groups
- Building ideas with others – when leading activities with the younger groups

- *“Getting better at having the courage to express ourselves better”*

How the youth work approach helped:

- *“Working with other people helps me make progress”*
- *“[Our youth worker] explained things well so we knew what we were doing. He was very patient and helped us get the equipment we needed quickly”*
- *“I actually loved the group. Making friends was a big part of it”*

Thoughts on the award:

- *“The award was educational”*
- *“The award is good for your CV”*
- *“For the award writing they should make the boxes bigger. There were too many words too that we didn’t understand”*
- *“They should make it that you have a clearer box for adding pictures. Photos would show progress just as much as writing”*

Hopes for the future

- More opportunities to take part in STEM projects
- *“I want to learn more about engineering”*

## Youth Workers' Perspectives

### Summary Reflections

- Both youth work organisations had a recent track record of offering STEM related activities to young people. This helped them to feel confident that they were equipped to deliver this programme, and, perhaps more importantly, that they had an established group of young people who they knew were likely to engage in the process. All reflected that more needs to be done to engage youth workers who might see STEM as being beyond their technical expertise.
- Whilst young people in both groups enjoyed many of the same creative and team-building activities to build their understanding of STEM and generate ideas, each group took the makerspace in a different direction. This was a natural consequence of youth workers using their skills to find what interested their group of young , and build ideas from there.
- All of the youth workers valued the opportunity to offer Young Stem Leaders Awards, but felt that the training, the materials for young people and the outputs required of young people and youth workers in administering the award needed adapting to suit youth work settings and learning styles.
- All of the youth workers felt that funding for / access to equipment, materials and people to support their activity enhanced the experiences they could offer young people.

### Summary Reflections on Learning

- All of the youth workers said that the process had opened their eyes to the breadth and variety of STEM – and the potential to offer activities that are hands-on, creative, engaging and non-directive.
- All of the youth workers noticed how young people grew in confidence through the experience – both in terms of their understanding of STEM and in their relationships, group-work skills and ability to share and build ideas with others.
- All of the youth workers said they felt they had themselves grown in confidence as practitioners as a result of experience. In particular they felt less daunted by STEM as an area of technical expertise and more confident in their skills as youth workers to offer engaging learning experiences. Interestingly, they reflected that the fact that they were learning alongside young people was an important part of the engagement and relationship building.
- All of the youth workers reflected on the importance of building confidence across the team to underpin the 'legacy' of the experience and ensure young people continue to build their skills and introduce the makerspace equipment to new cohorts. This creates



additional opportunities for collaboration and leadership for young people as well as for staff.

## **Recognising our skills as youth workers – Emma’s story**

I’m not a tech expert. I was a bit worried about that when I started on this that it was beyond my training somehow – STEM felt like some completely different thing. Then it clicked that the girls had a clear interest in art, and I realised that we could develop a makerspace around that. In fact, what worked was a classic youth work approach: start from what interests young people and support them from there. I just needed to trust that.

We had to learn how to use the new equipment in the makerspace with young people. We never made out we were experts – the young people were in it with us. We noticed how that seemed to build the young people’s confidence – and their relationships with us – and with each other.

I see that as youth workers, we sometimes shy away from topics because they seem beyond our technical expertise. We downplay our professional skills, and take for granted our ability to build relationships with young people in a way that supports their learning. I’m not sure why we do that when we know from experience that this approach can make all the difference to young people’s engagement. I think it’s time we owned and really valued those skills. Look at the progress we’ve made over the last 18 months in developing our digital youth work offer. We’re creative and capable educators. We shouldn’t be daunted, just because a topic isn’t comfort zone for us.

As youth workers, we are also in a position to support the development of the young people over time. It has been a privilege to watch the girls we worked with in the summer grow in confidence and now step into leadership roles, helping other young people to get involved in STEM activities and use equipment in our makerspace.

Youth workers might not all be scientific experts, but we bring a range of skills to STEM learning that are really valuable if we’re genuinely trying to make science accessible to all young people.

## **Different from School – Ryan’s story**

We already offer awards as part of our youth work provision, so I'm excited about the Young Stem Leader Award as a great way of recognising young people's achievements. I think the broad themes of the award: Discover, Create, Inspire and Lead are a really helpful guide for reflecting on progress. But, now that I've had this experience, I'd like to help to make the administration of the award, and young people's experience of recording progress more youth work friendly.

For me, this would start with the training for youth workers. If I'm honest, I struggled with this in its current format. It was webinar-based and directed. It felt quite formal and schooly - probably not surprising given schools are the primary audience for the award at the moment! With some adaptations, both to content and to the training approach, I think we could develop a much more engaging youth work training model.

I'd also like to inform a redesign of the materials that are provided to support young people's reflections on their progress in relation to the award. Young people in our group struggled with the current version. There was too much reading and writing. For some, literacy skills were a barrier. I think anything where there is a strong emphasis on reading and writing can cause an element of panic for some young people. But, more than anything, it was the volume of reading, writing and reflection that was involved - for me, as a facilitator, it felt excessive. More importantly, it was a barrier to engagement for the young people - so I think it needs simplified. Maybe we could also offer some different ideas for activities to support the learning conversations, so that it's not all about talking, pen and paper.

By definition, youth workers will offer STEM learning experiences that are different from school. I hope we can develop youth worker training for the award - and the materials we use with young people to help them record their progress - to reflect and value that difference.

## Conclusions about makerspaces

- Makerspaces create a tangible (& manageable?) focus for digital / STEM learning - from which people (young people and youth workers) start to make other connections (you see that in Emma and Stephen's feedback particularly). The makerspace isn't static...it can evolve in line with the developing interests of young people – would be useful to follow these 2 projects up and see where they go over time...
- Youth workers make sure that young people build a space that they are genuinely excited about and want to use (you can see the young people's enthusiasm in their feedback and I guess this is also clear in the very different focus of the 2 projects in this tiny sample? This is the crucial bit around engagement – and it's youth workers skill in genuinely identifying those interests with young people, and building relationships for learning that makes this work.
- The makerspace supports helpful (and sometimes new) kinds of collaboration - between youth workers and young people learning together (all the youth workers talk about this), across the youth work team (because the equipment is in house, staff who lack confidence have opportunities to learn from those who are initially more directly involved - Emma talks about this) - and as young people who develop the space grow in confidence, they take on leadership roles as they share skills and knowledge with other young people (again Emma talks about this). So there's legacy here: confidence and skills can be built over time.
- When there is funding to support the makerspace, young people feel valued and their ideas are immediately validated because they quickly have access to new equipment to realise them – this creates a sense of excitement, momentum, ownership, responsibility. So ongoing investment to keep evolving the makerspace feels important too.

## Reservations

- Despite the youth workers saying they are relatively new to STEM, all had done some STEM related youth work and Ryan and Emma were clear that many youth workers would need support to feel confident to take on the responsibility for developing a makerspace – they talk in the feedback a bit about their own anxieties at the outset, but they were already sold on the importance of this kind of work, so it would be important to think about up-front support for youth workers to help them say 'yes' to the concept and confident to take the idea to young people. And Stephen also talks about the importance of building skills and confidence across the team to use the equipment with young people so that it's not seen as a specialist thing and to ensure that the equipment continues to be used as youth workers and young people move on.