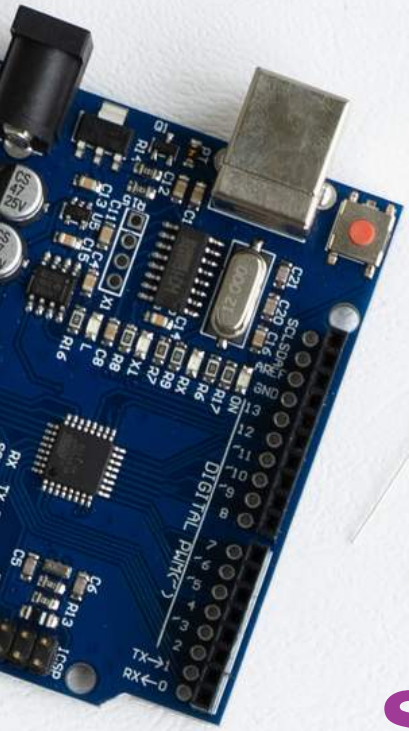

TheScottish
Rural & Islands
Transport Community
A Community Interest Company

SUSTAINABLE TRANSPORT STEM CHALLENGE

SRITC report for Rural Communities Fund

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June 2023

Scavenger hunt photos for STEM

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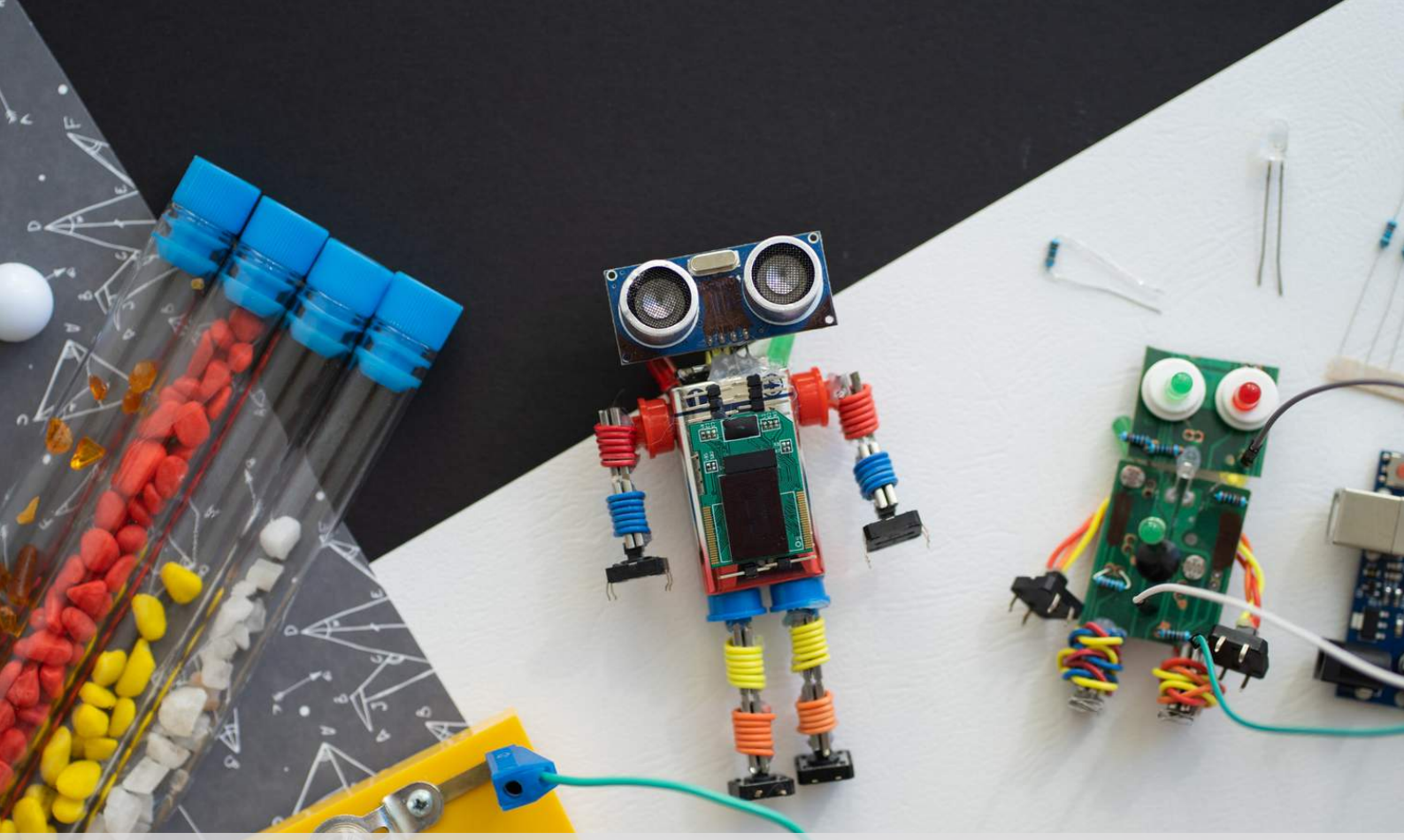

Acknowledgements

The Scottish Rural & Islands Transport Community would like to thank Inspiring Scotland, Rural Communities Ideas into Action Fund and Scottish Government for providing us with the opportunity to undertake this consultation process and complete the development of this report.

Thank you to all participants of the online workshop, those that have been involved with informal interviews and aided the trip to Orkney.

Scottish Government
Riaghaltas na h-Alba
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INSPIRING SCOTLAND

UN Sustainable Development Goals relevant to this research:

Executive Summary

The Scottish Rural and Islands Transportation Community ("SRITC") CIC is a social enterprise that works with stakeholders at every level in Scotland. The ethos and vision of SRITC is to be the collective voice for rural and island communities to help deliver a better transport future and represent the transport needs of residents to those who can facilitate change. SRITC understands the extent to which sustainable transport contributes to well-being and the principles of community wealth-building.

In 2022, SRITC CIC published a report entitled "Spotlight on Rural & Islands Transport Report 2022" which outlined 6 Big Asks as a result of the findings. To fulfil Big Ask number 5 (BigAsk5), a Sustainable Transport STEM challenge, a successful application was made to the Rural Communities Fund (RCF) to gather the knowledge and evidence to aid the design of the Challenge.

This report is based upon three months (January to March 2023) of research which involved desktop research, informal interviews, a visit to Orkney, and an online workshop into sustainable transport and STEM. A State of Knowledge Review was undertaken to establish a baseline and identify any strengths or weaknesses in the current literature. The findings of all these activities form the basis of the BigAsk5 Pathway, which includes four Recommendations and five Stepping Stones. This report provides useful resources for practitioners, a Stakeholder Map, five Case Studies and nine STEM Fictional characters (personas).

The Findings are divided into 4 sections. Section 1 explores the activity, type and location of STEM available to young people and the alignment with taught subjects. Section 2 presents six case studies: Children's Health Scotland; the Jim Clark Trust Scottish Electric Chariot Championship; Academy9; School Run to Net Zero; the Young Islanders Network Transport Questionnaire; and the Inspiring Futures programme in Shetland. Section 3 outlines the online workshop outcomes and Section 4 the developed personas.

The BigAsk5 Pathway has two routes, one for recommendations and the second called "Stepping Stones", which are actionable steps. The four recommendations are based upon the evidence collected:

1. Improved communication and coordination
2. Harnessing procurement opportunities
3. Keeping it local
4. Don't reinvent the wheel.

These recommendations are for practitioners (schools, youth groups etc.) and policymakers.

The second route of the Pathway are the "Stepping Stones": 1) to develop the Scottish Sustainable Transport STEM Cluster; 2) to work collaboratively to Champion Rural STEM, including in the field of transport and mobility; 3) to continue fostering connections with youth organisations and groups; 4) to design and deliver a Rural Sustainable Transport STEM Challenge Framework and 5) to design and deliver a Sustainable Transport Challenge for rural utilising recycling and reuse with an online element.

To conclude, of 14 STEM transport related activities in Scotland, only three had a rural or island focus: Academy9; School Run to Net Zero; and the Young Islanders Network. The need for an online or hybrid challenge which would be available to those in rural and island areas was identified. Indeed, Stepping Stone 5 is also based upon the discoveries of this work, namely that there are Sustainable Transport Challenges and activities available but they aren't readily accessible online. The Framework (Stepping Stone 4) will involve an online presence which is thematically organised, to showcase existing and any new sustainable transport STEM resources. Stepping Stone 1 has been a by-product of the research with a database of over fifty organisations/businesses created, which leads to the opportunity to form a cluster and the opportunity to champion rural in STEM and bring young people into the fold (Stepping Stone 2 and 3).

From the evidence, it was clear that "rural" did not appear as a strong theme in STEM, including in the field of transport. There are existing and emerging skill gaps and the need for a diverse and dynamic workforce to sustain economic development and to fill these gaps. This report provides the basis for a change and a tool to help others deliver STEM more widely and specifically in the field of transport and mobility.

Introduction

The Scottish Rural and Islands Transportation Community ("SRITC") CIC is a social enterprise that works with stakeholders at every level in Scotland. The ethos and vision of SRITC is to be the collective voice for rural and island communities to help deliver a better transport future and represent the transport needs of residents to those who can facilitate change. SRITC understands the extent to which sustainable transport contributes to well-being and the principles of community wealth-building.

The Scottish Government's Rural Directorate commissioned SRITC's "Spotlight on Rural & Islands Transport Report 2022" with the remit to provide evidence on the National Transport Strategy 2 (NTS2) from a rural perspective. As part of the report and consultation with rural stakeholders, SRITC made 6BigAsks (recommendations) that the Scottish Government should support, one being the development of a Sustainable Transport STEM (Science Technology, Engineering and Maths) Challenge. The evidence gathered highlighted that rural and island young people will be the best placed to tackle the rural and island transport challenges of the future.

> BigAsk5 is for a national sustainable transport STEM challenge aimed at young people across Scotland's rural and island communities would harness their first hand experiences of how transport services limit their social and economic mobility and catalyse the creation of science-based ideas that help to resolve these issues. These ideas would tackle real and pressing challenges in their community including active travel, last mile deliveries and ride-sharing. These young people deserve the opportunity to participate in the design of the transport systems that will support them as they grow older and their energy, intellect and imagination are valuable assets and need to be nurtured.

Quote[1]: Spotlight on Rural & Islands Transport – Response to NTS2 Consultation (2022)

Inspiring Scotland's "Rural and Islands Communities: Ideas into Action" has funded SRITC to develop a 3 month project (January - March 2023) to develop a Sustainable Transport Challenge (STC) for rural and/or island young people, who often miss out on more urban STEM outreach opportunities. To that end, SRITC brought experts from the STEM and transportation communities together to help formulate a STEM project that promotes transportation, helps to foster a critical thinking and problem-solving mindset, and inspires young people to consider a career in transportation.

1: https://ruralmobility.scot/images/Spotlight_on_Rural__Islands_Transport_by_SRITC_June_2022.pdf

Figure 1 demonstrates the direction and flow of the project in understanding and designing a Sustainable Transport Challenge (STC). However, after initial Desktop research and conducting a few informal interviews, it became apparent that a few STCs already exist, for example: Academy9 and School Run to Net Zero. Academy9 is linked with the infrastructure build of the A9 Trunk Road and is available to schools and groups along the route, embracing both rural and urban young people. Then the School Run to Net Zero based in Orkney which incorporates travel and the potential to minimise fuel usage in the community.

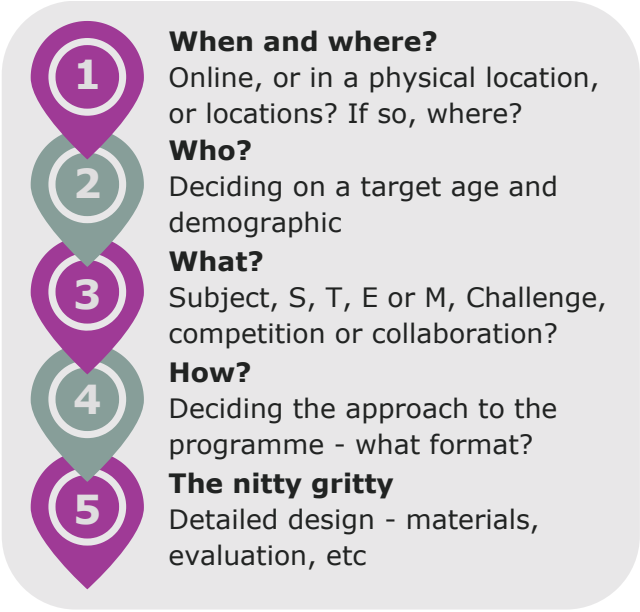


Figure 1: Designing our Sustainable Transport STEM Programme

To that end, the direction of the project altered and explored if any gaps existed in transport STEM challenges for young people in rural areas. Alongside that, whether there were further opportunities for collaboration between organisations to strengthen the current offerings.

Methodology

This project was a three month project to develop understanding of STEM provision in Scotland, with particular reference to children and young people in rural and island areas. The project involved a mixture of qualitative and quantitative steps to try and engage the relevant stakeholders. These ranged from desktop research, stakeholder mapping, informal interviews and an online workshop, all of which are part of the Design Thinking Principle and that of co-design and participatory organisation. This section provides an overview of the methodology and tools involved during this project.

Desktop Research - State of Knowledge Review

An exploratory approach to the desktop research was taken with four key objectives in mind. Firstly, to understand what examples of interesting or excellent STEM activity provision existed in Scotland and further afield, and more specifically that focused on transportation and mobility. Secondly, the research aimed to identify key organisations involved in Scotland (and the rest of the UK) in the delivery of STEM challenges and projects. This evidence-building would contribute to the Stakeholder Mapping exercise. Thirdly, the desktop research would contribute to a State of Knowledge section which would outline the current situation in Scotland and provide an evidence base for moving the project forward. Finally, it was hoped that key organisations, not directly linked or obvious to a Sustainable Transport STEM challenge, would emerge.

A key word search online was also undertaken, using the following terms (not an exhaustive list) as part of the knowledge review:

- STEM, science, engineering, physics, chemistry, transport, mobility;
- Scotland, Europe, EU, United States, Canada;
- girls, gender, non-binary, boys;
- neuro-divergent, dyslexia, dyscalculia;
- best practice, excellence, things to avoid, lessons learned;
- public transport, cars, aviation, trains, buses;
- remote, rural, island, virtual, online, digital.

The desktop research identified over 50 different stakeholders and several case studies, many of which were invited to the Online workshop.

STEM Activity Analysis

The project pinpointed a cross-section of 50 initiatives across the STEM programme ecosystem with a focus on transportation challenges. By analysing data on programme delivery, a more comprehensive understanding of the strengths and weaknesses of the STEM landscape with regards to the topic of sustainable transport emerged.

Informal Interviews and Islands Visit

Additionally, a SRITC researcher visited Orkney and spoke with a number of Island stakeholders which shone a light upon one project: School Run to Net Zero - Glaitness School (Further details are set out in the Case Studies in the Findings Section), and an organisation, the Orkney Youth Cafe. The Cafe offered an opportunity to learn about the work conducted by the Young Islander organisation and their Island Transportation challenge. This looked at the successes and challenges of transportation in Island communities.

The informal interviews were held as part of the desktop review, when an organisation or project required further insight or understanding. Along with the trip to Orkney, these methods not only helped develop the knowledge and evidence base but also shaped the Stakeholder Map and the participant list for the online workshop.

Stakeholder Map

The Desktop review unearthed organisations, challenges and projects which were collectively synthesised and mapped. This information then provided the basis for a STEM Stakeholder Map (Fig 2) which remains live. This map was used as a tool within the recruitment process for the online workshop and the surveys.

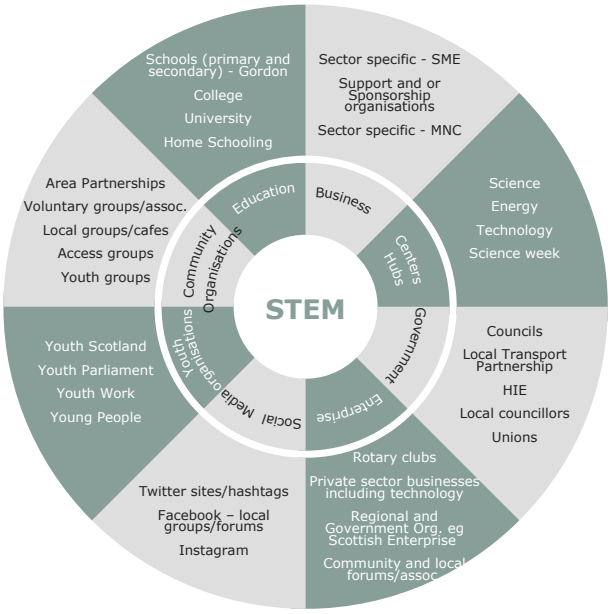


Figure 2: STEM Stakeholder Map

Online Workshop

An online (Zoom) workshop which was held in March 2023 with four objectives:

- To bring together a cross section of organisations and individuals involved in the delivery of STEM to share learnings and insights;
- To share SRITC's research findings on how STEM has been delivered and the options that currently exist;
- To use Story Cubes to create fictional young people personas;
- To consider the next steps.

Using Online tools such as Padlet, participants were involved in a "Day in the Life" exercise as an icebreaker after which SRITC shared the collected insights and evidence. To keep people moving, a scavenger hunt was performed by all participants. The main element of the workshop was dedicated to group work focusing upon developing Personas and addressing five key questions:

- Are there any gaps in the current STEM offerings? If so, what are they and how do we fill them?
- Thinking of the Personas, is the current array of identified transport STEM projects fit for purpose?
- Are there opportunities for some different STEM offerings to combine? If so, what/who/how?
- In your group's opinion, which are the top three best placed methods for delivering STEM e.g. practical kit, online competition etc? Please state the reason for selecting the three methods.
- What does a Scottish Sustainable Transport STEM programme look like? Is it a) to continue working as individual organisations, b) working together or c) working under a common programme/umbrella?

The Personas were developed by each group, using a cube presented via Powerpoint (Fig 3) to create a fictional person. Using the 'boxes' in the story cube as prompts to create the person, the groups created their fictional characters. This is a dynamic and fun way to engage participants, whilst also learning and contextualising the challenges and opportunities in ST. Not only did these cubes develop personas but future scenarios relevant to personas.

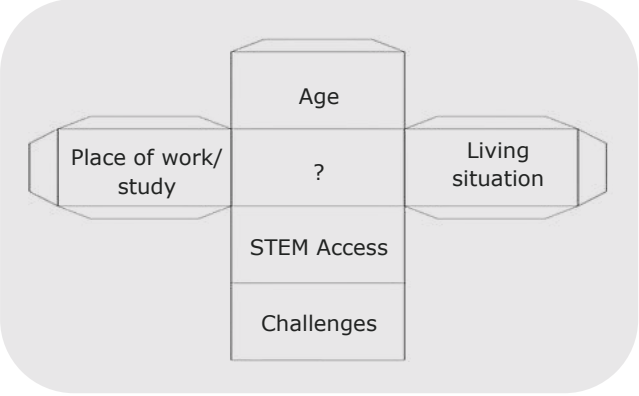


Figure 3[2]: Story Cube

These methods permitted engagement with a diverse range of stakeholders in a short space of time. It was a challenge to engage with younger people and schools and this was in part due to ongoing strikes and issues surrounding GDPR.

2: https://www.storyboardthat.com/create/story-cube-worksheets

State of Knowledge Review

SRITC approached the review from the standpoint of a CIC advocating for better connectivity and quality of life in rural and island areas. SRITC does not deliver STEM activities but identifies STEM learning as an important vehicle to promote innovation in rural areas and a method to facilitate socioeconomic development in rural areas. This report developed a state of knowledge review which has three sections: The UK-wide STEM landscape; STEM in Scotland covering available Sustainable Transport; and STEM challenges policy and delivery.

UK-wide STEM landscape

The ecosystem of STEM activity in the UK, at higher education and industrial level is strong, however at primary and secondary school level there is an acute and chronic shortage of suitably qualified teachers. This mismatch in the availability of teachers with the plentiful activities, as evident on the STEM Learning [3]database which offers access to many resources and access to 17 STEM Ambassador hubs across the UK (of which the Scottish hub is SSERC, see below) is a key concern.

Research published by the Royal Academy of Engineering (RAE) in 2016 found that engineering in the UK generates up to an estimated £645bn Gross Value Added (GVA) to the UK's economy annually – equivalent to 32% of the country's economic output.[4]

The same research also identified a number of hotspots in the UK for engineering: Mid Ulster, West Cumbria, Flintshire and Wrexham, West Lothian, Aberdeen and Aberdeenshire were all identified as areas where a high proportion of the local population is employed in engineering.

The RAE report on "The UK STEM Education Landscape" (2016) sets out the organisations involved in the delivery of STEM activities and a summary of how the education system in England and Scotland promote and or manage STEM. RAE identified over 300 providers of STEM activities across the UK with one finding of the report being that STEM career pathways had a significant impact on the UK economy. The RAE also sets out the main challenges (Fig 4) limiting young people from pursuing STEM related careers and which if resolved, would result in an increase in the number of people pursuing an engineering career pathway. The UK Commission for Employment and Skills (UKCES) highlights that there remain shortages of skilled STEM workers year on year, particularly in the innovation sector and this includes Scotland (Table 1).

3: www.stem.org.uk
4: A hotbed of innovation: New research reveals engineering adds up to an estimated £645bn to the UK's economy annually (raeng.org.uk)

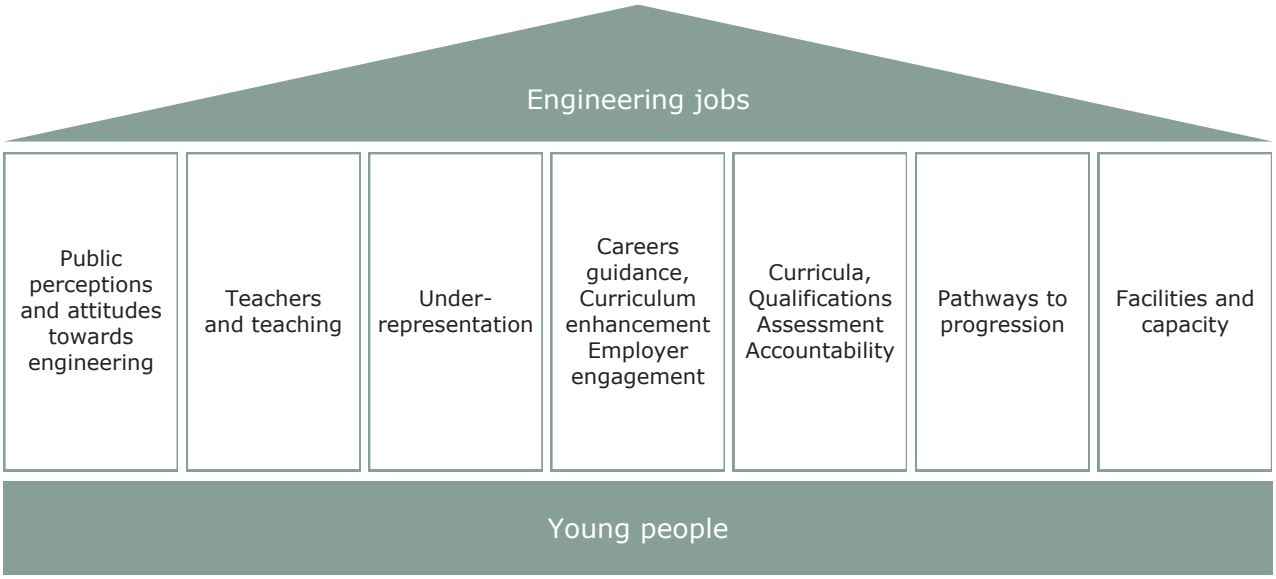


Figure 4[5]: Challenges for Young People

STEM in Scotland

STEM activity in Scotland is a vibrant field. Each of Scotland's four large cities has a Science Centre; there are annual Science and Tech Festivals, and activities tied to the annual Science Week. Some of the Scottish universities have outreach and access, and there are many small and medium sized enterprises working in innovative fields. While there is a whole constellation of providers in Scotland, there is no obvious single overarching framework for STEM activity.

Most STEM activities for young people are delivered through schools and colleges, and at present there is an acute shortage of STEM teachers. There is currently an annual shortfall in the target intake for new teachers, despite £20,000 bursaries being offered for STEM subject student teachers. Table 1 indicates the extent of the shortages, with only 46% of the Student Funding Council target accomplished.

Scottish Funding Council Target for 2022	Subject	Actual Intake 2022	Actual Difference
163	Biology	107	-56
159	Chemistry	48	-111
52	Computing	26	-26
250	Maths	114	-136
131	Physics	60	-71
85	Technological education	34	-51
840 total		389	451

Table 1[6]: STEM in Scotland

The above staff shortages should be seen in the context of real term education funding cuts in the UK since 2010. This has had an impact on school subject choices by young people which in turn can close off access to STEM subjects in higher and further education.

The Scottish Government recognises the importance of fostering STEM activities and development with STEM responsibilities part of the portfolio of the Minister for Higher and Further Education[7].

5: Royal Academy of Engineering (2016)
6: Scottish Government (2023)
7: https://www.gov.scot/about/who-runs-government/cabinet-and-ministers/minister-for-higher-and-further-education-minister-for-veterans/

Recent commitment was announced in February 2023, by the Scottish Government that ScotWind, representing the offshore wind industry, was committed to providing £900,000 to the University of Highlands and Islands's initiative to promote careers in STEM to primary school children across the north of Scotland (UHI, 2023).

Other organisations involved in Scotland include STEM Learning, Skills Development Scotland and the SSERC (Scottish Schools Education Resource Centre).

The latter offers a broad portfolio of services in support of STEM in the curriculum, including the provision of professional learning for Early Years practitioners; primary and secondary school teachers; school and college technicians; and childminders. It also offers an Advisory Service, and wider engagement activities including the Young STEM Leader Programme, management of the STEM Ambassadors in Scotland Hub, the Scottish STEM Placements Programme and Education/Industry Partnerships, etc. (Table 2).

Workstream	Aim
Professional learning	To increase the breadth and impact of the professional learning offering.
Advisory service	To further develop and promote the Advisory Service.
Outreach work	To increase capacity and capability to offer a greater volume and range of Professional Learning via SSERC accredited centres and the use of digital communication and technology.
Evaluation activity	To use evaluation data to influence the direction of all SSERC workstreams and publish using various channels, e.g. website, academic journals, social media.
School technicians	To raise the professional status of school technicians and promote the role they play in the education community in Scotland.
Business development activity	To increase income streams from non-traditional sources to allow for increased capability and activity.
Wider STEM engagement	To increase the level of STEM engagement.
International activity	To participate in a range of international activity linked to SSERC's three core functions.

Table 2: SSERC Eight STEM workstreams [8]

8: SSERC (2022) Annual Report

Skills Development Scotland is the national skills agency for Scotland, with more than 1,400 staff working across the country in schools, careers centres and partner locations. For an example of its engagement, My World of Work Live has a project aimed at school children which offers a programme of interactive activities aimed at helping young people understand possible future careers. This project works in partnership with industry and offers activities such as how to pilot a drone, and real-life applications.

The Procurement Reform Act (Scotland) 2014, tying community benefits to procurement, has been transformative, though the stakeholders involved felt the act had been underused and required monitoring. Aspects of the Act include youth outreach as part of Corporate Social Responsibility; Diversity, Equality and Inclusion. An example of good practice the Inspiring Scotland's Future Engineers initiative by Transport Scotland. This is an expanded education programme for schools using the Queensferry Crossing.

In the private sector, companies such as Balfour Beattie have initiatives, such as the Virtual Work Experience, to make a positive social impact or working with prison and young offender institutes to help some of the most disadvantaged in society. Balfour Beatty are also members of The 5% Club, an employer-led organisation set up by Chief Executive Leo Quinn. The 5% Club aims to tackle the dual issue of skills shortages and youth unemployment. Over 250 members including FTSE-listed firms and SMEs aspire to meet a 5% figure for apprentices, graduate recruits and sponsored students within their workforce.

The aim is to unlock the next generation's potential and enhancing the national skill base.

The Royal Navy is another organisation supporting STEM and young people by providing a Greenpower/Chariot car to schools throughout Scotland. The Royal Navy provide a range of support for schools from tool kits, spare parts to manpower and helping with practical matters like transporting the 'car' to events.

Finally, there are a range of tech start-up incubators including Codebase in Edinburgh. Their aim is to work with businesses and young people to build culture, community and education that promotes and supports tech innovation. Examples of the programmes and scale-ups can be found here on their website.

STEM Policy in Scotland

The Scottish Government's STEM Education and Training Strategy Second Annual Report (2020), identified rurality as one of the equity gaps in STEM learning in Scotland, as well as gender, deprivation, race and care experience.

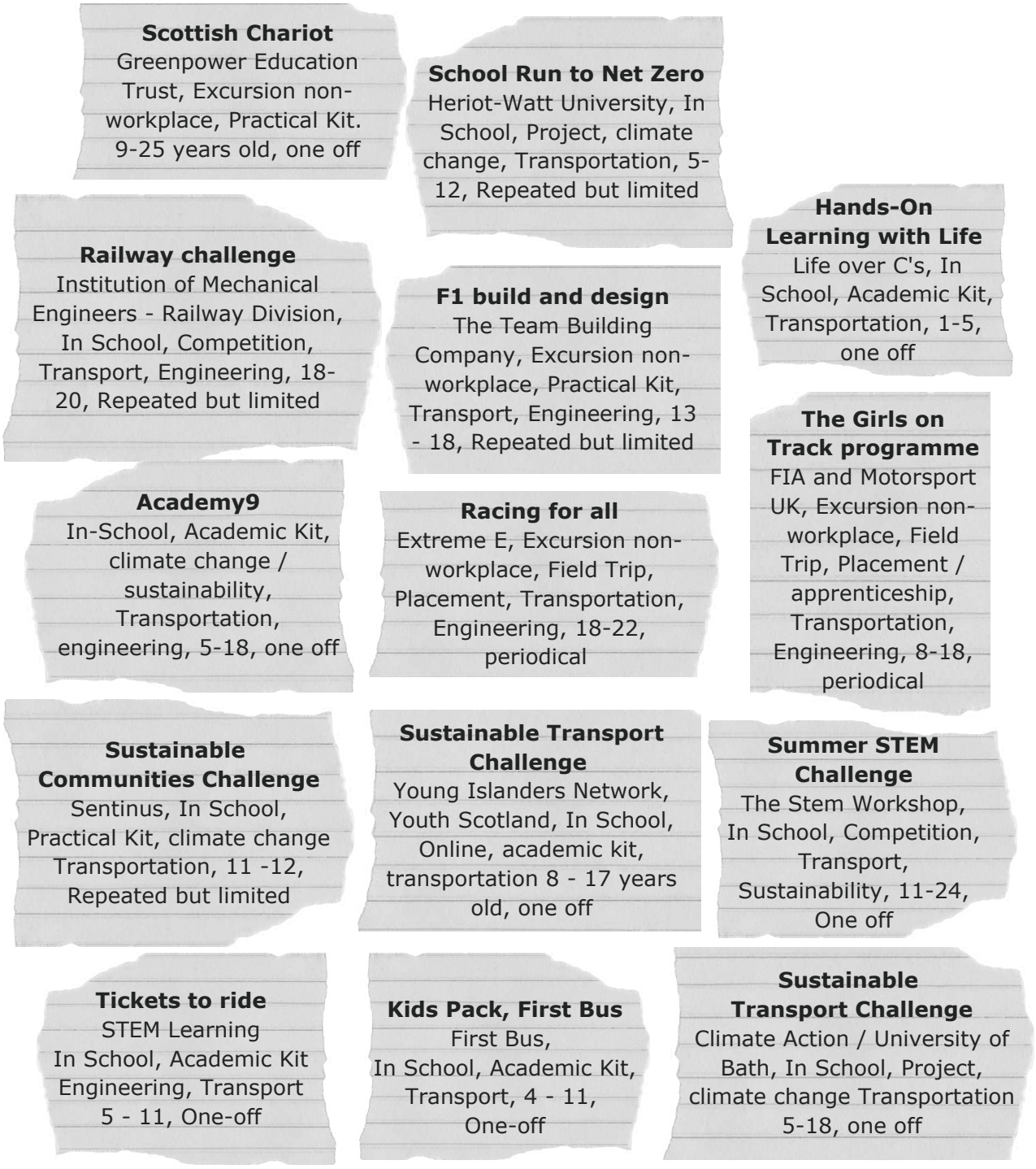
Sgoil Bhreascleit on the Isle of Lewis; Aviemore Early Years and Childcare; and the Dunoon Cluster were given as examples where interventions had been made to reduce the potential inequity of rural or island settings.

A year later the Third Annual Report (2021) explained that grants had been provided to the Institute of Physics, the Royal Society of Chemistry and East Ayrshire Council, as part of deliberate action to assist planning interventions in remote and/or rural locations.

STEM Transport Challenges in Scotland

The research identified 14 STEM initiatives (Picture 1) focused on transportation in the UK with all bar the challenge run by the University of Bath, are applicable in Scotland.

None of the 14 projects were applied purely in a rural transport context, however, all incorporate activities with rural elements in the programme. More generally, 80% of STEM transportation-related programmes did so in conjunction with another STEM topic and "sustainability" and "net-zero" themes appeared in around a third of these challenges.



Picture 1: Sustainable Transport Challenges

STEM Delivery in Scotland

How STEM is delivered varies in approach throughout Scotland from STEM Learning creating activities accessible by educators over the internet to organisations like Mangorolla CIC who deliver "I'm a Scientist", a digital platform for young people to ask questions and interact with STEM based professionals. In contrast, others prefer practical kits like that delivered by the Future Group based in Aberdeenshire.

The group provides science and technology STEM sessions at small rural schools using practical kits (Picture 2) ranging from electric circuits, making batteries, understanding atoms and molecules to kits used to explore the four main states of matter: solids, liquids, gases and plasma. For those 'home-schooled'[9] there is a Science Club but it is not uncommon for families to travel a 3hr round trip, by car, to attend.

A vital component in any STEM challenge is that of support. STEM Ambassadors (coordinated by STEM Learning) is just one example: volunteers work in a variety of STEM subjects that support schools in delivering activities. Other organisations like the Chartered Institution of Highways and Transportation (CIHT) also offer volunteers and support with over 40 Ambassadors in Scotland.

Picture 2: STEM Practical Kits

9: https://www.futuregroup.org.uk/

Building on existing active or sustainable transport initiatives

Stakeholders presented a number of active travel projects and programmes for schoolchildren and young people, which also include building in a STEM component. Firstly, Forth Environment Link have pupil-led active travel projects in five high schools across Stirling and Lornshill. Potential STEM elements for inclusion range from app-building, activity tracking, mapping and GIS, or competitive gamification. Secondly, Aberdeenshire Council have some resources to help teachers embed active and sustainable travel into the curriculum. The project highlights the experience of a young person combining Mathematics with Sustainable Transport:

> "Through practical activities which include the use of technology, I have developed my understanding of the link between compass points and angles and can describe, follow and record directions, routes and journeys using appropriate vocabulary"
>
> PROJECT PARTICIPANT

Findings

There are four sections to the findings of this report. Section 1 focuses on a cross-section of STEM activity, type, subject and location and the patterns that emerge from these data points. Section 2 is five case studies: Children's Health Scotland; the Jim Clark Trust Scottish Electric Chariot Championship; Academy9, School Run to Net Zero; and the Young Islanders Network Transport Questionnaire. Section 3 focuses on the qualitative data generated during the online STEM workshop conducted with various STEM stakeholders and finally Section 4 presents a series of personas developed during the STEM workshop highlighting the challenges that circumstances cause young people.

1.STEM Activity, type, subject and location

Overall, there are over 300 STEM providers covering STEM in the UK, but specifically this research identified only 14 providers (Picture 1) looking at the field of transport.

This research examined a cross-section of the STEM programme ecosystem, looking more specifically at around 50 STEM providers and associated activities which were analysed further into a number of data points: (1) transport related; (2) organisation; (3) Summary; (4) Activity Site; (5) Activity type; (6) frequency; (7) area of STEM; and (8) audience. The identification of relevant data points facilitated the identification of gaps in activities of providers and potential opportunities.

The data points collected in the cross section are divided into the following:

STEM Activity Analysis

Data point	Comment
Transport related	The overall aim of the project is to identify transport related STEM providers. This datapoint was selected in order to easily identify the relevant providers from the cross-section of providers.
Organiser	Organisers can provide multiple activities on different topics. Organising the dataset by organisers allows for the effective grouping of activities by providers.
Summary	The summary details the activities and the concept behind each activity. The summary provides depth to the dataset and allows further interrogation by the report.
Activity Site (In School, Excursion non-workplace, Excursion workplace, Online, Conference)	Identify the activity site is important for this research due to the rural focus of SRITC as access to online activities and physical locations is more nuanced in a rural setting and can form a barrier to the access to programmes and education.
Activity Type (Field Trip, Project, Practical Kit, Academic Kit, Debate, interviews, competitions, placement/apprenticeship)	Activity type allows the identification of whether an activity will be appropriate for a certain type of community eg. rural. This category is to some extent connected to the activity location and determined by the outcome and resources available to the delivery.

Data point	Comment
Area of STEM (Biology, Ecology, Physics, Technology, Engineering, Mathematics, Computer Science, Careers, General Science, Climate change/sustainability, Chemistry)	STEM stands for Science Technology Engineering and Maths. The reason why this data set includes additional fields of study is to provide a richer set of data and, more specifically, identify the areas of STEM covered by providers.
Audience (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22)	Target audience is decided by the provider. While the nomenclature of primary, secondary, and university-level students is ubiquitous in the education industry, STEM providers target activities to specific year groups. It would therefore be unrepresentative to group age ranges in this dataset.
Frequency and duration (Ongoing, Repeated but limited, One-off, Periodical)	Frequency was selected as a data point as it impacts the level of engagement and accessibility of programmes. It also indicates the timeframe of projects.
Link	For additional information, links to the website presence of programmes are added to the database.

Table 3: STEM Activity Analysis

Activity Type

From the cross-section research, a number of trends in the STEM ecosystem became apparent, many of which were discussed through the informal interviews.

Of the 50 providers that were analysed, the majority offered activities in the form of academic kits (Fig 5) which included 'work books' and 'problem question' to explore with students. The primary reason for this trend related to the cost efficiencies of producing a workbook, most notably once it was created it could then be easily disseminated and repeated. While this is easy for providers to create, there is still a burden, of the 18 providers focusing on providing academic kits, 15 were designed to be conducted in the classroom. Teachers have indicated that they are already stretched to deliver the curriculum without adding additional STEM work. This means that resources are not utilised by schools due to a lack of capacity on the part of the teacher.

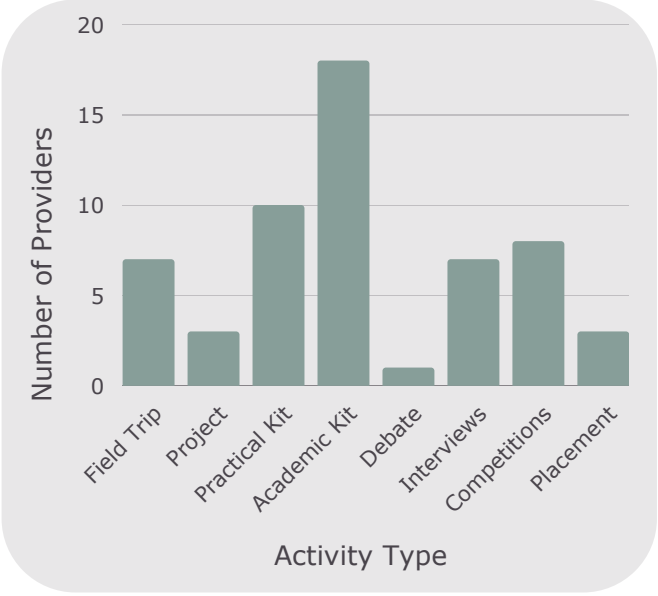


Figure 5: Activity Type

STEM Subjects

Excluding the providers/activities related to transportation which formed the focus of the research, the most prevalent STEM subject is engineering (Fig 6). The popularity of this topic is similarly related to the academic kits in that it is simpler to create a practical kit which can be posted to students.

This is also reflected in the transport related STEM projects where 7 out of the 14 providers looked at transportation through an engineering lens.

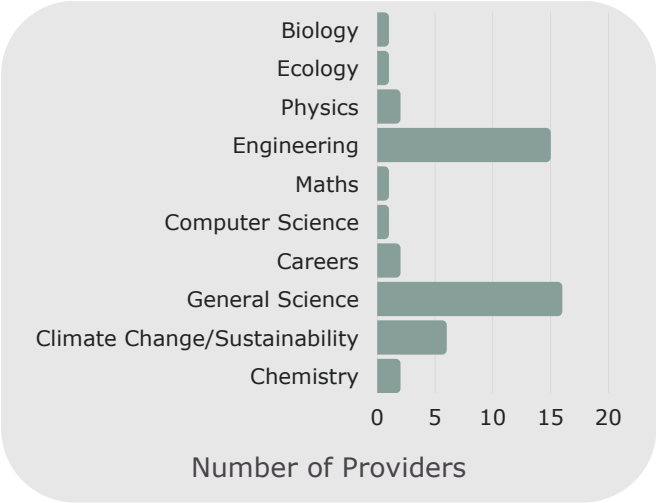


Figure 6: Areas of STEM

STEM Activity Locations

The large majority of activities took place in schools, with excursions (non-workplace) significantly further behind. Fig 7 shows the spread of STEM activity locations from conferences, schools, the workplace to online for the 44 providers. A repeated commentary from practitioners was the difficulty of juggling curriculum teaching with STEM activities as there continues to be an over reliance on developing STEM programmes for in-school use.

Also, having reviewed the available transport STEM challenges, it was evident that there was a clear mixture of delivery methods alongside different audiences, but in the main these were targeted at school aged young people and/or those based in more urban areas. The preference was for academic or practical kits with engineering and general science popular STEM subjects.

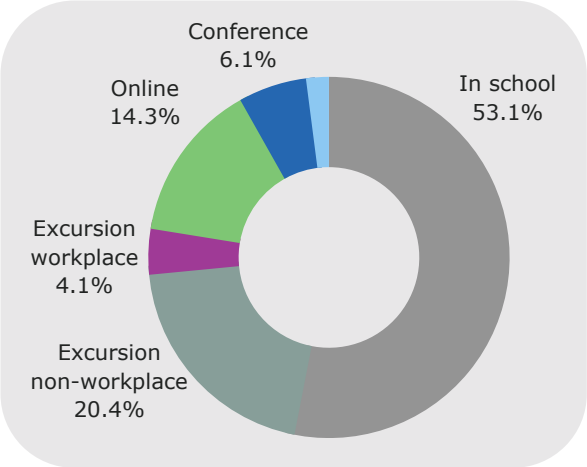


Figure 7: Activity Sites (44 STEM providers)

2. Case Studies

From the desktop research, informal interviews and the Orkney Visit, six case studies stood out: Children's Health Scotland; The Jim Clark Trust Scottish Electric Chariot Championships; Academy9; School Run to Net Zero - Getting to School the Glaitness Way; and the Young Islanders' Network Transport Questionnaire; and the Inspiring Futures programme in Shetland. This section outlines these case studies.

Case Study 1: Children's Health Scotland: SMS Connect

Although not designed as a STEM challenge, Children's Health Scotland's SMS Connect Project provides a potential model for future challenges. Young people can be referred or self-referred to participate in the programme and the organisation is funded by the Scottish Government.

Children's Health Scotland offers an online Self-Management Skills Programme (SMS:CONNECT) for children and young people living with health conditions, particularly those living with long-term health-conditions.

It is aimed at young people aged 9 to 17 years and runs over six weeks through a dedicated online platform, Digital Bricks Learning. Each week, there are two one-hour sessions for the two age categories - children aged 9 - 12 years, and young people aged 13 - 17 years.

Each participant receives an information pack (Picture 3) which contains envelopes for each week's activities. The groups have ten participants and two coaches. The online sessions have a mixture of activities and games and address a range of topics in a "light-touch" fashion, thinking about health, stress-management, coping with change, and healthcare rights. One of the aims of the programme is "to improve the relationship you have with your health and well-being, and building your confidence and self-esteem." The children and young people are encouraged to work on their communication and build friendships in a safe but informal setting. Each young person has tailored calls with a coach and on completion of the programme receives a certificate and the ability to join the online community hub.

Picture 3: Participant's information pack

Picture 4: SMS: Connect[10]

Case Study 2: The Jim Clark Trust Scottish Electric Chariot Championships (SECC)

The Jim Clark Trust Scottish Electric Chariot Championships (SECC) is a not-for-profit which aims to engage young people across the nation in STEM. The SECC provides a platform to connect teams of students, businesses, thought leaders, and professional bodies together to create the next future wave of clean tech leaders and innovators. The platform targets a wide age range from 12 to 25.

Once provided with an electric chariot kit, the student teams work through term time to build their own Electric Chariot - typically either a Goblin, F24 or Greenpower kit.

The young people are challenged to think for themselves and use their hands as they collaborate to build a car from its component parts. The challenge offers many practical lessons, from hard skills such engineering, mechanics, and applied maths, to the softer skills of team-working and problem solving. It provides a valuable experience, especially for those who learn best away from the traditional school environment, embedding real-life context in education.

10: SMS: Connect (2023) A case study

Picture 5: Young people working together on a kit car chariot[11]

The young people also learn about managing finances, branding, and marketing. The race team competes in Scotland in the form of Time Trials; one car at a time against the clock. After completion, the electric chariots can be carefully dismantled and then used again for another challenge or developed for future races.

One teacher has said: "Rarely have I seen a project to which pupils have so willingly given up their own time to undertake [...] and which has benefited them to such an extent. The pupils had of necessity become a well-organised team with a project manager and pairs focussed on the brake system, steering and electrical specialists, or "Sparks" as they love to be known."

Case Study 3: Academy9

In 2015, the Knowledge Exchange Partnership Ltd was invited by Transport Scotland to develop a framework to run in parallel with the upgrade of 80 miles of trunk road on the A9 between Perth and Inverness, to dual carriageway.

Thus Academy9 was launched in May 2015 and highlighted the design of a progressive programme (Fig 8) of STEM-related activities and experiences covering school, college and university education, aimed at pupils, students, teachers, parents and the wider community, along the A9 corridor.

Its evolving framework aims to promote skills and learning, STEM education and employment opportunities for the next generation. The opportunities vary from site visits, online virtual careers fairs, the apprenticeship academy, mentoring roadshows, and challenges. The programme won the British Construction Industry Skills Impact Initiative of the Year award in 2018.[12]

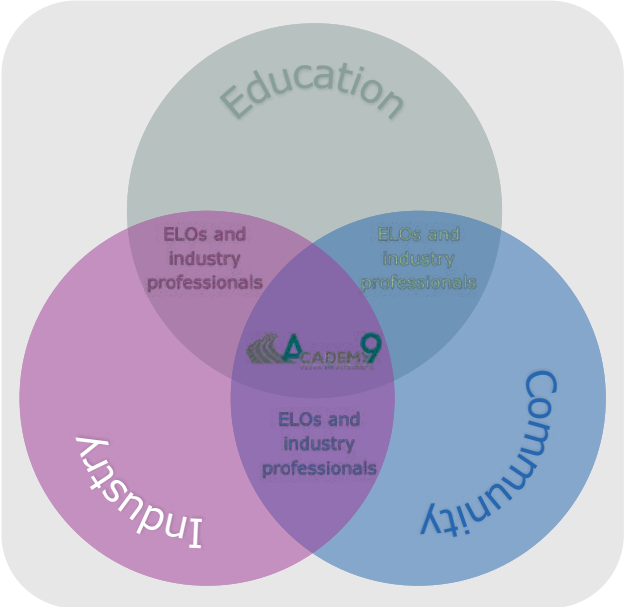


Figure 8: Academy9

It was developed in partnership with all the schools along the A9 corridor in addition to wider communities across Scotland, educational professionals, educational consultants and industry professionals.

Picture 6[13]: Kingussie Primary school children at the launch of Academy9

11: https://thesec.scot/
12: https://blogs.glowscotland.org.uk/glowblogs/academy9/how-to-guides/case-study/
13: https://blogs.glowscotland.org.uk/glowblogs/academy9/

Recognising the power of partnerships between industry and education, Academy9 has been building a legacy of STEM-related skills and achievement through a series of progressive STEM activities and experiences, providing future generations with the opportunity to learn both hard and soft skills and consider STEM-related careers. Academy9 sets out a strategic vision of educational engagement:

- Recognising and building upon knowledge exchange and creative thinking in professional and social contexts;
- Capturing the power and potential of collaborative and partnership working; and
- Leaving a legacy of achievement and desire for learning for all.

Case Study 4: School Run to Net Zero - Getting to School the Glaitness Way, Orkney

The School Run to Net Zero is an innovative educational initiative geared towards primary schools, encompassing teaching, learning, and practical action in Orkney. Pupils at Glaitness School, one of the two primary schools in Kirkwall, are taught how to examine their community and the usage of fossil fuels strategically. Young people cover topics such as historical context, energy consumption, CO2 emissions, and exploring sustainable futures. The ultimate objective of the programme is to achieve certification for net zero utilisation of petrol and diesel in the transportation of students and faculty staff to and from school.

Picture 7[14]: Kirkwall, Orkney

The project[15] received funding through the Highlands and Islands Climate Change Community Grant and is being developed by the Transition Engineering Lab at Heriot-Watt University in Stromness in collaboration with Glaitness School teachers and students.

In 2022, the primary source of carbon emissions for Glaitness School [11] was attributed to the utilisation of petrol and diesel in private vehicles for transporting students to and from school, as well as for staff commuting. Despite this, there are currently no limitations on the use of petrol cars for the school run. Parents and guardians choose to drive children to school as it is a practical solution that provides a sense of security. Over the past two decades, various transportation projects have been implemented to promote alternative modes of transportation such as walking, cycling, scootering, or using public transportation. The rationale was to address the problems commonly associated with high levels of vehicle drop-offs, which are prevalent in primary schools globally.

14: https://www.ordnancesurvey.co.uk/
15: https://www.aemslab.org.nz/icnz_hwu_orkney

This project uses interdisciplinary transition engineering (Figure 9) which is an emerging field that focuses on the design, development, and implementation of sustainable systems and technologies. It aims to address the challenges of transitioning to a low-carbon economy by integrating technical, social, and economic considerations into the engineering design process.

This has translated into the school appointing "Net Zero Heroes", leading a drive to participate in "Walk to School Week", and Heriot Watt staff coming to school to speak to the children, among other measures.

The project was launched in November 2022, so initial results have not yet been reported, however, if successful, this model could be replicated for many primary schools.

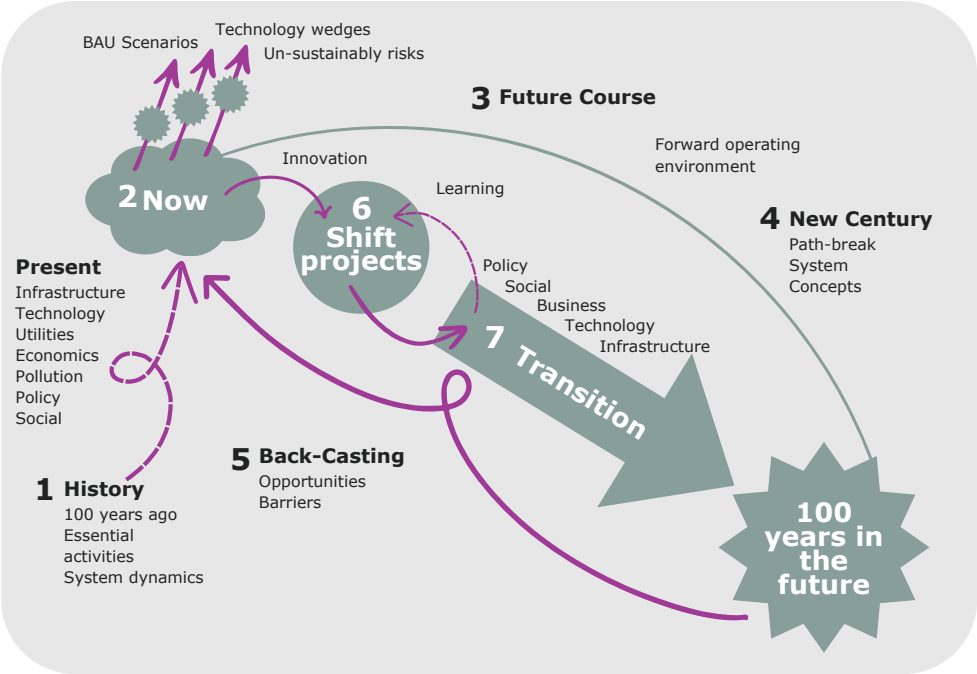


Figure 9[16]: The Interdisciplinary Transition Innovation, Management and Engineering (InTIME) Methodology

Case Study 5: Young Islander Network - Transport Questionnaire

The Young Islander Networkis a legacy of the 2021 Young IslandersChallenge. In partnership with the Scottish Government and the National Island Plan it is led by young people with support from Youth Scotland. The Young Islander Network (YIN) is a community amplifying the voice of island natives in island policy creation.

The network ties into STEM through the challenges and activities that it delivers across Island communities, more specifically the "Transport Challenge Sheet". In 2023, this questionnaire was adapted to an online form.

This originally was a paper pamphlet asking young people on islands to describe their transport systems and imagine how to make improvements. The data collected can be used to inform input to local and national policy - this is an ongoing and evolving process, which also teaches young people the value of civic engagement.

16: https://www.aemslab.org.nz/transitionclimate

Case Study 6: Informing Choices, Inspiring Futures- Shetland

Skills Development Scotland (SDS) is an organisation dedicated to supporting individuals and businesses in Scotland by providing a wide range of services aimed at lifelong learning, skills development and employment. The organisation undertakes several activities relating to education namely apprenticeships and work-based learning, training and education and skills development initiatives.

In the Shetlands, SDS developed the activity guide 'Informing Choices, Inspiring Futures'. The programme is a practical, hands-on course for 8 to 18-year-olds using technology to engage the participants.

An online platform with mini games focused on target STEM sectors helps the participants in engaging in a range of activities from the use of drones in construction to a land yacht challenge. The programme is incredibly versatile and targets a wide age range of young people with eclectic interests.

3. The Online Workshop

It became apparent during the "State of Knowledge" phase there were gaps in awareness of activities in the overall Scottish STEM outreach field. The participants were from a wide range of backgrounds from business, academia, education, social enterprise, to relevant chartered transport institutes (Table 4).

Cairngorms National Park	Highlands and Islands Enterprise	Scottish STEM Ambassadors, SSERC
California Academy of Sciences	Innovation Centres Scotland	Social Track
Childrens Health Scotland	Instition of Mechanical Engineers – Railway Challenge	Stem Academy Scotland
CIHT	Jacobs	STEM Learning (Ticket To Ride)
CILT	MACS	STEMFest
City of Edinburgh Council	Mangorolla / I'm a Scientist Get me Out of Here	Stirling Active Travel Hub
City of Glasgow College	Mobility and Access Committee for Scotland	Surveyar
CodeBase	Mott Macdonald	SYSTRA
Community Lab	MTB Innovation Centre	TechFest
Cycling Friends Scotland	North Carolina State University	The Royal Navy
E-Sgoil	Primary Engineer	The STEM Workshop
ESOGA	Princes Trust	Transport Scotland - A9 Academy
First Bus	Robert Gordon University	University of Glasgow
FuelChange	Royal Academy of Engineering	University of Highlands and Islands
FutureGroup	Royal Navy	Women in Mobility
Glasgow Caledonian University	Royal Society of Chemistry	Women in Transport
Glasgow Science Centre	Science Skills Academy	Young Engineers Programme
Glasgow Science Festival – Creating Engineers/Ingenious Circus	Scottish Funding Council	Youth Parliament
Glasgow University STEM ambassadors	Scottish Government Advanced Learning Directorate	Youth Scotland
Gordon Cooper, Teacher	Scottish Rural Network	Youthlink Scotland
Greenpower Education Trust	Heriot Watt	

Table 4: Relevant Chartered transport Institutes

The discussions centered around five key questions and the findings are presented under these headings.

1. Is the current array of identified transport STEM projects fit for purpose? Do they accommodate young people?

Attendees agreed that a very large number of STEM activities are taking place in Scotland. These are arising from Government-funded STEM Education organisations, major infrastructure project procurement, local community initiatives, organisation Diversity, Equity and Inclusion commitments and higher and further education outreach.

One participant, who had been educated himself in a semi-rural setting, said that it was not so much the science in the classroom which had inspired him into a 40 year career in engineering, but the site visits to industrial and manufacturing businesses in his local area – "even watching the roads being surfaced". Seeing the real-life application of science and engineering in his own home town had had a deeper and more lasting impact than the more theoretical education in the classroom.

There was a consensus that there was scope to involve young people more in the planning and design of STEM activities, so that the activities/challenges more closely match their interests.

It was also raised that practical kits and excursions are great activities for students that know that they are interested in STEM subjects, but it does not have an impact on students that haven't thought about getting involved in STEM.

It was also noted that many of the stakeholders involved in STEM projects can be considered community wealth-builders, in various and diverse ways. By equipping rural and island children and young people with valuable STEM skills and opportunities, they are given social mobility which in turn offers them geographic mobility. While the hope is that young people feel enabled to remain in their 'home' area, sometimes young people move away for education and career experience, and then later return to rural and island communities, re-investing valuable skills and employment into the area. This is not always the case.

2. Are there any gaps in the current STEM offerings? If so, what and how do we fill them?

It was felt that STEM skills needed to be taught in such a way that they built on and enhanced the 'meta-skills' of problem-solving, teamwork, creativity, etc. Some participants felt strongly that STEM had moved too far away from hands-on, multi-sensory learning.

> "When you're approaching a STEM problem, you should use all your senses. You feel with your hands, you listen, you look and observe, sometimes you sniff. STEM has moved too far away from that, it's too much in your head, it should use all five senses."
>
> WORKSHOP PARTICIPANT

It was agreed that the delivery of STEM activities was often done in an educational silo which did not really take the needs of employers into account. One participant's experience and observation noted that small businesses were recruiting school leavers and graduates with the ability and aptitude for STEM, but not with the actual STEM skills. It was recommended that there should be closer communication with local employers, both large organisations and SMEs.

One finding, which given the effects of the COVID pandemic are still being felt, was that as far as participants were aware there had been relatively little online or hybrid STEM activity.

It was also highlighted that a lot of STEM activities were created in the absence of student engagement. One participant highlighted the need to co-design STEM activities with students to ensure higher levels of engagement and participation with programmes. STEM providers do create activities but these do not necessarily attract young people into STEM. The STEM activity design needs to involve young people.

3. What are the known current challenges to STEM?

There was consensus that given the constraints of COVID, budget cuts and industrial action, teachers do not have the funds, time or the capacity to provide any (or extra) STEM offerings. One recurring theme was that all too often the future of funding was uncertain, therefore it was sometimes hard to guarantee continuity, and multi-year planning.

During the session, it was noted that new STEM challenges or ideas can take 1-2 years to be rolled out in a school and that often the teacher delivering STEM is not qualified to do so or is covering for a colleague. As stated by Education Scotlands' (2022) report "Structural Barriers to STEM Engagement" report:

> STEM education does need to be resourced properly and many schools report that they lack these teaching resources or the ability to invest in them. Resource sharing and collaborative working across settings is one way to overcome this. More flexible teaching and STEM delivery spaces may also positively impact on delivery.[17]

It was also highlighted that the cost for some schools is prohibitive. Many struggle to justify expenditure on printing or the purchasing of stationery or items. This was particularly the case in rural smaller schools, thus it was advised that external organisations, who provide the kit, visited. For those who are based at home, some would also struggle to purchase consumables to participate in a challenge.

4. What are the preferred methods for delivering STEM and why?

The group recognised the differences between the different disciplines of the STEM acronym – e.g mathematics being more computer based, while the others could be more experiential. The point was made that a STEM Challenge/Programme needs to be co-designed, with input from the children themselves, the educators, and the potential future employers. On balance there was a preference for hands-on activities, as being more interesting and inspiring to young people.

17: Education Scotland (2022) Structural Barriers to STEM Engagement

One participant noted that more use could be made of existing STEM ambassadors, and coordinating their activities - for example, the previously mentioned CIHT STEM ambassadors in Scotland and STEM Learning ambassadors. That said, there was consensus that wherever possible, the input of STEM ambassadors should go beyond "talks in schools – get them into the engine room!" or to "show and tell" their job.

Another participant explored the issue of gatekeeping and how female students in America would be pushed out of STEM classes the older that they got with the participant suggesting providing courses targeted specifically at young girls, similar to that of Girls on Track mentioned in the State of Knowledge Review.

5. Are there opportunities for some STEM offerings? If so, what / how / who? In addition, who would the new offering target?

Collaboration was agreed amongst the participants with the emphasis on not 'recreating the wheel'. However, one participant noted that STEM providers need to record and share activities as at present dissemination and information available online is limited. Thus it is difficult to assess the overall impact of current STEM activity, although the Scottish Government does provide Key Performance Indicators (KPI)s (Scottish Government, 2017).

Related to the measuring and dissemination of STEM, one participant highlighted that the Public Contracts Scotland (PCS) procurement system offers an opportunity under the requirement for tenders, over a certain financial threshold, to offer community benefit and or Corporate Social responsibility (CSR). In the case of transport-related tenders, this offers ideal scope for the inclusion of STEM activities, like that seen with Academy9. However, it was explained that this lacks an audit process to ensure that the relevant STEM activities have been delivered after successful award of the tender.

4. Personas

The development of fictional characters (personas) through the use of story cubes engaged all the participants and encouraged a different perspective and lens to STEM. These relatable characters (Picture 8) were developed as part of the co-design process and were used when discussing the above five questions.

The personas, although not a full complement of the varying young people living in rural and island areas, were developed by those knowledgeable of the geography and STEM subjects. The personas will be used further in future work and will be applied to all five Stepping Stones.

Findings Conclusion

The findings strongly indicate that there are opportunities including the social value of STEM in any setting. The findings highlight that there is a distinct lack of cohesion in the field with many resources, activities and or challenges/projects hard to discover. To some extent, the plethora of activities, as listed by STEM Learning, does overwhelm an individual or organisation.

Age/Name:	Hamish, aged 7
Home life:	Lives in Tiree with his grandparents, has 2 sisters and a brother, involved on the croft.
Education/ Hobbies:	Walks to schools where there are 2 teachers and 10 children.
Opportunties:	Working with Ferry operator

Age/Name:	Catherine, aged 15
Home life:	Lives in the City with her mum and attends a large school. She has sensory difficulties.
Education/ Hobbies:	Talks to her friends via an I-Pad and is isolated due to lack of opportunities to suit.
Opportunties:	Partnership with relevant Tech Business; science centre, festivals

Age/Name:	Michael, aged 48
Home life:	Children heading to University, lives in the suburbs and is changing career.
Education/ Hobbies:	College then into Armed Forces. Single Dad so financial restraints.
Opportunties:	A work force retraining programme for veterans.

Age/Name:	Logan, aged 9
Home life:	Lives in town with his parents who have a history of not working.
Education/ Hobbies:	Social Work involved and doesn't enjoy school. Enjoys his skateboard.
Opportunties:	To be buddied with a person from school

Age/Name:	Mabel, aged 6
Home life:	Has Muscle Dystrophy and lives with mum. Lives on the outskirts of a city.
Education/ Hobbies:	Can't attend many activities or schools but has a support group she attends.
Opportunties:	To be involved with 'inclusive' STEM activities e.g coding

Age/Name:	Bob, aged 18
Home life:	Lives in rural area and relies on parents for travel. Town has less than 100 people.
Education/ Hobbies:	Final year of school, rugby player but feels he's missing out due to travel needs. Also games.
Opportunties:	Online or Hybrid offerings

Age/Name:	Susie, aged 24
Home life:	Lives with her parents on an islands off an island. She has a learning difficulty.
Education/ Hobbies:	Walking and nature. Left college 3yrs ago and still unemployed.
Opportunties:	Online courses/apprenticeships

Age/Name:	Ellie, aged 13
Home life:	Divorced parents who have shared access. Lives on a farm.
Education/ Hobbies:	Started Academy and enjoys the outdoors and horse riding and cycling.
Opportunties:	Partnership with Young Farmers; access to unique STEM tools.

Age/Name:	Stuart, aged 27
Home life:	Lives in a satellite village on the edge of a city.
Education/ Hobbies:	Works part time at a supermarket. Enjoys the gym and socialising.
Opportunties:	Short college/ further education courses.

Picture 8: Personas

The Future

BigAsk5 Pathway

One of the "Big Asks" which emerged from the "Spotlight on Rural and Islands Transport" (2022) report was a Sustainable Rural Transport STEM challenge. The road to fulfilling this BigAsk, follows a Pathway with a series of Recommendations and "Stepping Stones".

Recommendations

Recommendation 1: Improved Communication and coordination

While the Education Scotland's Summary of STEM resources is an excellent resource, the research suggested that there were low levels of awareness amongst STEM practitioners of the array of opportunities be that partnership working or resource sharing. Collaboration would arise from better communication and coordination. This would also ensure fewer gaps in the STEM network, which as a consequence young people miss out on valuable opportunities. In particular, better communication between education providers and potential employment destinations was seen as important.

Recommendation 2: Harnessing procurement opportunities

As per the Procurement Reform (Scotland) Act 2014 there is a requirement for tenders over a certain financial threshold to make provision for community benefits to be included.

In the case of transport infrastructure or service procurement, this provides excellent scope for STEM activities to be provided. Indeed, the evidence suggests that contractors often do propose STEM outreach as part of the community benefits offered, but that this is not always recorded, monitored, or delivered. SRITC recommends the development of a centralised recording system where community benefits are recorded, and audited annually.

Recommendation 3: Keeping it local

STEM activities and careers are more relatable to young people when these activities and jobs are rooted in their local area. From wind, tidal and hydro-electric renewable energy plants, to spaceports or operators such as Calmac, Loganair, and manufacturers such as Alexander Dennis, and various drone specialists – there is no shortage of STEM activity. However, schools and colleges are under strain and may need assistance in forging links with local industry and business for school visits and apprenticeships, etc. The evidence suggests a need for better communication on the network of local ambassadors available to work locally within their area to help broker useful relationships between education providers and employers.

Recommendation 4: Do not reinvent the wheel

Linking to Recommendation 1, many organisations, schools and businesses are unable to locate online existing STEM opportunities. The Institute of Engineering Report (2016) states that there are over 300 providers/ initiatives and the STEM Learning database has over 14000 activities listed in the STEM ecosystem.[18] This recommendation asks that there is better dissemination of existing activities and that any stakeholder interested in delivering a STEM activity, should undertake a comprehensive review of their specific topic area, before "reinventing the wheel".

Stepping Stones

These form the core of the BigAsk5 Pathway and provide direction for future work and discussions.

Stepping Stone 1 - Scottish Sustainable Transport STEM Cluster

During the three months, over 50 organisations, individuals, businesses were approached and consequently this Stepping Stone is a by-product of that work. SRITC now holds a small database which represents the beginnings of Cluster. SRITC proposes working with other partners to formalise the Cluster, offering future collaborations, networking and providing quarterly drop in sessions as support.

Stepping Stone 2 - Champion rural STEM

Working with established and new partners, SRITC will work collaboratively with rural stakeholders and community led organisations to champion STEM in the transport and mobility sector and more widely across all "rural" life.

Stepping Stone 3 - Young people

SRITC will continue to foster connections with youth organisations and groups to ensure that their voice is included and heard. Opportunities like attending the Royal Highland Show, The Scottish Rural Parliament and recruiting a young person onto the SRITC Advisory Board or volunteers (Musketeers).

Stepping Stone 4 - Sustainable Transport STEM Challenge Framework

SRITC will organise the relevant Sustainable Transport STEM challenges thematically on their website. This landing page will provide the starting point for organisations, businesses, schools to locate relevant resources.

Stepping Stone 5 - Sustainable Transport Challenge for rural

The Challenge will be progressed and designed to include the recycling and reuse of "at home" products whilst creating and cultivating innovation and inspiration for young people living in rural and island areas. Based upon the Children's Health Scotland model, the Challenge would also embrace online sessions and provide a buddy/ambassador for those involved.

18: https://www.stem.org.uk/resources/search

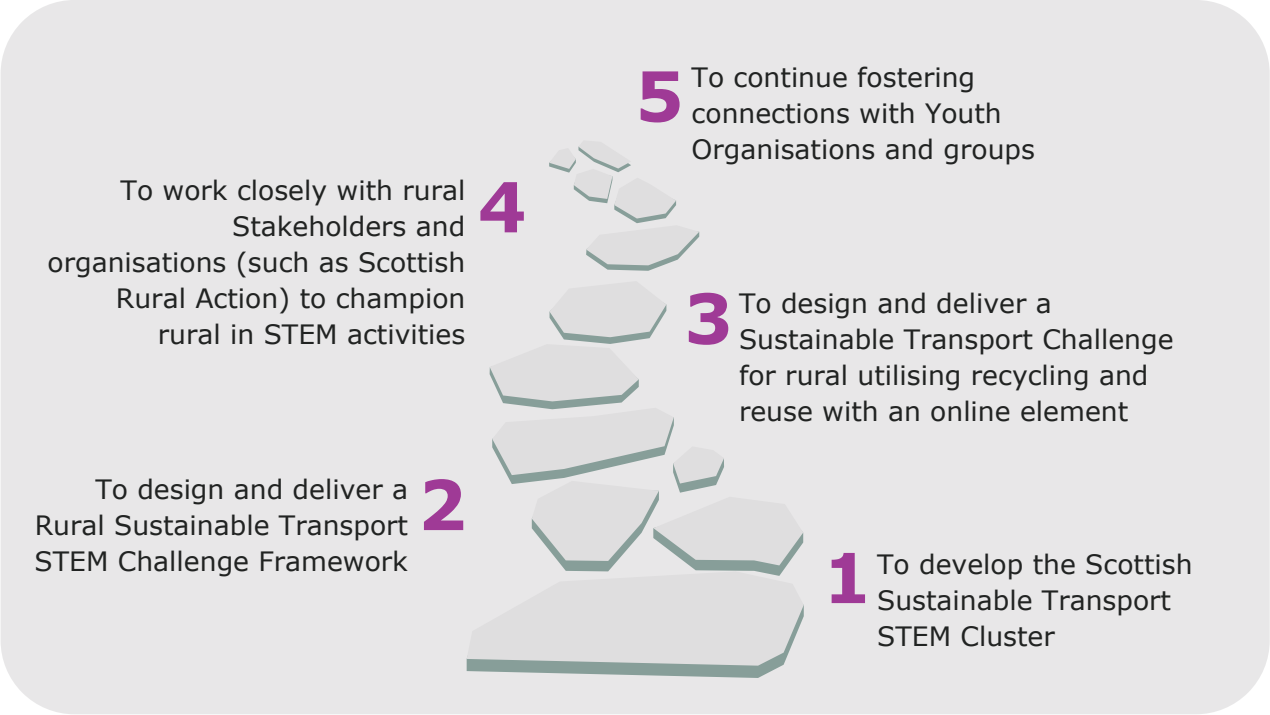


Figure 10: Stepping Stones

Report Conclusion

The aim of this project was to undertake some scoping to understand the STEM terrain in Scotland, and to undertake the groundwork for the foundations of a Sustainable Transport STEM Challenge for children and young people in rural and islands Scotland. Over the last three months, challenges have represented themselves from strikes in the education sector through to the ongoing impacts of the COVID-19 pandemic on work loads and resourcing. This has affected participation of relevant stakeholders in this work but was highlighted as a key barrier to STEM activities in schools. Other challenges included the lack of successful research with regard to some hard-to-reach areas such as home-schoolers and the Gaelic Medium Education segment but this may be an indication that there is a shortfall of consistent rural STEM activity, and in particular transport-related STEM activities.

As outlined, the original objective to develop the case for a dedicated Sustainable Transport Challenge has bloomed into larger opportunities, namely that of a Framework of various programmes and a dedicated transport cluster. In addition, the recent Scottish Government's commitment to a Rural Delivery Plan, announced in April 2023, provides opportunities for 'rural' STEM to be included across departments such as health, education and transport.

SRITC delivers practical solutions and offerings and the BigAsk5 Pathway which includes 4 Recommendations and Useful Resources, such as the Stakeholder Map and 9 STEM exemplar personas are just that. The Stepping Stones are core to the Pathway as they encapsulate several of the Community Wealth Building Pillars which were announced as part of the Programme for Government 2022/23 (Scottish Government, 2023b), namely Spending and Workforce and in turn empowering those young people in rural and island areas.

Limitations of Work

Due to the timeframe, there were obvious limitations on the research including the ability to reach some groups or organisations. The impacts of COVID-19 and the strikes in the education sector had a clear impact.

It was also hard to engage with young people, partly due to GDPR issues but also in the main to gain traction and understanding when face to face opportunities were very limited.

During the State of Knowledge Review, a challenge that repeatedly emerged was the difficulty of finding information about specific STEM initiatives. For the avoidance of doubt, this does not mean that it was difficult to identify any STEM challenges as there are a plethora of organisations and initiatives to access and participate in STEM activities, the difficulty is identifying specific programmes that cover niche topics, such as sustainable transport or rural transportation.

One of the primary reasons for this difficulty is that STEM initiatives are often isolated from each other thus making it difficult to locate information on specific initiatives and to understand how these fit into the larger STEM landscape. Additionally, many STEM initiatives are run by non-profit organisations or academic institutions, which can have limited resources for dissemination. As a direct consequence, locating information on STEM initiatives requires significant effort and research, making it a challenge for individuals and organisations/businesses looking to engage with and support these important initiatives.

Additional Useful Resources

- Future Group: https://www.futuregroup.org.uk/
- STEM Directory (2023): https://www.stem.org.uk/enrichment/stem-directory accessed on 14th February 2023
- My World at Work: https://www.myworldofwork.co.uk/

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TheScottish
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A Community Interest Company