How children make digital projects: Research from Coolest Projects 2018

Oliver Quinlan and Lucia Flóriánová

Raspberry Pi Foundation Research No.7

Raspberry Pi

code club

CoderDojo

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Introduction

Coolest Projects is a world-leading showcase that empowers and inspires the next generation of digital creators, innovators, changemakers and entrepreneurs. Young makers bring their projects to share with others in a 'science fair'–style exhibition. Projects are submitted in categories, and judges select the outstanding projects in each category to win awards. The emphasis is on sharing and learning from others, and getting inspired by the wide range of projects shown. Coolest Projects started in the CoderDojo movement. It is open to any young person across the world with a digital project, through annual national events in the UK and North America, and an international event in Ireland.

At the Coolest Project events in London (UK) and Dublin (International), we interviewed teams to find out about their projects, what they learnt, and their participation in the event. The focus was on the impact of Coolest Projects and the activities around it on the young people.

Nine teams were selected for each event to represent a range of types of project, geographical areas, genders of participants, and group and individual projects. We spoke to the teams for 20–30 minutes, using a structured topic guide for questions, and making notes using this guide immediately afterwards. We explained to participants the nature of our research, and provided them with an information sheet with this information and how to contact us to opt out in case they or their parents were unhappy with taking part or changed their mind.

These interviews have been analysed to identify common and interesting themes, and these have been used to make recommendations for actions that could be taken as we continue to develop these events. This document contains an analysis of these themes, followed by a list of recommendations, and case studies of each of the projects.

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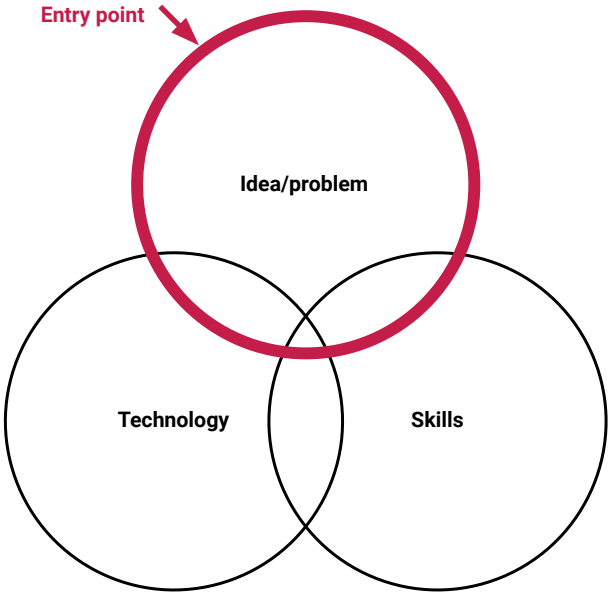
Themes

Project stories: ideas, technology and skills

Children have to balance the relationships between their ideas, the technology available, and their skills, in order to create a successful project.

The stories that children told us showed that there are different directions taken when choosing and developing a project. Some children start with an idea or a problem to be solved, and their project is driven by trying to address this. Others start with the technology they have at their disposal or they want to explore, and then consider the ideas it could be applied to. Still others start by looking at and reflecting on their own skills, and explore how to express these skills in interesting ways.



There is often a complex relationship between the idea or problem, the technology, and the children's skills, which children and their mentors must negotiate. Children who start entirely focused on a problem that interests them have the challenge of understanding what skills they need to address it and acquiring the appropriate technologies to do so. Indeed, most children interviewed said that they improved their skills to realise their project. To do this successfully they need to take account of the level of challenge and realistic skills development within the timeframe of the project. Where children start with a focus on doing something interesting with a given technology, they have to consider what problems this might be applicable to.

Negotiating between the idea or problem, the technology to use, and the skills required is key to a successful project. Different teams have different entry points for their projects, usually focusing mainly on one of these aspects to begin with. To create a finished project they have to find a balance of all three.

Of the teams we interviewed, Linear Equation, Security System, and Zombie Defence System were among those who were initially driven by a particular available technology, and explored possibilities to define an idea for a project. These tended to follow existing examples of what a project could look like, although with their own modifications. Dragon King, Healthy and IOT Project to Track Pets were driven by strong ideas first. In some cases these were very ambitious, and the teams had designed and researched their idea but not yet fully implemented it.

Fewer projects were driven by the primary consideration of skills. This was perhaps the case with some of the simpler Scratch projects, but also one of the most sophisticated projects, Intelligentia. This maker had spent some time developing his skills in facial recognition and machine learning, and decided to deploy them to solve the problem of locating missing persons. He also had other applications of these skills in mind for the future, showing a 'skills first' approach to projects. The team who created Dance Magic also showed a sophisticated balancing of their idea and their skills. They wanted to replicate a commercial game, but weighed up the skills they had and aimed for something more realistic as they designed their project.

A balance has to be found between a compelling idea, the technology that is to hand or can be acquired, and the skills that exist or can be developed. As mentors are often responsible for facilitating these kinds of processes at a CoderDojo, support for them to negotiate this territory and guide children through it would probably be of value.

Engaging with creating projects

Most teams spend a long time on their projects across a range of contexts, both in and outside of clubs and Dojos.

We asked teams about the amount of time they had spent creating their project and the rhythm of this engagement. In the UK this was also asked as part of the judging, but it was a question children often found difficult to answer specifically. In our interviews it became clear that this was because most projects had evolved over a long period of time, not only in structured sessions such as CoderDojos but also during get-togethers at each other's houses, in spare moments, late into the night, and even on the train on the way to the event. Many projects had become quite absorbing, so it was hard to say how long they had taken.

This is very positive in terms of the passion and experience of children already involved. However, it is more problematic for children whose circumstances do not allow them to spend time independent of a structured session to engage with digital making. As we grow the reach of Coolest Projects, we need to consider how we enable these children to create projects they feel are complete enough to share.

Power of seeing others' projects

Seeing other people's projects inspires children, builds their confidence in their own work, and raises their aspirations for future projects.

When we asked people to name the best thing about Coolest Projects, the most common response was that it was the chance to see other projects. Many teams said they had enjoyed talking to other people exhibiting near them about their projects, and some enthusiastically recommended we look at a particular project that had impressed them.

Some told us that they were impressed with more advanced projects they saw, and this would encourage them to create something even more ambitious in the future. Others said it was reassuring to see that their projects were on a similar level to others they saw. One team member said that seeing projects from people his own age or younger made him realise he was capable of even more than he had already achieved.

Some of the benefits of seeing others' projects could be realised more widely by creating regular opportunities for young people to see what others have made. This often happens already in CoderDojos, where ninjas present their projects at the end of sessions, but it would be worth exploring how we can do this further, in other clubs and across the community. The nature of showcasing can encourage the most ambitious projects to be shared, but it is clear from talking to attendees that they value being able to see a range of projects, and the benefits of this are more complex than just seeing ambitious examples that they can aspire to. Seeing projects on the same level as their own builds confidence and gives them ideas.

Besides ideas gained from specific examples, talking with other makers and seeing their projects has another benefit, that it helps build a community. One girl we interviewed said that at school, she and her friend are different from most of their peers because of their interest in programming. At Coolest Projects, they are part of a huge community of people just like them. This sense of community helps validate young people's experience.

Learning

What children learn preparing for Coolest Projects is as diverse as the projects themselves, ranging from many specific technical skills to soft skills and confidence.

What children learnt preparing their projects differed for each project. They included skills in programming Scratch, Python, Java and other languages, electronics and physical computing, and the design of digital products. Teams also talked about learning non-technical skills such as teamwork, confidence and resilience. Children often identified gaps in their knowledge and were motivated to fill them as necessary to accomplish a task. They successfully learnt new concepts and approaches to troubleshoot problems in their projects. They applied what they learnt straight away in the context of their project, making the learning highly relevant.

Some groups, when asked about their learning, focused on higher-level and more transferable skills, such as working as a team. To them it was the 'soft skills' they had learnt that were most prominent. Other teams focused on specific technical skills, such as interfacing with certain pieces of hardware, or learning how to achieve new things using programming languages. These were all expressed as a means to an end: a concept that had been learnt to achieve something they wanted to do, or fix something that wasn't working in their projects.

Some skills are more straightforward to articulate than others. For example, discrete technical skills such as 'Python programming', or broad soft skills such as 'collaborating' are easy to recognise. Conceptual skills such as computational thinking or decomposing problems were cited less by interviewees, but it is likely that this is because the language for reflecting on these is less readily accessible to them. A member of the team 'Quench' spent some time discussing how she had understood the nature of programming machines to repeatedly monitor a condition, and carry out some instructions if that condition was found to no longer be true. She lacked the vocabulary on computational thinking to describe this in a technical way, but she was aware of this concept in computing that she could apply to future projects. Supporting children to reflect in this way on their learning, and supporting adult mentors to facilitate this, would help with continuing to build on the learning that has taken place.

Confidence

Coolest Projects puts children in a situation where they have to talk to a lot of strangers, but are talking about something that they know a lot about and that their audience is interested in, allowing them to develop confidence in presenting.

Across both events, children benefited from a chance to present a project that they had worked on for some time and understood deeply. Even those who initially seemed shy presented their projects with confidence. Presenting at an event like this can be a daunting experience, but talking about a concrete project that they know intimately gives many of them them a strong foundation to do this well. Children have the opportunity to become comfortable with talking to varied groups of people and presenting in front of others. Through speaking to others about something that they understand well, they experience success and can gain confidence and become more comfortable with presenting in general. Many young people we interviewed had this experience from their participation, and we observed a number who did not come across as naturally comfortable presenters clearly and confidently presenting their projects. The format is a strong one for developing confidence in sharing and presenting ideas in a supportive environment. As one girl commented, everyone at the event is interested in your project and that makes you feel confident in sharing it with them.

Team roles

Some teams collaborate very flexibly; in others, participants take on specific roles.

In some of the teams we spoke to children took on specific roles. Sometimes these were roles related to technical aspects, such as C Programmer, Python Programmer, or Hardware Engineer. In other teams the roles adopted were very different, such as one child writing the story and art for a game and another doing the programming, or one doing the programming and another writing the music.

There are a lot of positive aspects to this kind of collaboration, and the specialisation of roles and use of different skills supports recent academic work on effective collaborative learning (see **Nesta's work on collaborative problem solving**). However, there were some teams where some children specialised in non-technical roles, leaving technical tasks to others rather than developing the technical skills to realise their own ideas.

Legitimate peripheral participation

Some children may contribute less to projects than others, but taking part in more superficial ways is a crucial first step to becoming part of a community.

The Coolest Projects exhibitions are high-profile events, and many children are very actively involved in preparing a project. However, we did talk to teams where some members were much less actively involved. A number of teams had some participants who were clearly driving the projects, while others took a much smaller role in terms of digital making. For example, they might have been involved in a testing role. These children were much less vocal in the interviews we carried out, and in some cases they were talked about but not actually present.

In the literature on communities of practice, it is noted that there are different stages of participation in a community of learning, and that this often begins with legitimate peripheral participation (Lave & Wenger, 1991). Through undertaking simple and peripheral tasks, newcomers become familiar with the language, practices and conventions of a community, allowing them to join that community and begin a journey to becoming successful practitioners themselves.

There is some evidence that this is happening in the CoderDojo community, and further work to understand this phenomenon and how to support newcomers to join the community should be undertaken.

Influence of adults

The support of parents and club leaders is essential to facilitating children's involvement in this event, and the children clearly recognise the support adults give them.

All of the participants that we talked to seemed to be strongly influenced by adults around them, but in different ways. These adults were often parents, but also club leaders or teachers. Many of the parents were professionally involved with technology, such as through programming or technology innovation. Others spent time creating with technology in their free time, often participating in coding clubs and activities together with their children.

However, there were a number of teams supported by parents who were not experts or especially engaged with technology themselves. These parents had noticed their children's interest in technology and searched for a club for them to attend, accompanied them to various events, or tried to provide resources for their children to make with (e.g. an old laptop or a Raspberry Pi computer). Having supportive parents is in most cases a prerequisite for attending an event like Coolest Projects given the context. However, these parents do not need to be technical themselves; they just need the attitude that digital making is worthwhile. There were a few examples of exceptions to this, where teams who had formed at their school were brought by teachers rather than their parents. We should consider both how to encourage positive attitudes towards digital making amongst parents, and how to support teachers and those working with young people to facilitate their involvement if parents are not involved or are unable to help their children to attend events. The bursaries for travel are one initiative that supports this already.

It was clear in many interviews that club and Dojo leaders greatly influence children to be ambitious and aim to create a project they can proudly share at Coolest Projects. Many children told us it was their club leaders that had told them about the event, and that adults had often structured their participation in their clubs or Dojos towards creating a project to show. Some heard about Coolest Projects first and decided to attend Dojo or a club to develop ideas and skills needed to take part. For some, participation was framed as representing their Dojo community, and a part of the collective identity of the Dojo. This ethos is supported by the awards given to Dojos. Structuring participation at a Dojo towards enabling teams to attend Coolest Projects is an area where there is clearly some good practice that could be shared more widely to enable even more young people to get involved.

Interdisciplinarity

Children often learn about other things than digital making, and it can be a medium for interdisciplinary learning.

Coolest Projects sometimes inspired children to create interdisciplinary projects that deepened both their programming skills and their knowledge in other areas. Combining coding with other domains such as health, environment, security systems or robotics, they explored these areas of interest in order to develop their project. Children also showed entrepreneurial thinking: they often created projects that solved a real-world problem or were practically applicable. Such an approach to computing can trigger interest in technology and motivate children with different interests to get involved with digital making. It can also help them see that technology can be used as a tool for achieving a particular goal, and is not necessarily the goal itself. Digital making can support other subjects beyond computing, bringing powerful tools to these areas. It is worth exploring how to further support interdisciplinary learning through our other programmes.

Coolest Projects as an inspiration

Many children say they make more ambitious projects because they have set their sights on this event.

All the children we spoke to were involved in digital making before Coolest Projects, but the event had been an inspiration for many of them to develop and put work into their projects. Some of them had created projects specifically for the event. Others had taken a project they had already made and developed it further, inspired by the opportunity to share it at Coolest Projects: for example, the 'Locking Medical Box' team had taken a cardboard prototype and made iterations until they had a finished product made from perspex. There were some projects that had been built for the Raspberry Pi Foundation programme Pioneers and were being shown as created for that competition, but most participants we spoke to had been inspired by the event to create something new or to take their existing creations to the next level.

Primary school programming

Programming in schools is having an important influence on some children in the UK.

A number of children at the UK event said their first steps in digital making were taken when learning programming in primary school. It was through these early positive experiences that they became interested in programming and digital making. Some mentioned particularly inspirational teachers in primary school, who made them realise that programming is something they could do well at. Children at the international event spoke much less about the influence of schools. Currently the majority of these participants are Irish, and as computing and programming is not yet a part of their school curriculum, this is not surprising.

Challenges getting help

Getting specific technical support for projects can be a challenge, even online.

When they have faced a particular challenge in building their project or don't know how to do something, young people look online for resources to help them. They spoke of using online project guides, YouTube videos, forums and documentation related to their programming tools.

These resources are abundant, but several teams mentioned the difficulties they faced when making use of them to help with their projects. Usually these projects are driven by their own ideas, so when they are stuck, they generally find resources that have been created to achieve something different. There is therefore some translation they need to do, in order to look at someone else's solution to a different problem and see how it may or may not apply to the problem or difficulty they are trying to solve.

Forums in particular present their own problems. They can be a valuable resource for learning about computing and digital making, but in addition to the challenges described above, they are environments that some young people find difficult to access. Getting involved with forums and asking and answering questions present the challenge of understanding and fitting into the community, which is not always tolerant of those just starting out. One team member described how he had been banned from forums before for asking too many 'newbie questions'. He found face-to-face support from others most useful, because it could be framed around an actual problem he was facing, and he could ask questions until he understood. However, with clubs running weekly, fortnightly or monthly, there will sometimes be some time before young people can access this kind of support. Sometimes less skilled volunteers may also not be able to answer all their questions. Providing support beyond face-to-face meetings at clubs could thus be a valuable addition, such as through an online platform for participants to seek help with troubleshooting or an additional online mentoring scheme.

Not participating

Not all children and adults feel sufficiently competent to participate.

We also talked informally to one group (a teacher with three students) who came to have a look at the event, but did not submit projects themselves, and to a Code Club leader who came to volunteer but did not think about signing his learners up for the event. The reasons for not attending were mainly related to a lack of confidence and being unsure about what to expect. The club leader said that the name 'Coolest Projects' suggests to them that the projects have to be extraordinary, or of a very high quality. The teacher suggested that it would have been helpful if students could see all the projects from past years online. She thought this would help provide inspiration, and give a better feel for the event and the type of projects that they should be working on in order to participate themselves. Providing more examples from past years, and including some simpler projects, could have mitigated some of these uncertainties.

Recommendations

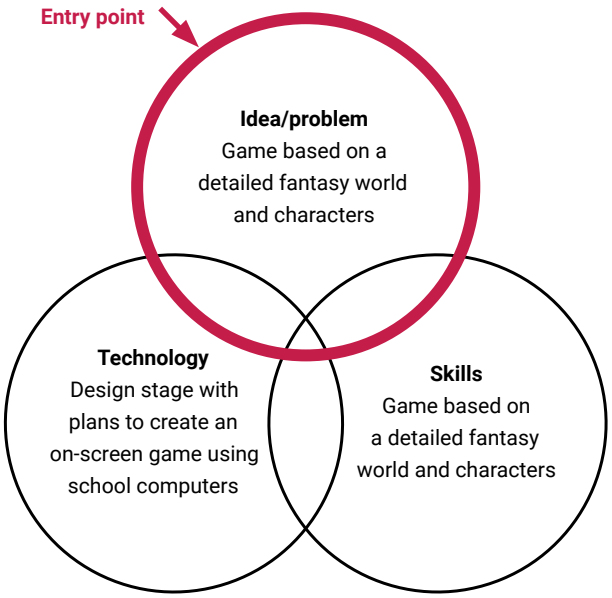
1. Continue to build support for project planning, helping children and mentors to achieve a balance between ideas, available technology and skills.
2. Consider how clubs and Dojos can enable children who cannot spend time outside of structured sessions to create successful projects.
3. Share more examples, case studies and stories of projects, so that those who can't attend Coolest Projects can experience some of the benefits of sharing projects. These should be at a variety of levels of complexity and not just the most ambitious projects. Some children will aspire to the highest level, while others need to see things they feel they could create with more modest skills.
4. Consider how to enable children to reflect on their learning and understand what they have learnt, in terms not only of specific technical skills but also of approaches to design and problem solving that can be applied to future projects.
5. Undertake more research on the role of legitimate peripheral participation in our communities, with a view to recommending further actions to take advantage of and encourage this initial step into digital making.
6. Review the support and structures for club leaders or teachers to bring children to the event if parents are not able to do so, in addition to the existing travel bursaries.
7. Share the good practice in some Dojos of seeing Coolest Projects as a clear goal for all their participants and structuring their sessions to enable children to ideate, design and realise their projects within the right timeframe to submit to the events.
8. Explore how our online projects site can support children stuck on projects based on their own ideas.
9. Think of possible ways to foster creativity and confidence in cases where children do not feel they have a creative idea that is good enough for Coolest Projects.
10. As we expand Coolest Projects across the wider Raspberry Pi community, continue to emphasise the range of levels of skill and ambition of projects, so that everyone feels able to submit their project and people do not feel the event is only for the most accomplished. Sharing more examples of projects at different levels could help to achieve this.

Case Studies — UK

For safeguarding reasons we have not included the names or personal details of children in these case studies.

Dragon King

Category: Games & Web Games
Number: 4
Girls: 1
Boys: 3
Ages: 11–12
Club: School-based club
Country/Region: London, UK



Description of the project

A design for an on-screen adventure game with a rich story.
"Journey to avenge your dead brother and defeat the dark dragon king, bringing peace back to the land of Tochi. Using Python and PyGame Zero."

Story

Dragon King is a concept for a game world that a twelve-year-old girl has been working on for some time. She has created comprehensive character artwork on paper, developed the mythology and story of the game, and written scripts for cutaway scenes. She wanted to turn the concept into reality, so she got together a team of friends to work with. They needed to work on it in school, and had to persuade their teacher to let them use the Computer Science facilities after school.
The teacher has set up regular after-school sessions to work on the project, although they have only had one or two of these so far.

Choice of technology

Much of the work for this project had been done on paper, developing concepts, artwork and scripts. They had begun to animate their characters and were planning to program the game using Python and Pygame, using the laptops in their school Computer Science department.

Team roles

The lead girl was responsible for concept, direction, art and scripts. Others focused respectively on animation, coding, and project management.

Influences

Adults

The team's Computer Science teacher is involved in running CoderDojo Ham. She set up an after-school session for them to work on the project, but only after the team persuaded her.

Learning

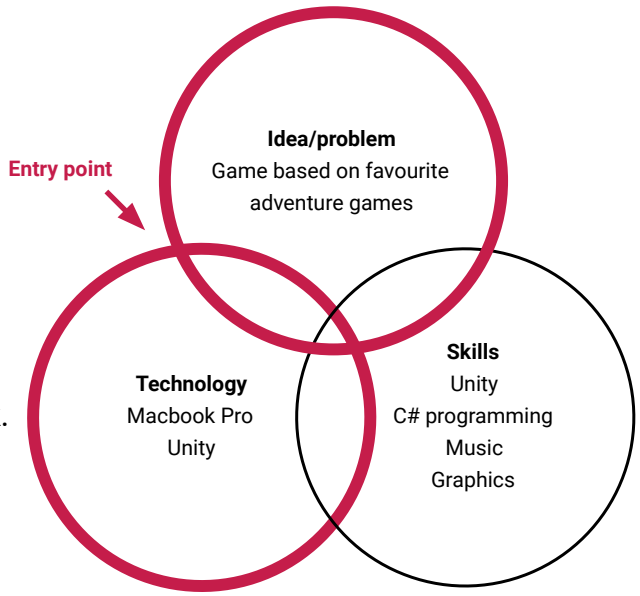
The team were most focused on what they had learnt about putting a team together and making a project happen. They also said they had learnt about animation and Python.

Why Coolest Projects?

Their teacher arranged to bring them to Coolest Projects because people she knew from CoderDojo Ham were planning to show their projects there.

Behind the Wall

Category: Games & Web Games
Number: 3
Girls: 0
Boys: 3
Ages: 11–13
Club: CoderDojo Dragon Hall
Country/Region: London, UK



Description of the project

A Unity adventure game with an original soundtrack. "You begin with a character that has seemingly lost his parents. He decides to go on a quest when he realises there is nothing else for him. It seems cheerful and easy, but as your character levels up, secrets will unfold."

Story

The project's creator has been playing role-playing games on his iPad since he was five. After a while, he wanted to make his own games like the ones he wanted to play. He had a go at coding using HopScotch on the iPad. He soon reached the limitations of this, and after his mum bought him a Mac for his birthday he started learning to use GameMaker. Unity came next, and this project is his first using this platform.

Choice of technology

The lead boy chose software programming as he has his own Apple laptop to use. He has had some problems wanting to use software that is PC only and having to find alternatives. He said he prefers to do on-screen projects as he feels he is good at programming but not good at physical making. He showed a strong growth mindset with regards to programming, but he didn't feel he had the skills for building a hardware project.

Team roles

The boy we interviewed had the vision for the project and does the coding. He enlisted two friends, one to help with animation and the other to compose and record piano music for the score.

Influences

Adults

The lead boy's mother had brought him to Coolest Projects and has supported and encouraged him, as well as taking him to CoderDojo events.

Clubs

The lead boy has been to a CoderDojo once a month for six months to work on his project, and to meet people who can mentor him in programming, particularly in C# for Unity.

Learning

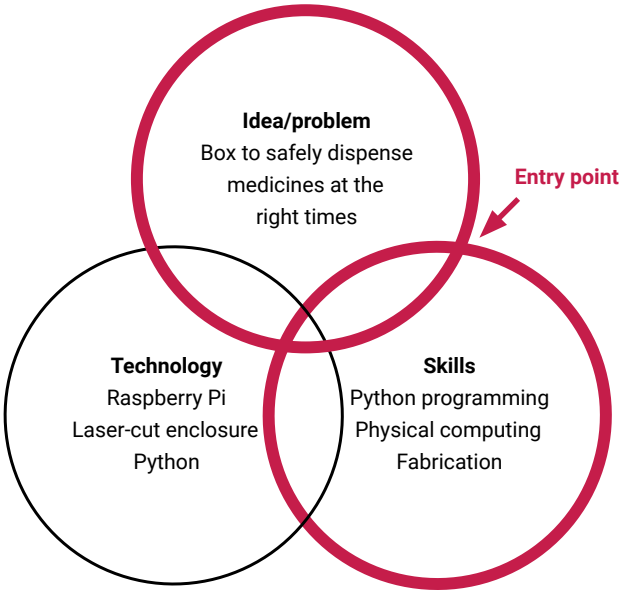
The lead boy was very reflective about his learning, and had a clear narrative of how he has moved from playing iPad games to programming in Unity. Everything he did in Unity was learnt through this project, and debugging errors has been a huge part of this experience. He has tried to use online resources such as tutorials and forums, but finds it hard to find examples of how to achieve specifically what he wants for the ideas behind his game. He has been banned from a forum for asking too many 'newbie' questions, and has decided that learning from people face-to-face in a mentoring situation is better. His mum took him to CoderDojo to find some mentoring on C#, but no one there had the knowledge.

Why Coolest Projects?

The lead boy's mum arranged for him to come so that he could find ways of getting more support to learn, and possibly meet a mentor in C# or game-making.

Locking Medical Box

Category: Hardware
Number: 3
Girls: 3
Boys: 0
Ages: 14–16
Club: CoderDojo
Country/Region: Manchester, UK



Description of the project

A locking box for medicines that unlocks at the right time and indicates the correct dose.
"Made with Raspberry Pi, this box unlocks when it's time for a person to take their medication, then locks again after being opened. It also alerts a user when it's unlocked, and a person of their choice if not opened after a certain amount of time. This helps people with mental health issues take their medicine on time without overdosing."

Story

The team met each other at a summer coding camp and became friends. One of them had done an online coding course some time before, but had not found a use for it. The others had done some Scratch in primary school. They started going to other coding events together, including a two-day hackathon. When brainstorming ideas, they came up with the concept for the locking medical box, and created a prototype using card and a Raspberry Pi. One of the team attends a CoderDojo and found out about Coolest Projects, and they used this challenge to develop the project to the next stage. They live quite far apart, but parents drove them to each other's houses to work on the project and they did some work at home. One of the team made use of the design technology facilities at her school, and recruited a friend there to help with manufacturing the physical box.

Choice of technology

They already had a Raspberry Pi with a small screen and knew they could connect motors to it. They had to get hold of a motor and a chip to drive it. The technology they had available obviously influenced some design decisions (such as the timer on the screen), but this project was led by the idea first.

Team roles

They took fairly equal roles in the project, although one of the team did much of the manufacturing due to access to tools and materials. Another was described as the Python expert, but the others had been working on this too.

Influences

Adults

The team members' parents supported them by encouraging them and taking them to events, but were not technically skilled themselves. Two parents worked in healthcare, which may have influenced the idea. One team member credited an inspirational primary teacher as a big influence in getting her interested in programming.

Clubs

One member regularly went to a CoderDojo. The team met through a summer coding camp and continue to go to ad hoc events such as hackathons fairly regularly together.

Learning

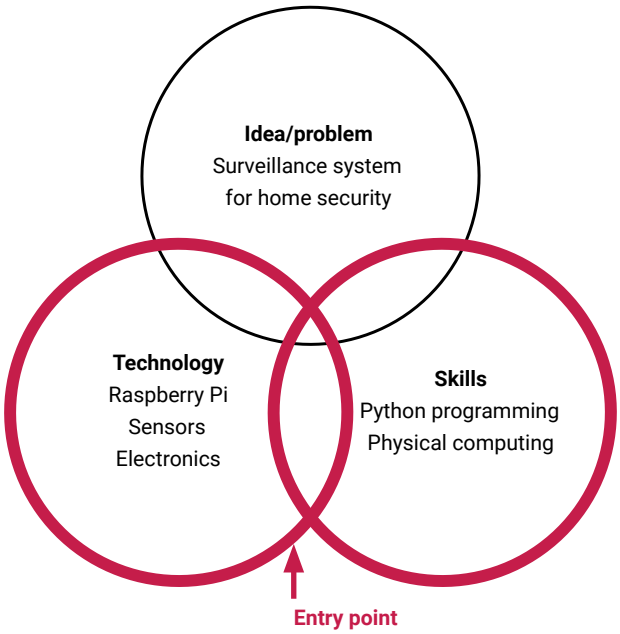
The most important thing to the group was learning how to work on a project as a team: knowing how to collaborate but also work separately and on different sections, taking account of their separate skills. The manufacturing of the box was very new to them, and they learnt to deal with tolerances and created a spec for this work for a DT student to construct for them. They also learnt how to use an L293D chip to control motors. In terms of programming, they felt they were using what they knew rather than learning much more Python.

Why Coolest Projects?

They were proud of their original prototype and felt the idea was worth developing, so Coolest Projects spurred them on to take it to the next level. It gave them a reason to develop the idea, and they want to keep working on it and take it even further now.

Security System

Category: Hardware
Number: 2
Girls: 0
Boys: 2
Ages: 15
Club: School-based Pioneers club
Country/Region: London, UK



Description of the project

A Raspberry Pi security system with sensors.
"A remote security system which makes use of a series of sensors to raise an alarm when intruders are close by. The sensors can be activated and deactivated by a web development platform, and messages are also sent to this platform when the alarm is raised."

Story

Both team members have been interested in technology for some time. One had been given a Raspberry Pi and some sensors as a Christmas present but had made only a little use of them. Their computing teacher found out about Pioneers and offered students in the school the chance to take part. They were the only two who chose or were able to take part. They spent around four hours over two weeks putting the project together in response to the theme given by Pioneers.

Choice of technology

They had the Raspberry Pi and the sensors, as well as the theme of 'Only you can save us'. Together these suggested a security system to them.

Team roles

The two team members collaborated without specific roles, and both could talk knowledgeably about the project and how it worked.

Influences

Adults
Their teacher had the biggest direct influence by setting up Pioneers, and had also taken them to Coolest Projects when they were invited by the Foundation. Parents supported them by buying the Raspberry Pi kit for Christmas.

Clubs
Pioneers run as a club at their school.

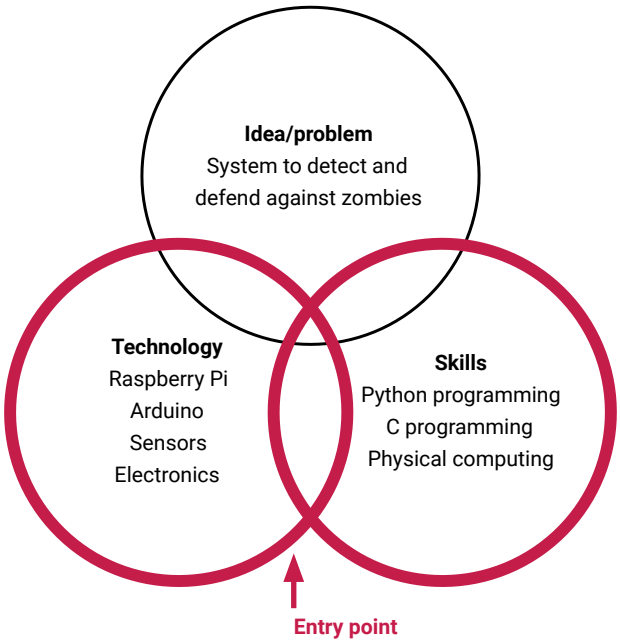
Learning
Both had been interested in programming since lessons in primary school. They had continued this at school and chosen GCSE Computing, learning Python in lessons. Although they had worked with software before, this project was their first experience with programming. They were very specific about the technical skills they had learnt through the project, through wanting to achieve something and having to learn how to do it. The web-based interface was built from scratch with HTML, and learning to communicate with the Raspberry Pi, send instructions, and receive data and photos was a considerable learning process. They had a strong problem-solving approach, and described how they would stand back, try to understand how the problem was happening, what elements it was related to, and then look at how they could adjust those elements. They noted that their work on Pioneers and Coolest Projects has directly supported their school work by developing their Python skills.

Why Coolest Projects?
They were invited as they took part in Pioneers.

Security System
School-based Pioneers club, London, UK

Zombie Defence System

Category: Hardware
Number: 3
Girls: 1
Boys: 2
Ages: 10–12
Club: PiRates
Country/Region: London, UK



Description of the project

Automatic door locks and holy water spray to protect against zombies. It included a touchscreen interactive presentation explaining the project, and an Arduino-based animated sign.
"Various parts to counter zombies."

Story

The team have been friends for some time, but went to different schools until recently when two of them moved to the same secondary school. They spent about a day each week for a month working on the project.

Choice of technology

The project was based around a Raspberry Pi and sensors, with an animated sign made with an Arduino. The project was driven by being inventive with the equipment they had, buying just a few additional parts.

Team roles

Each team member had a different role based on their skills. One focused on hardware, one on Python programming, and the other on C programming with the Arduino. They could all talk in great depth about what they achieved as a team and what they had personally contributed.

Influences

Adults
A number of the parents of the team are IT teachers and encouraged them to take part in Pioneers. They helped with solving technical challenges, but the team had obviously been quite self sufficient, looking online for advice and not just relying on the adults.

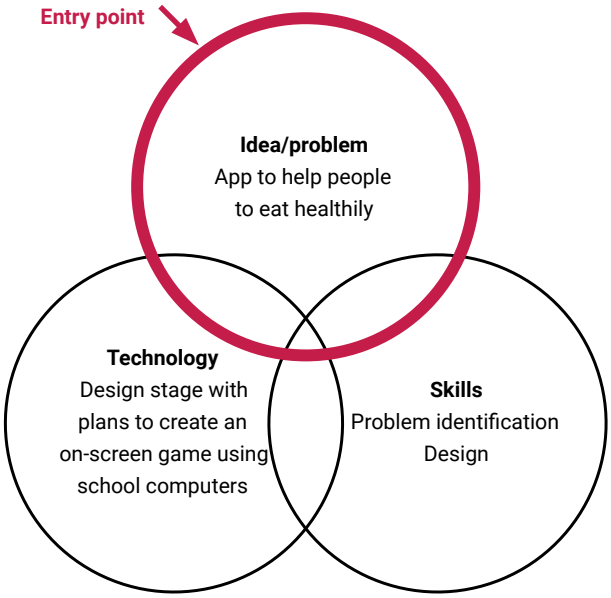
Clubs
They went to Code Club in their primary school, but this project was something they did at home.

Learning
The learning they discussed was largely about specific technology skills related to aspects of hardware or programming. One of the team had learnt C from scratch to program the Arduino; another had learnt to use an interface chip for the various sensors and hardware they used.

Why Coolest Projects?
The team took part in Pioneers and were invited to come to Coolest Projects. They were brought by their IT teacher parents.

Healthy

Category: Mobile App
Number: 1
Girls: 1
Boys: 0
Ages: 15
Club: CoderDojo Ham
Country/Region: Surrey, UK



Description of the project

An app to advise users on healthy eating, prototyped on an app design platform.
"Healthy eating advice, support for diabetic people, personalised diet plan according to your health conditions."

Story

The creator of this project was motivated by a mentor to start her project by identifying a real-world problem that she would like to solve. Having had experience with lack of support about healthy diet and habits, especially for diabetics that she knew personally, she decided to try to find a solution for this problem using technology. She created an app that guides people's diet and health habits. This includes elements such as recipes, as well as eating patterns using a timetable with the healthiest times for the main meal of the day.

Choice of technology

She decided to create a mobile app as people are always on their phones, so it would be convenient. She learnt how to work with the app prototyping software Marvel specifically for this project.

Team roles

She worked alone, with occasional support from her mentor once a month at CoderDojo. She came up with the idea, designed the app including its graphics, researched health advice, and prototyped her software, essentially in that order.

Influences

Adults
Her mum attends the Dojo with her, studied a technology-related course, and was described as technical. The girl also considers herself a technical person. Her mum originally found the Dojo for them to attend.

Clubs
She decided to attend Coolest Projects thanks to her Dojo. Although she has been interested in coding since starting to program in Scratch in Year 7, she only joined the club three months before Coolest Projects UK.

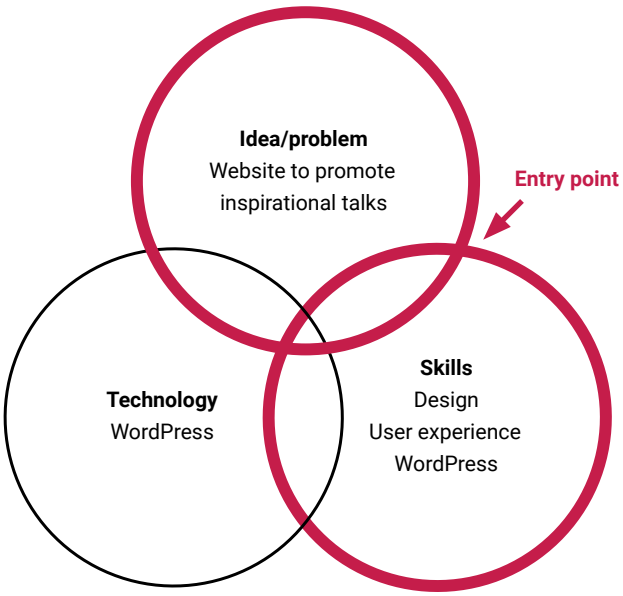
Learning
She thinks that a project for Coolest Projects is different from other projects that she would work on, as “This project needs to be the best”. She feels that she significantly improved her knowledge and skills. She used Marvel for the first time, and learnt to program a phone app and troubleshoot (“It’s really fiddly”). She also gained a lot of knowledge about health through her underlying research.

Why Coolest Projects?
She learnt about Coolest Projects through the Dojo that she had just joined, and started to work on a project that she could present there.

Healthy
CoderDojo Ham, Surrey, UK

Hackerfemo.com

Category: Websites
Number: 1
Girls: 0
Boys: 1
Ages: 12
Club: South London Raspberry Jam
Country/Region: London, UK



Description of the project

A website for a business providing coding workshops and inspirational talks.
"I started a blog when I was nine, which I have migrated to wordpress.org and now use for clients to contact me for workshops and inspirational talks. I am presently working on an AI chatbot and other possible IoT uses."

Story

He created this project before he decided to attend Coolest Projects. He got interested in computing aged eight, when he found out he could hack Minecraft. Around the same time, his mum went to Picademy and they attended a Raspberry Jam together. They got interested in how communities are formed, so decided to start their own Jam. They wanted people in their area to bring their projects and work on them in a safe and inclusive environment, and have an opportunity to meet, share ideas, get support, and learn from each other. The boy started to engage with creating with technology in various ways: he started his blog when he was nine, and began to deliver inspirational talks. He later migrated his blog onto a website where he documents his activities and makes it easier for organisations to contact him. It is this website that he presented as his project at the event.

Choice of technology

He worked on the project independently from Coolest Projects. The technology he chose is related to the needs of his business — to enable customers to get to know about him and contact him with requests for inspirational talks.

Team roles

He did everything himself, but he seems to have had support from his mum. He refers to the project as a business and speaks about its development and his activities collectively (e.g. 'we go' and 'we contact'). Website graphics are ones he chose from available themes.

Influences

Adults

He got into tech alongside his mum, and both parents are very supportive. His mother is a maths teacher and a Raspberry Pi Certified Educator and his dad is a mechanics teacher. His younger brother presented a Dinobot project in the Hardware category. Both parents came to the event with their children and were at their stands.

Clubs

As well as running a Raspberry Jam with his mum, he also engages in other activities that aim to inspire people to get involved with technology. He speaks at conferences and provides motivational talks to businesses. He has visited other countries to teach children less fortunate than himself, and is soon going to speak at a conference for a major technology company. He has also attended a Dojo a couple of times, has been asked to run a Code Club at his school, and spends a large proportion of his free time coding.

Learning

He learnt more about user experience and understood how important it is to have a good website presentation for people to navigate, something that his blog previously lacked. This was not specifically for Coolest Projects, as he migrated and extended the blog before that, but it was through work on this project.

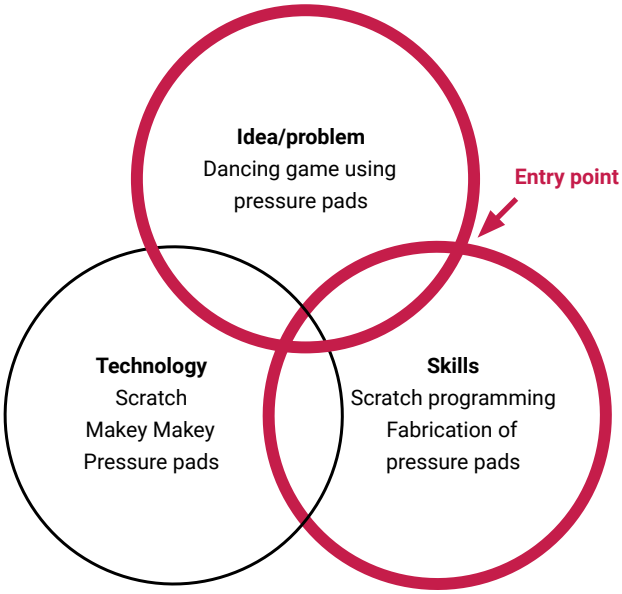
Why Coolest Projects?

He and his family are involved members of the Raspberry Pi community, so they quickly heard about Coolest Projects and applied to take part.

Hackerfemo.com
South London Raspberry Jam, London, UK

Dance Magic

Category: Scratch
Number: 2–3
Girls: 2–3
Boys: 0
Ages: 11–15
Club: CoderDojo GlassBox
Country/Region: South West, UK



Description of the project

A dancing game controlled by touch pads that includes 50 moves. Arrows on the top of a screen indicate the move that the player is supposed to make by pressing one of the four arrows: left, right, up or down. The game also displays the move carried out by a player and counts points.

Story

The team wanted to create a game similar to Nintendo Wii Let's Dance. They realised that a game like that was too difficult, so tried to think of a variant they could create using the knowledge and resources available. They first used pressure pads placed on the floor under cardboard, which a player would jump on to control the movement. However, the prototype was fragile and broke, so they decided to make a hand-controlled game instead, using sponges and smaller pieces of cardboard.

Choice of technology

They chose Scratch as both the group and their mentor (mum) felt comfortable with it. For the hardware, they chose a laptop, Makey Makey and pressure pads — the resources available through their club. They were familiar with the use of pressure pads as they had used them for their Pioneers project.

Team roles

The team did not seem to have any specific roles assigned to individuals: the girls seemed to have worked on both of their projects together.

Influences

Adults

Parents are supportive (they help with transport and the group worked on a project at one team member's home for the last week). Two other team members are sisters, and their mum is a volunteer at the club and supervised the girls' project.

Clubs

One girl started to attend a CoderDojo in January when it was launched, and sometimes also attends a Code Club run by the same volunteer.

Learning

One girl said that, compared to a standard project that she would be working on, this project is an "upgrade, a level up". She felt she learnt many new things and her programming ability markedly improved. She described how she can now look at a piece of code, find a mistake and debug it, and can put the right piece of code in the right place at the right time.

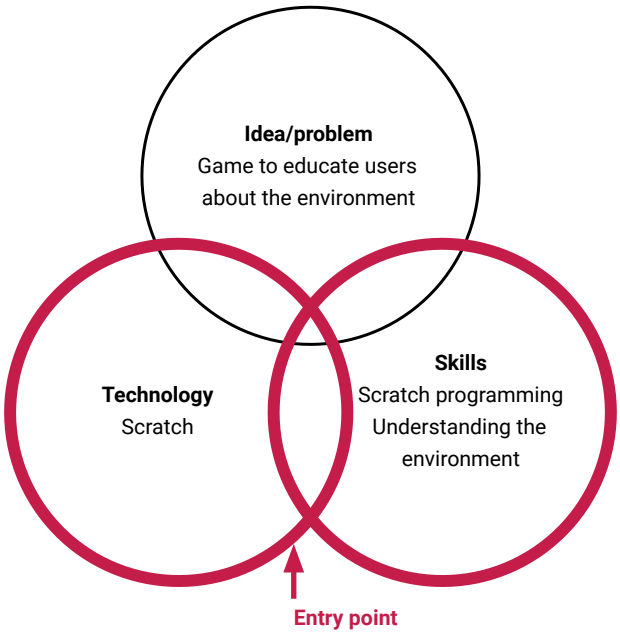
Why Coolest Projects?

They wanted to go and represent the club, to tell other people about it.

Dance Magic
CoderDojo GlassBox, South West, UK

Shadow Neighbours

Category: Scratch
Number: 2
Girls: 0
Boys: 2
Ages: 7–8
Club: CoderDojo Ham
Country/Region: Surrey, UK



Description of the project

A Scratch game about the environment.
A bottle falls from the top of the screen, and when a key is pressed a crab rushes towards it, catching it if the player pressed the key at the right time.

Story

One of the team is interested in animals and feels upset about how they suffer from pollution caused by humans. He and his mum therefore wanted to make a game that will raise awareness and educate people about environmental issues. Two children created the whole project, and found a way to code it based on similarities with projects from our learning resources that they had previously completed.

Choice of technology

They chose to do the project in Scratch as one team member had already worked with it and knew how to program using it.

Team roles

Two boys worked on the project together, with the mum supporting the activity but not really the coding side of it. According to her, boys would meet at one team member's home and work on their project, with the more experienced team member teaching the other.

Influences

Adults

One of their mothers cannot code but has an Oxford University degree in technology innovation. As her son liked the Scratch coding that he was doing at school, she gave him her old laptop, which she was going to throw away, so that he could practice at home. She also signed him up for a Dojo three months before the event, and supervised the project that he and his friend were working on.

Clubs

It appeared that although parents supported children's coding activities, they got to know about Coolest Projects through the Dojo.

Learning

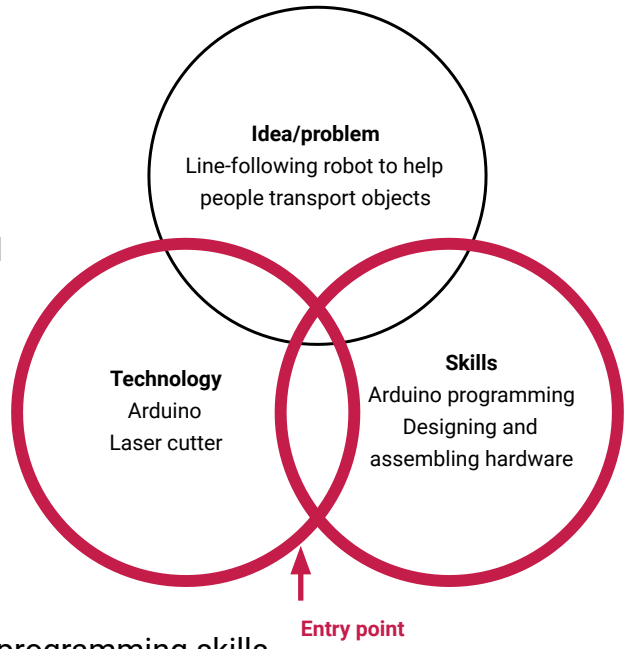
The first team member said that he learnt a lot while working on the project, naming Scratch blocks as an example. It also seemed that he needed to put some computational thinking into finding similarities between this project and the projects that he has completed before, to look for hints about how to program the game. The other team member said he didn't learn anything new. This could be because the question was asked in a busy period with children impatiently waiting to have a look at others' projects.

Case Studies — International

For safeguarding reasons we have not included the names or personal details of children in these case studies.

Linear Equation

Category: Hardware
Number: 1
Girls: 0
Boys: 1
Ages: 16
Club: CoderDojo Athione
Country/Region: County Westmeath, Ireland



Description of the project

A line-following robot based on an Arduino and a laser-cut plastic frame. It is a prototype for a robot that could be used to carry heavy loads around for people.

Story

The creator of this project had some hardware and programming skills, and wanted to build a project that was a robot that solved a social problem. He designed Linear Equation to help with lifting heavy loads, looking at a potential purpose for the popular line-following robot.

Choice of technology

He already had the technology he wanted to use, but was very focused on finding a problem it could solve that gave it a social purpose. He wanted to look after people's health and help them to relax.

Team roles

A solo team where one person undertook everything to create the project.

Influences

Adults

His parents are supportive and brought him to Coolest Projects, but they have no particular technical knowledge.

Clubs

He found CoderDojo himself online and started attending, building on an interest in technology he has had since he was little. He spoke highly of his CoderDojo mentors and how much they have supported him and helped him to learn. He used to do programming at school but it was replaced with physical education, so going to the Dojo every week is now his main influence.

Learning

He learnt more about Arduino programming through making this project. He also learnt about designing and assembling hardware, the importance of prototyping and testing, and the physical skills of putting it all together. He has always been interested in technology, and said he thought it was something that either you are into or you are not. He took his existing technical skills and used Coolest Projects as an opportunity to deepen them.

Why Coolest Projects?

He had been aware of Coolest Projects for some years, but had never quite got around to putting together a project and presenting it. This year he decided to take on the challenge to put together a project specifically for the event. He feels he's gained a lot from presenting. It has also let him see the standard of others' projects. This has raised his aspirations for what he could achieve, and he plans more ambitious projects for the future.

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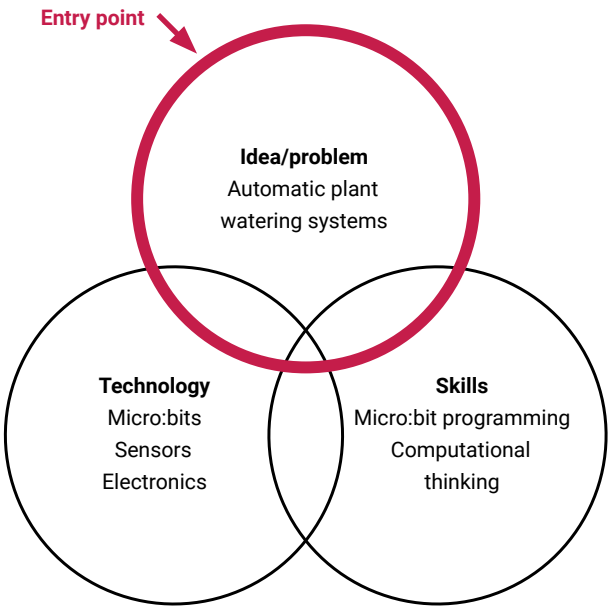
Linear Equation
CoderDojo Athione, County Westmeath, Ireland

Quench

Category: Hardware
Number: 2
Girls: 2
Boys: 0
Ages: 10
Club: SiliconDocks
@ Accenture The Dock
Country/Region: Dublin, Ireland



Description of the project

A system for keeping your plants watered when you go on holiday. It uses a micro:bit with a moisture sensor to detect when a plant needs watering. The micro:bit is powered with a solar panel and waters the plant with a water pump. The Project was presented in a Lego model of a house to give it some context, with a number of plants to water through the day, and collages advertising it as a product.

Story

TThe two girls in this team are friends from school who go to a CoderDojo together. They wanted to make a project that solved a problem, and had identified that house plants in their homes often didn't survive a family holiday. They decided they wanted to make something using their micro:bits to address this. They worked on the project every two weeks at their CoderDojo, and at home as much as they could. They have a lot of other activities and hobbies and they had to make time for this around them.

Choice of technology

The project was strongly driven by the problem they had spotted, but also shaped by having micro:bits available and knowing how to program them. Their original micro:bits broke and their CoderDojo mentors bought new ones for them to use.

Team roles

The project lived at one team member's house, but they said they took turns and worked together on it. They both had a good understanding of the project and worked as a team.

Influences

Adults

Their parents encourage them and take them to the Dojo but don't know any programming. It's their mentors who have taught them what they know.

Clubs

They spoke highly of their mentors at CoderDojo, who have taught them programming. They have lots of friends at their Dojo and they spoke of encouraging each other.

Learning

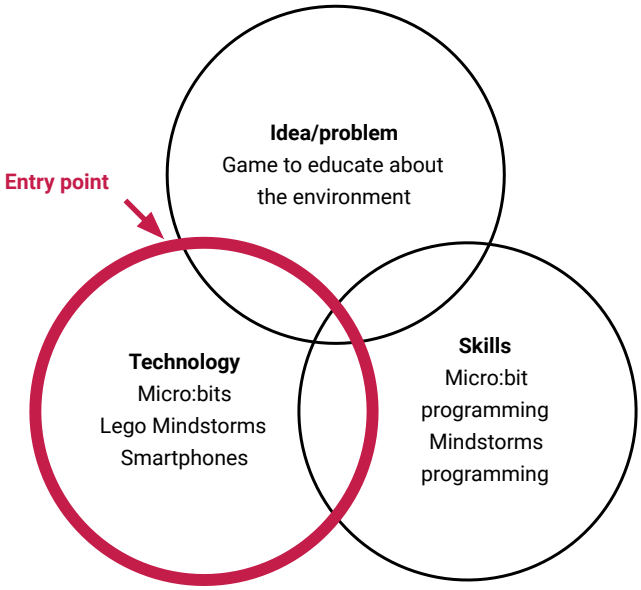
They learnt how to put together and test hardware, and improved their micro:bit programming. As well as these specific things, one of the team was very aware of the more abstract concepts she had learnt. She explained how in order to monitor the state of something (moisture), they had to set up a loop that constantly checked the value, and could trigger an action when it went outside of expected parameters. Although she did not always use formal language to describe it, she was very reflective and aware of the computational thinking she had learnt.

Why Coolest Projects?

This was their first Coolest Projects. The mentors at their Dojo had encouraged everyone to put together a project for it and to attend. They were brought by both sets of parents. They said they were nervous but excited and had enjoyed presenting their project.

Find Phone

Category: Hardware
Number: 2
Girls: 2
Boys: 0
Ages: 8–9
Club: Sofia @ 11
Country/Region: Sofia, Bulgaria



Description of the project

Find Phone is made up of two related projects. The first is a micro:bit which allows you to get your phone to play a notification when you press a button so that you can find the phone. The second is a Lego Mindstorms robot carrying a Bluetooth speaker and a phone. It follows a wand the children carry using an infrared light and sensor, which means their music can follow them around when they play in the park.

Story

The girls in this team have been friends since kindergarten and their mothers run CoderDojo Sofia. They both love smartphones and wanted to create a project that could use them. They identified challenges they have with their phones, which were losing them at home and wanting to listen to music when playing in the park but not wanting to break them.

Choice of technology

The micro:bit and the Lego Mindstorms kit were technology they had and, wanting to make a hardware project, they came up with an idea that linked their interests and the available technology.

Team roles

Each member of the team worked on their own side of the project. They discussed them and helped each other, working together at their CoderDojo, and both together and separately at home.

Influences

Adults

The girls' mothers run the CoderDojo in Sofia. The father of one is good at programming and helped them with programming the Mindstorms robot. He worked closely with them on it and showed them how to do much more than they knew how to do at the start.

Clubs

They have been going to CoderDojo once a month for some years. One told us that CoderDojo is not like school, because at school other people are not like you and have no interest in programming. At CoderDojo and Coolest Projects everyone is like you.

Learning

One girl said she has gained confidence in talking to people through the event. The other had less to say about her learning, saying "I've always liked to talk".

Why Coolest Projects?

Their parents brought them as part of a trip they organised for ninjas from the Dojo they run. This is their third Coolest Projects. At previous events they presented Scratch projects, but this time they wanted to progress to hardware while one has a younger sister presenting for the first time in the Scratch category. They said the best thing about Coolest Projects is seeing other people's projects and making friends, and they had obviously been talking to other children nearby about their projects.

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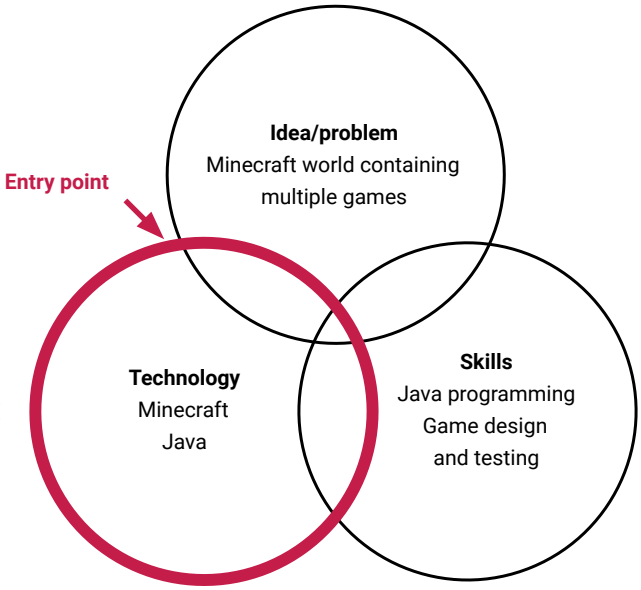
Find Phone
Sofia @ 11, Sofia, Bulgaria

Second World

Category: Games & Web Games
Number: 3
Girls: 2
Boys: 1
Ages: 10–15
Club: Bucuresti Nord
Country/Region: Bucharest, Romania



Description of the project

A Minecraft world that contains three games that the team have created. Players can connect to the world online to play together.

Story

The team told us they had always been interested in technology. Minecraft games were described by the girls as 'the games of [their] childhood'. They had played a lot of them and wanted to make their own versions of them. Their experience of coding courses on Khan Academy gave them confidence they could achieve their ideas using code. They researched by looking at the most popular online Minecraft games and coming up with ideas that used the best elements of these. The game was coded using Java, both at home and at their CoderDojo. The CoderDojo mentors helped them to learn Java programming.

Choice of technology

The project was all computer-based due to the nature of Minecraft. They were very engaged with on-screen games as players, so that is what they chose to create. Their experience was in software programming, influencing their choice.

Team roles

The two girls appeared to have collaborated closely on the programming. The younger boy seemed less involved in the programming and more of a peripheral participant.

Influences

Adults
Their parents included a nuclear physicist and an informatics auditor, and had encouraged them to get involved in digital technologies. The parents found them coding courses to do, and also found CoderDojo and organised for them to attend.

Clubs
Their CoderDojo is a big influence, with their mentors teaching them the Java they needed for this project.

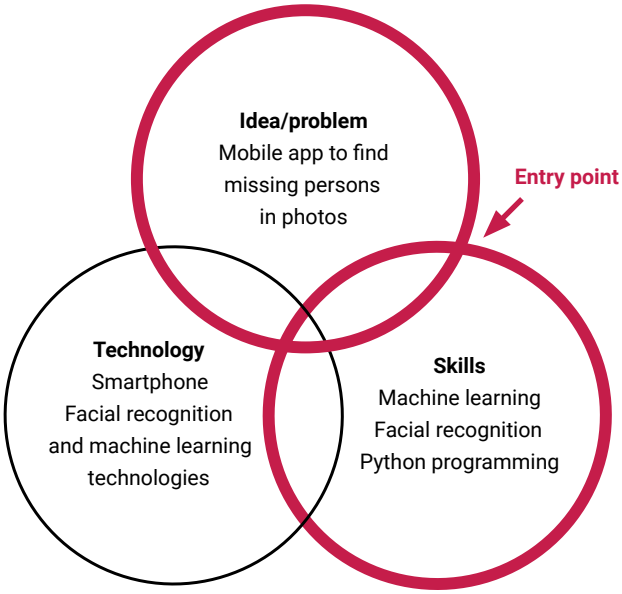
Learning
When asked, they focused on telling us about learning Java programming. It was clear from their comments that they had also learnt a lot about designing a digital product; doing research, testing with users, and getting feedback. This had shaped their project, and they created a feedback survey to display on the wall at Coolest Projects and get more feedback from visitors.

Why Coolest Projects?
Their CoderDojo promoted Coolest Projects, and strongly encouraged the ninjas there to apply to attend and create a project that they were proud to showcase there.

Second World
Bucuresti Nord, Bucharest, Romania

Intelligentia

Category: Evolution
Number: 1
Girls: 0
Boys: 1
Ages: 16
Club: CoderDojo Dublin @ Zalando
Country/Region: Dublin, Ireland



Description of the project

An app that allows people to help the police to locate missing persons. The app is installed on a smartphone and runs in the background. When the police issue a missing person photograph, it uses facial recognition to check users' photos for a matching person, even in the background, and notifies them if they have a photograph that might be that person so they can choose to notify the police. Privacy concerns have been considered with all processing happening on the phone itself.

Story

The creator of the project has been involved with CoderDojo in Dublin for five years, attending, presenting at Coolest Projects many times, and mentoring other young people. The idea for this project came from the photographs regularly shared on social media to raise awareness of missing persons. By sharing the posts, people do something small to help with the problem. His work exploring facial recognition technology made him think he could implement something that allowed people to contribute by simply installing an app.

Choice of technology

The field of machine learning and facial recognition really interests him and he has been studying it in depth, building expertise in this area. He then looks for applications that he can use to apply the knowledge he has gained. His choice of project was defined by the technology, but in a very sophisticated way, as he sees himself building a specialist understanding and then applying it to create projects. He has access to hardware and is using this to build a Raspberry Pi HAT, but the present project just required a smartphone and a computer.

Team roles
One person did everything on this project.

Influences

Adults
His father is a software developer and has worked with and founded startups. He also spoke highly of the influence of his mentors at CoderDojo who have supported him.

Clubs
CoderDojo has been an important influence on him. He has been involved in CoderDojo Dublin @ Zalander for five years, since he was eleven. He is now involved in running the Dojo and supporting other young people. He goes to the CoderDojo twice a month.

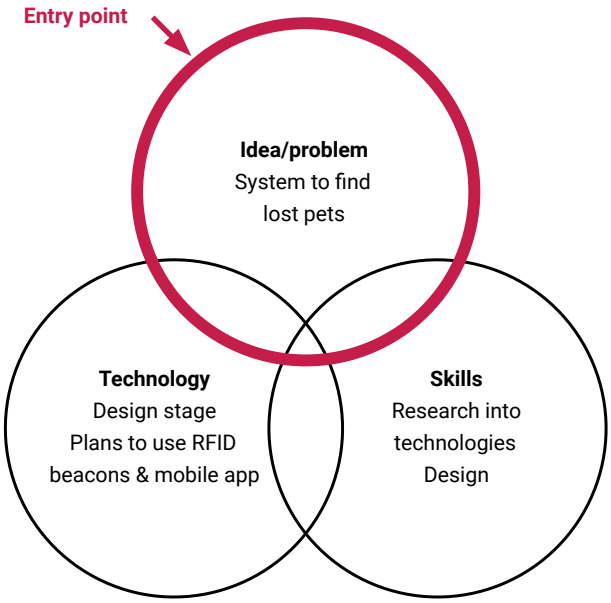
Learning
This project is part of an ongoing learning journey in AI, ML and facial recognition. The specific learning for this project was integrating elements of the project to work together, especially when those elements were implemented in different programming languages. The project works across multiple languages to use the best language for each element, but he also rewrote some elements in Python to make integration better. He also continued his learning in applying ML and facial recognition techniques.

Why Coolest Projects?
This is his sixth Coolest Projects. He thinks it's a really important event to build confidence and to learn to pitch your projects. He talked at length about how his confidence has been built by presenting each year. His other hobby is acting, and this has contributed to him improving in this field as well. He has seen a lot of other young people benefit from the events, and his friend won the overall competition two years ago.

Intelligentia
CoderDojo Dublin @ Zalando, Dublin, Ireland

IOT Project to track pets

Category: Mobile Appp
Number: 1
Girls: 0
Boys: 1
Ages: 12
Club: CoderDojo Belfast
Country/Region: Northern Ireland, UK



Description of the project

"The app tracks pets using a tracking device, finding their location through a web front end." At the time of the event, the mobile app was at the design stage. The creator had done substantial research on different tracking technologies and devices that can be used to track animals and has an elaborate plan about how to construct the project. He doesn't know what app software he will use, but for hardware he will use a beacon, a device that can be attached to a pet's collar and connected to a mobile app. It can contain different sensors, but he wants to start with the tracking one. He wants to use RFID tracking and data analysis when developing the app, to analyse the data about the pet's location. He presented the initial idea through a presentation.

Story

His friend could not find his hamster and after a week he sadly found it had died in his flat. He had the idea that this could have been prevented if the hamster had been found immediately. He started to work on a plan for a pet-tracking device that could be connected to a phone.

Choice of technology

The choice of technology stemmed from the requirements of the problem: a beacon with tracking sensor, RFID to track and analyse data, and a mobile app for a user to track their pet. he did a lot of research into suitable technologies.

Team roles
This was an individual project.

Influences
He started attending CoderDojo when he was around seven or eight, and has always liked technology. He likes creating with technology at home in his free time. He also attended Coolest Projects International two years ago.

Adults
His dad is good with technology.

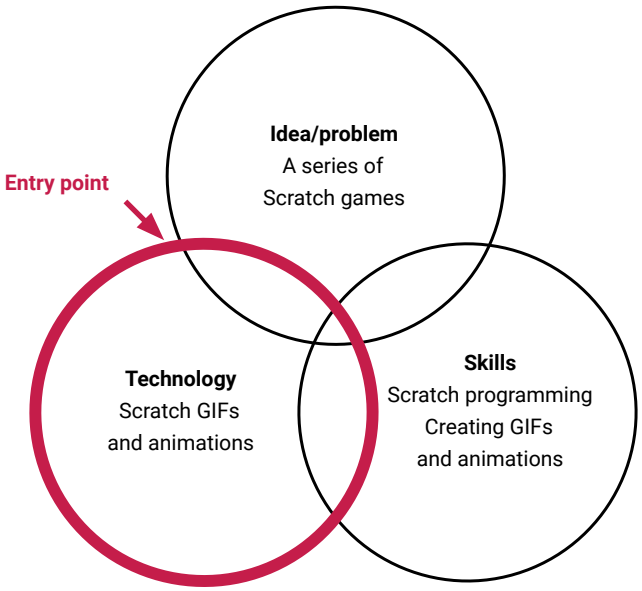
Clubs
His dad comes to Dojo with him at the beginning to see what they are doing and what to help him with at home, and then leaves him there.

Learning
At this stage, he mainly improved his interdisciplinary knowledge and skills. He had to learn about different companies and their tracking devices and sensors. He did research on different technologies that already exist to develop his idea further and plan his project. All of this is included and explained in his presentation.

The depth of knowledge about tracking technologies that he acquired during a relatively short time demonstrates that Coolest Projects has a strong potential to trigger children's investment in researching different ideas that are not directly linked to coding, but are essential for the project. We observed a strong entrepreneurial approach, intentional research of programming and non-programming concepts, and purposeful learning in many cases during Coolest projects events.

The Random Games

Category: Games & Web Games
Number: 1
Girls: 0
Boys: 1
Ages: 16
Club: CD Dublin 2
Country/Region: Dublin, Ireland



Description of the project

Six different games that run on one platform. Each game is in a different genre, one of them being a 3D game running on a 2D platform. A very complex project that combines Scratch with animations and GIFs used as costumes and backgrounds.

Story

The project's creator started working on the project bit by bit, working on individual games and on multiple computers. He then brought them together on one device and in one Scratch program.

He started his project as a part of a Twitter competition a year ago, which he was motivated to enter by the prize of a MacBook.
He had not done anything with technology before and only started to learn Scratch for the competition, also beginning to attend Dojo and another workshop. He did win the MacBook. He is very interested in art (drawing), and likes animations (he mentioned Dreamworks), so started thinking of combining his drawings with animations.

He now wants to create more games, and has also become interested in the business side of things. He wants to improve his presentation skills, as he will need this skill to present his games to people.

Choice of technology

Chance played a role in his choice to learn Scratch. The Twitter competition had three categories; HTML, Scratch and robotics. At first he wanted to do a robotics project, as it would fit nicely with his interest in anime. Then the category was called off, so he chose to work with Scratch as HTML seemed too hard. He started to research Scratch blocks and experiment with what he could do in Scratch to improve his games.

Team roles

This is an individual project.

Influences

Adults

His family includes doctors and artists, but he is the first member of the family to engage deeply with technology. His uncle does some programming, but does not seem to be a strong influence. Similarly his brother has done some programming in HTML but he does not consider that a major influence.

All his digital making really started thanks to a teacher whom he mentions frequently and who was evidently a significant influence. The teacher told the class about the Twitter competition and supported his work for it. The same teacher was looking for some people to attend Coolest Projects. The boy came as not enough people had signed up and he wanted to support the school.

Clubs

He started to attend CoderDojo after learning about the Twitter competition. He hoped that it would be a place where he can work on his project, learn and improve.

Learning

He demonstrates a deep understanding of different programming concepts, all of which he has developed through working on this project. He spent a very long time researching different Scratch blocks to find out what he can do with them, and gradually improved his game and made it more elaborate (this is the third version of the project). It is clear that he has put a significant amount of design and computational thinking into the project. Now he is motivated to learn more, specifically Unity to make better games.

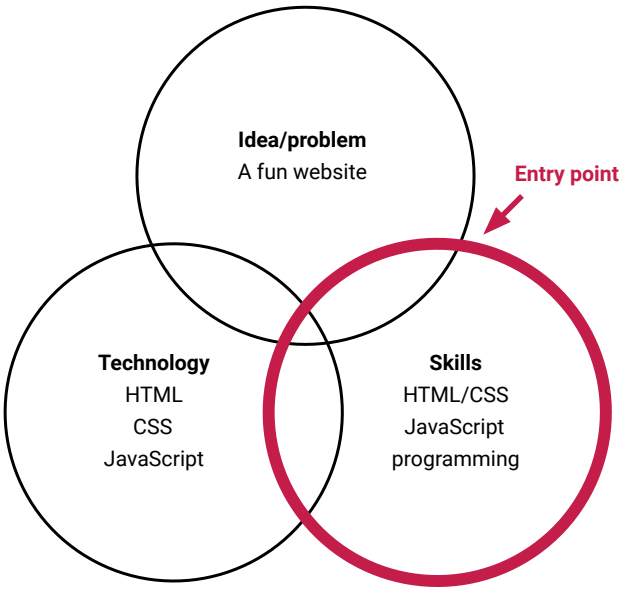
From the project it is clear that intensive work has been put into achieving a desired result. This also provided a motivation to be resilient and improve. It shows that once children find a project that interests them, are sufficiently motivated and receive enough support, they can become deeply invested and can improve significantly. His story is outstanding in its scale, but not unique in its principle: we observed similar patterns of learning in cases of less advanced projects and younger children.

Why Coolest Projects?

He decided to attend Coolest Projects for two reasons. One was to support the school (he felt sorry for the teacher who looked for people to attend but not many raised their hands). The second reason was to improve his skills at presenting to a wider audience.

sCATch

Category: Websites
Number: 1
Girls: 1
Boys: 0
Ages: 12
Club: CD Dublin 15
Country/Region: Dublin, Ireland



Description of the project

"A fun website where I experiment with HTML, CSS and JavaScript."
The showcased feature of the website calculates the time remaining until the user's birthday, and displays a "Happy birthday!" message on the day. It is based on the user's input of their date of birth.

Story

The project's creator heard about Coolest Projects from a friend who attended the event last year. They started to think together about a project that she could create. They came up with the idea of a 'Happy birthday'–wishing website together, but after this each of them worked on their own project (the friend's website is also live). Apart from coding, she also loves drawing (especially cats and unicorns), which she used to decorate her stand and website. She likes dancing and is a calm and confident presenter.

Choice of technology

She already knew how to build a website and developed ideas based on these skills.

Team roles

This was an individual project supported by the child's dad.

Influences

Although she has always liked technology, her engagement with CoderDojo was triggered by a friend whom she met at an after-school club (not related to technology) at her new school. The friend kept telling her how much she liked Coolest Projects and got her to come to CoderDojo, and as a result she started attending regularly. At her Dojo, she worked on her projects a little but mainly helped her little brother with his projects.

Adults

Her close family engages with technology. Her father works with software, attends Dojo with her and also volunteers there. He supervised her project and helped her debug the website when she needed help. Her mum works in the security and innovation technology industry.

Clubs

She and her little brother are a part of CoderDojo and their father is a mentor there.

Learning

She used a number of tools to program her website: HTML, CSS and Javascript. Although she already knew how to use the first two, she had to learn how to work with Javascript. She did so with the help of her dad and a w3schools.com website which she found very useful for her learning.

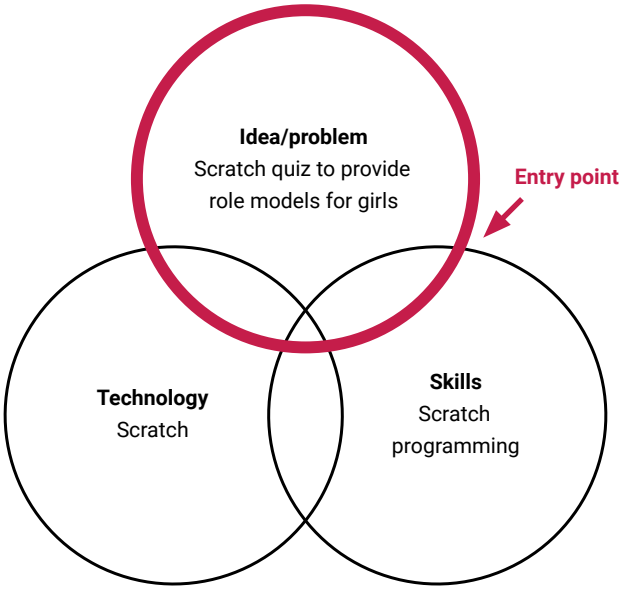
This case study suggests that once children have some knowledge that they can build on, it can give them confidence which enables them to resiliently learn a new programming concept and adapt a new tool. We observed this in many cases during Coolest Projects.

Why Coolest Projects?

Her friend kept telling her how great it was, so she decided to take part. The best thing about it was the chance to talk to other people about their projects and look for inspiration. She was also intrigued by activities such as a virtual reality stand and escape rooms.

The Rebel Quiz

Category: Scratch
Number: 2
Girls: 2
Boys: 0
Ages: 8
Club: CD Dublin@UCD
Country/Region: Dublin, Ireland



Description of the project

"Take a quiz to find out which Rebel Girl you are and complete a challenge to learn more." Girls programmed a Scratch-based quiz that generates an answer based on a number of questions, such as whether you prefers sports or concerts, or thinking over doing. The game is supposed to show positive role models to girls and was inspired by the book Goodnight Stories for Rebel Girls. The idea was to provide girls with inspiring role models. Some of the role models were modern celebrities (such as the Spice Girls) and some were historical heroes about whom the girls learnt from the story book.

Story

The main interviewee got into coding through her friend, who had been told about Dojo by her teacher. Her friend started to attend and took her along. Since then, they had both got more into coding. She regularly attends Dojo and now tries to program some games at home on her own. Her free-time involvement with tech developed after the two girls started to work on their quiz.

Choice of technology

It seemed that Scratch was an automatic choice as it was what they used at their Dojo.

Team roles

The girls worked on the project together, although one seemed to have more technical knowledge and understanding of the code. However, it is clear that the other contributed to the project, and is inspired to learn more about coding thanks to her engagement with the quiz.

Influences

The theme of the project seems to have been inspired by an upsetting experience at school in the UK. After watching a film, the girl wanted to become a mechanical engineer, but a teacher told her that it was a job for boys. The family moved back to Ireland, where the girls met, and she got interested in coding after they were told about CoderDojo by a teacher.

Adults

One mother supported the activity but did not help with coding herself. The other child's dad attends Dojo with her, and her grandfather is a volunteer there. Both of them helped the girls to code their project.

Clubs

Both girls decided to attend Coolest Projects after coming to Dojo where they got to know about it.

Learning

The girls benefited from their work on the project. One has been taking notes in her Dojo sessions and learning more about blocks in Scratch. The other started to engage with digital making as a result, demonstrated how the project works and was very proud of it, wanting to learn more. She also learnt about the different female characters and role models that they researched while creating the quiz, an example of interdisciplinary learning.

For one team member the project was not really about coding a quiz; it was about helping girls find their role models. However, her friend's interested in coding and the interesting topic of the project served as a trigger that got her engaged. Although she seemed to be the one with less involvement in programming the project, she still feels a strong ownership of it and started to engage more with digital making as a result of this positive experience. Her work on the project equipped her with confidence stemming from a sense of achievement.

The Rebel Quiz
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CoderDojo