STEM Outreach Programme

2023/24 Annual Report

The STEM Outreach Programme is hosted by the **University of the Highlands & Islands (UHI)** and supported by industry to inspire the next generation of Engineers, Scientists Technologists, and Renewable energy experts right across the north of Scotland.

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Contents

Tha an aithisg bhliadhnail ri faighinn sa Ghàidhlig.
Cuiribh fios gu STEM@uhi.ac.uk a dh'iarraidh leth-bhreac.

Introduction

The STEM Outreach Programme is a three-year, funded programme focused on early years and primary school children whilst also building STEM confidence and capacity with primary school teachers.

Another key aspect of the programme has been the facilitation of local STEM Networks both geographically - based around our UHI academic partners - and with communities of interest.

This is to ensure information exchange and to support the development of collaborative work partnerships that will help plan local, focused STEM activities across the whole of the education journey.

These local networks are a critical link enabling us to join up the national Scottish Government STEM Education & Training Strategy (2017) through the regional Highlands and Islands STEM partnerships (chaired by UHI).

https://www.gov.scot/policies/science-and-research/stem-education-training

We were absolutely delighted to be recognised as an example of best practice in Scotland in the recently published IMechE report.

Engineering Skills for Scotland's Just Energy Transition to Net Zero (imeche.org)

Ro-ràdh

'S e pròram maoinichte trì bliadhna a th' anns a' Phròram For-ruigheachd STEM le fòcas air clann sna tràth-bhliadhnaichean agus sa bhun-sgoil agus aig an aon àm a' togail misneachd agus comas ann an STEM le tidsearan bun-sgoile. B' e pàirt chudromach eile den phròram a bhith a' soirbheachadh Lìonraidhean STEM ionadail an dà chuid a thaobh sgìre - stèidhichte air ar com-pàirtichean acadaimigeach aig UHI - agus le coimhearsnachdan ùidhe.

Tha seo airson dèanamh cinnteach gum bi iomlaid fiosrachaidh ann agus gus taic a thoirt do chruthachadh chom-pàirteachasan co-obrachaidh a chuidicheas le bhith a' planadh gnìomhachd STEM ionadail, chuimsichte tarsainn na slighe foghlaim gu lèir. Tha na lìonraidhean ionadail seo nan nasgadh uile-chudromach a leigeas leinn ro-innleachd nàiseanta Riaghaltas na h-Alba airson Foghlam & Trèanadh STEM (2017) a cho-cheangal tro chom-pàirteachasan STEM sgìreil na Gàidhealtachd is nan Eilean (le UHI sa chathair).

https://www.gov.scot/policies/science-and-research/stem-education-training

Bha sinn air leth toilichte a bhith air ar n-aithneachadh mar eisimpleir de dheagh chleachdadh ann an Alba san aithisg a chaidh fhoillseachadh o chionn ghoirid le IMechE.

Engineering Skills for Scotland's Just Energy Transition to Net Zero (imeche.org)

Happy Birthday

We celebrated our first-year anniversary at our team development day in May. It was a fun learning experience for all the STEM Coordinators & was facilitated by 'Raising Robots' who shared skills in learning to teach STEM coding & robotics in classrooms.

It created a lot of laughter & built confidence & valuable skills for the STEM Coordinators themselves.

Scaling Up

Thanks to a generous donation from Buchan Offshore and our collaboration with colleagues from the Aberdeenshire Council Education Team and NESCol (www.nescol.ac.uk), we are excited to announce the appointment of a new STEM Coordinator based at the Fraserburgh campus.

This coordinator will focus on primary schools in the Fraserburgh, Mintlaw, and Peterhead areas.

Moving On

We sadly said goodbye and thank you to a couple of our STEM Coordinators, one of whom moved to another role within the UHI, and another took up a post with a local charity. As a result, however, we have also been able to welcome new staff members to our team.

Angela MacAskill will join us as our STEM Coordinator in Stornoway later this month and will be providing outreach activities in Lewis and Harris for UHI North, West & Outer Hebrides. Lucy Downie also joins us in West Highland (Lochaber & Skye) and we have been able to leverage existing programme funds to create an additional part-time post that will focus on North West Highland (Ullapool & Dingwall) - currently being recruited to. We have secured additional Outreach support for The Inverness Area, which covers east to Nairn and south to Kingussie. Ana Candido Barton will be working alongside Jack McIntyre.

Both Angela & Lucy are biology graduates with education backgrounds, and Ana will continue in her primary school teaching role as well as contributing to our STEM Outreach Programme.

Thanks to Buchan Offshore we have been able to scale up the programme and are delighted that an Outreach STEM Coordinator will be hosted in NESCol Fraserburgh covering the North East of Aberdeenshire. Consequently, as we start year two of the three-year programme, we now have 14 STEM Coordinators (Outreach) inspiring the next generation of Engineers, Scientists, Technologists, Mathematicians & Renewable Energy experts right across the North of Scotland.

Moving On

The majority of these posts are part-time and, despite not being fully staffed in our first year we wanted to celebrate by sharing our experiences and what makes the programme special for each of us.

We made a video, which includes contributions from the whole team including our student intern, and can be viewed by clicking on the link below.

Click here to watch the video - https://www.youtube.com/watch?v=cpjeAvvBD2Q

This programme is delivering at scale across the Highlands and Islands because of the generous industry funding we received just short of £1M over the 3-year programme.

We are very grateful to our industry sponsors and others who have provided the donations which have enabled the UHI STEM Outreach concept to become a reality. We need to consider the future and sustainability of the programme and welcome the opportunity to discuss this further.

UHI | STEM

Meet the Team

Our STEM Coordinators come from a wide range of backgrounds and interests, all are passionate about inspiring future generations in STEM and STEM skills. The current list of STEM Coordinators working across the whole of our region is:

STEM Coordinator	Location	Email
Jo Oliver	UHI Argyll (South Argyll)	jo.oliver@uhi.ac.uk
Mia Leng	UHI SAMS (North Argyll)	mia.leng@sams.ac.uk
Lucy Downie	UHI North, West and Hebrides (West Highlands)	lucy.downie@uhi.ac.uk
Vacancy	UHI North, West and Hebrides (North West Highlands)	Pending
Mara Gibb	UHI North, West and Hebrides (North Highlands)	mara.gibb@uhi.ac.uk
Angela MacAskill	UHI North, West and Hebrides (Outer Hebrides North)	angela.macaskill@uhi.ac.uk
Monica MacLeod	UHI North, West and Hebrides (Outer Hebrides South)	monica.macleod@uhi.ac.uk
Eleanor Hutcheon	UHI Shetland	eleanor.hutcheon@uhi.ac.uk
Ria Kirkpatrick	UHI Orkney	ria.kirkpatrick@uhi.ac.uk
Kathleen McDougall	UHI Moray	kathleen.mcdougall.moray @uhi.ac.uk
Jack Marley McIntyre	UHI Inverness	jack.mcintyre.ic@uhi.ac.uk
Ana Candido Barton	UHI Inverness	ana.barton.ic@uhi.ac.uk
Laura Grassie	UHI Perth	laura.grassie@uhi.ac.uk
Vacancy	NESCol	Pending

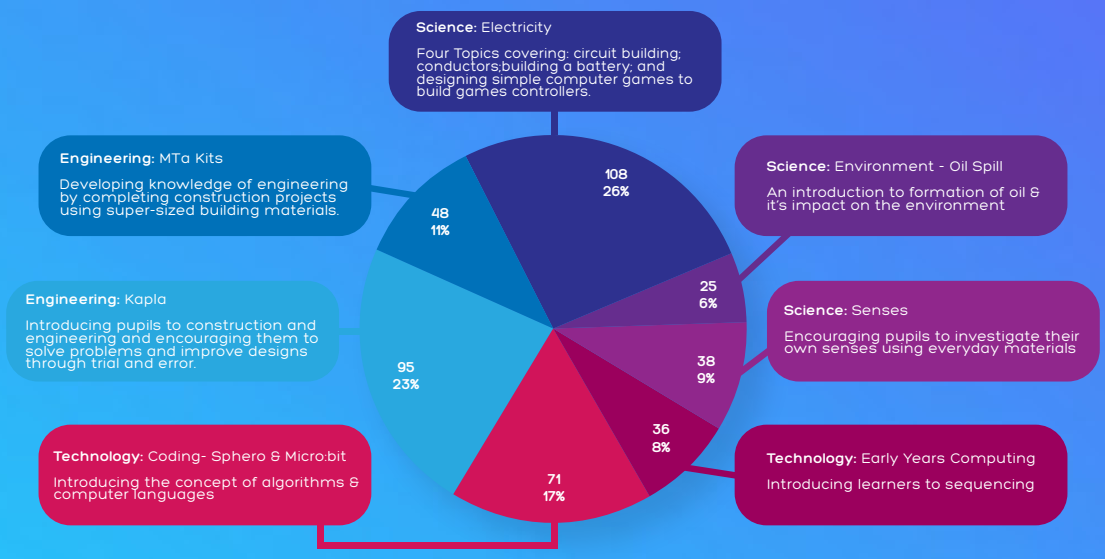
Core STEM Team members

STEM Coordinator	Position	Email
Dawne Bloodworth	Head of STEM Development & STEM Education Lead for North Coast Space Cluster	dawne.bloodworth@uhi.ac.uk
Victoria Caine	STEM Administrator	victoria.caine@uhi.ac.uk
Jilly Munro	STEM Curator	jilly.munro@uhi.ac.uk
Mhari Ross	STEAM Technician (Student Intern)	mhari.ross.ic@uhi.ac.uk

So what did we do?

Over the past academic year, we have delivered inspiring engagement activities using our bespoke UHI 'Lend-a-Lab' engagement materials. The topics we provide have been influenced by teachers themselves based on survey feedback from them about what they would like to see us provide.

In AY2023/24 approximately 7,800 children in primary schools across the Highlands and Islands, Moray, Perthshire and Argyll & Bute have received UHI 'Lend a Lab' engagement experience. Through our other community outreach activities, we have also reached more than 3,700 other children across the region. Please note we have a structured methodology for data collection and this is collated quarterly & annually.



Total Lend-a-Lab sessions delivered in schools
(September 2023 to June 2024)

Feedback from the Outreach programme

The following images show a snapshot of some of the wonderful feedback we have received from teachers & pupils following Lend-a-Lab sessions from our STEM Coordinators.

We are looking to develop the evaluation element of our programme & look forward to being able to highlight the very positive responses to the Outreach Programme in the future. This will certainly include a section in which we will aim to capture a view of the wide variety of careers that young people across the Highlands & Islands aspire to in the years ahead.

Lend-a-Lab feedback ratings

After the Lend-a-Lab session, how confident do you feel delivering STEM lessons?

4.1

Booking Process

4.9

Topic & content, particularly materials & technologies provided & activities

4.9

Presentation, communication & knowledge of the STEM Outreach Coordinator.

4.9

Lend-a-Lab Feedback:
Ratings

We asked our students

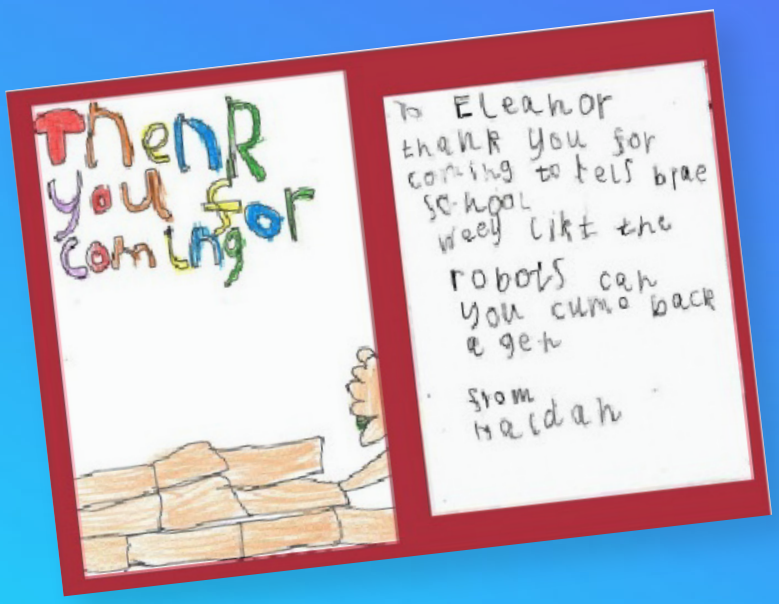
'What do you want to be when you grow up?'

Girls

Dancer, singer, palaeontologist, PE teacher, art teacher, hairdresser, car mechanic, gladiator, doctor, YouTuber, gamer, gymnastic teacher, geologist, nurse, cafe lady, librarian, nail person, scientist exploring space, vet, inventor, baker, florist, working at a zoo

Boys

Farmer, fisherman, YouTuber, scientist, painter, mime act, builder, policeman, Lego YouTuber, footballer, marine biologist, gamer, creator, electrician, engineer, car racer, person who makes survival bunkers, joiner, rugby player



Lend-a-Lab Feedback:
Pupils

We asked our students:

" Did you like the Lend-a-Lab session? "

" Did you learn something new? "

Teacher:

" They said they enjoyed expanding their knowledge through practical activities."

" They enjoyed programming a physical device to move much more than watching animations, which is what we had been doing so far "

" It was like learning magic! "

"I love learning STEM! "

"We had never used Spheros before."

"I liked it all, but especially doing the bugs in computer language."

"We arranged a wedding with our robots."

"It was good to see your coding move something."

"We know how to create a disco using code."

"I liked using the cups to show binary language."

Lend-a-Lab Feedback: Teachers

Any addiional comments?

Did the sessions meet your expectations?

PGDE Primary

Teachers are key influencers in building our STEM capacity and our aims include building teachers' capacity and confidence in teaching STEM subjects.

Our programme starts with UHI PGDE students and we provide training in how best to communicate STEM subjects with hands on experience of our Lend-a-Lab equipment.

We have also provided a virtual learning programme for the probationary teachers in Highland Council (i.e. in first year of practice) & are currently updating this so that can be made available to our other local authorities during 2024/25. This creates a continuum of input and support to teachers from their early training through to their first year in the classroom.

Another great example of resources for school teachers comes from Eleanor Hutcheon, STEM Coordinator at UHI Shetland, and the local STEM Network in Shetland.

Click the link below to visit The Shetland STEM Hub:

https://shetlandstemhub.my.canva.site

STEM Equipment & Store

We ensure that each of the STEM Coordinators has quality assured resources and equipment to deliver the outreach engagement activities through a collection of bespoke Lend-a-Lab boxes. A great deal of this equipment is held at a local level with each of our STEM Coordinators having a full set of 11 Lend-a-Lab boxes to be used in school engagements in their respective local areas

The Lend-a-Lab collection currently covers a total of 14 different topics at different levels and across all of the STEM areas:

Science: Electricity (Introduction to circuit building), Electricity (Building a battery), Electricity (Building a games controller), Electricity (Conductors & insulators), Environment - Oil Spill, Senses (Two levels)

Technology: Early Years Computing, Micro:bit, Sphero

Engineering: Kapla (Three levels), MTa (Two levels)

Mathematics: Early Years Maths Tales (Three topics)

STEM Equipment & Store

All of our classroom resources align with the Education Scotland curriculum for excellence and all of the written material contained within the Lend-a-Lab boxes - including activities and lesson plans - are available in both Gaelic and English to support the delivery of STEM topics in Gaelic-medium classes. (We are also looking to expand the basic Gaelic skills of all our team members and currently have members with Gaelic language skills in both our regional and core teams.)

We had allowed for some new equipment purchases within the programme and are also very grateful for subsequent generous support through gifts & donations. This equated to about £25K in new STEM teaching equipment in our first year.

Underpinning our Outreach Programme behind the scenes has been our central STEM equipment store. Our most expensive equipment (e.g. Kapla, Robots, Spheros and MTa kit) is held centrally and is available for use by the whole team to deliver the relevant topics.

Coordinators can borrow this equipment for a period of time through a bespoke booking system that also has an 'availability calendar' that coordinators can access to help schedule their STEM activities.

We have funded a work experience post with a student intern from UHI Inverness who is carrying out the role of our STEM Technician. This post is a critical part of the team. They support the booking of centrally held equipment, prepare the equipment for collection by couriers and delivery to our coordinators and also maintain the equipment when it is returned to the STEM store. We have hygiene and maintenance protocols to ensure the kit is clean, complete and ready to use for the next booking. Thankfully we have a courier working with us who can usually deliver across the UHI region within a 2 or 3-day period (weather permitting!)

One of the requests we have been able to support over the year is creating STEM equipment boxes for larger community engagement events. These Community Event boxes are themed and can be supplied to community event organisers via the local STEM Coordinators. The boxes are very much aimed at providing fun activities for the whole family during the day.

Currently, we have 14 boxes covering a wide range of topics and themes: DNA Sequence Bracelet, Chemical Inflation, Microscopy -fingerprints, Microscopy - Smartphone microscope, Dinosaur Maths - Excavation, Footprints, and Sorting, Offline Computing - Binary Beads, Space - Constellations and Gravity, Badge Making Kit, Sensory Box with light pad, and several STEM-themed dressing up boxes.

An Ask for Help

Our STEM equipment is always being renewed and replaced & we would like to ask for help in donations to support us expanding the STEM equipment store, not only to purchase new kit but potentially to make the equipment more available.

Currently we have to limit our users to the STEM Coordinators (who are supporting some local community engagement events).

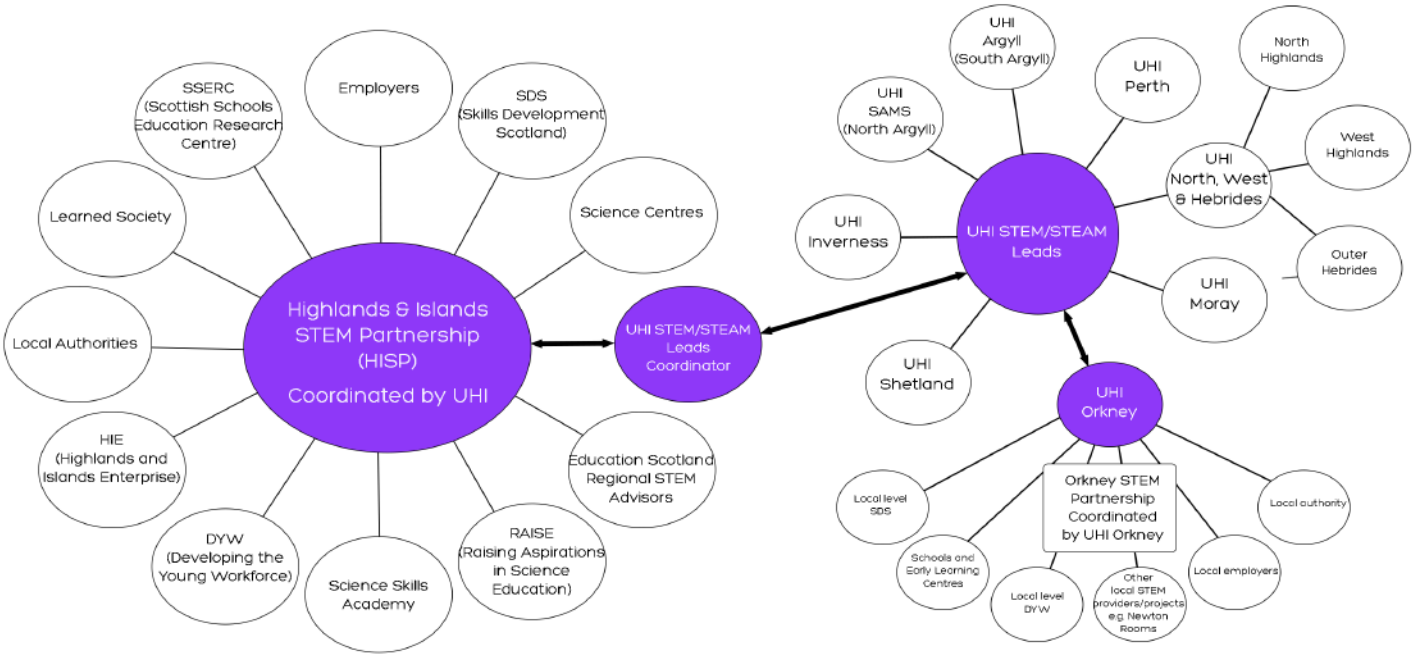
However, we are ambitious to make some of the equipment available for others to book. Alongside that, we want to create a STEMHUB of online resources that can be used across the Highlands & Islands.

Ongoing requests for STEM Equipment from other STEM organisations, community event coordinators and small businesses have made us consider the possibility of widening access to specific STEM equipment. This will require dedicated resources and further planning regarding this continues as we seek grants & donations to realise this ambition.

If you can assist, we would love to hear from you and any donation large or small will help us to maintain & expand our STEM equipment & resources offer.

Thank You

Local STEM Partnerships/Networks



During this initial year we have been able to connect with various academic organisation and education charities to hear about the work they are doing or planning to do and discuss how we might work more collaboratively at both a local and regional level.

This has included acting as a point of contact for STEM coordination and linking these enquiries to UHI and/or faculty members and/or other STEM organisations working locally.

In addition to our work with schools our other key Outreach Programme aim was to support and facilitate Local STEM Networks/Partnerships, based our local academic partners, to share information, knowledge and so enabling coordination and collaboration across the whole education pathway.

And as a result, two 'community of interest' networks are being facilitated and coordinated by the STEM Outreach Programme.

STEM North

Education Scotland asked us to ensure the continuity of the STEM North group, which is made up of various organisations with a STEM or community education remit across the North of Scotland and is another invaluable conduit for sharing information & progressing collaboration.

Chaired by the UHI STEM Curator, Jilly Munro,

The North Coast Space Cluster

Highlands and Islands Enterprise requested support from the UHI STEM Programme to lead STEM Education for the North Coast Cluster. Scotland has five satellite launch locations, with four of these in the UHI region (or North Coast Space Cluster). The other site is in Ayr.

The UHI STEM team has already established working partnerships in this regard in Shetland (Saxaford) and in Argyll & Bute (Machrihanish), and is exploring opportunities in Sutherland (Orbex) & with SpacePort1 (Uist) harnessing the inspirational power of this topic with young people.

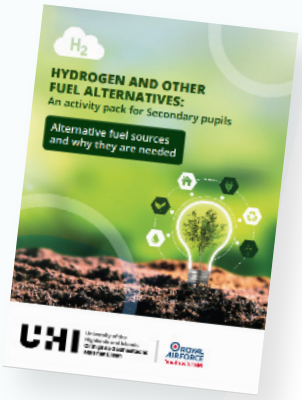
This is an emerging development as capacity allows but has included networking both on a national basis across the UK (e.g. National Space Academy, Space Catapult, STEM Education etc.) and at regional level with Space Scotland, Scottish Schools Education Research Centre (SSERC), Education Scotland & others like TechFest & Scotland's Science Centres.

The new chair of the Skills Working Group at Space Scotland has just been appointed and this national/regional coordination will enable knowledge sharing and an opportunity to leverage planning & resources for the Highlands & Islands.

Chaired by the Head of STEM Development, Dawne Bloodworth

Development of UK-wide Educational Materials

We are really pleased we were able to leverage our expertise with the development of UK wide educational materials, including the Hydrogen and Other Fuel Alternatives activity pack for secondary pupils.



The resource packs - to be distributed by RAF Youth STEM Team to secondary schools from June - will allow students to explore the science behind hydrogen and other fuel alternatives. They will also provide information on activities linked to the Science, Technology, Engineering and Mathematics (STEM) school curriculum content.

Each of the eight resource packs & accompanying short animations focusses on a particular area linked to hydrogen and alternative fuels and will also detail the career opportunities available and skills required to work in this sector. They are designed to allow teachers to position the materials within their own teaching practices.

They have been developed and funded by the RAF Youth STEM Team with the support of experts from UHI and the UHI STEM outreach programme. Many of our UHI Faculty members have contributed to the development of the packs.

Andrew Rae, UHI Professor of Engineering, said:

"Alternative sources of energy that replace fossil fuel will be an increasingly important part of our future, so there is a need to prepare the next generation of scientists and engineers who will help deliver this global necessity.

There are no 'silver bullets' to remove carbon from our energy system, so helping pupils understand the various challenges & the associated opportunities, is key to making sure the vision is attained."

IGNITE24

We have a vision of a Highland wide science festival with events at multiple locations and online activities to enhance accessibility, the IGNITE concept replaces the legacy of the Inverness Science Festival.

The UHI STEM team has already established working partnerships in this regard in Shetland (Saxaford) and in Argyll & Bute (Machrihanish), and is exploring opportunities in Sutherland (Orbex) & with SacePort1 (Uist) in harnessing the inspirational power of this topic to young people.

The pilot event of this concept was organised and assessed in 2024 with various events in June. (Note: online activities continued during July/August and some schools programme activities were also held in September).

The programme for IGNITE24 was challenging due to delayed confirmation of availability of grant funding, and this impacted on planning timetable and capacity of the organising committee in relation to delivery of specific activities.

However, as we had secured mentoring support from Orkney International Science Festival the IGNITE24 organising committee felt that a pilot event would enable us to test the concept.

In practice, the timing for the event was an issue with resource availability from STEM partners limited within the ask period of eight weeks. This resulted in the family event being postponed.

The planned skills and career event was supported by staff and industry but the timing with secondary schools was not ideal and, as a result it was also postponed to 2025.

However, the school's programme was very well received and over 800 school pupils P6/7 and S1/2 engaged in inspiring STEM activities at various locations across Highland. Family activities were provided online and to date over 290 downloads have been recorded.

A key lesson for the organising committee has been 'timing' and ensuring sufficient capacity and resources are available to support this emerging concept to ensure successful delivery at scale. Current partners involved in the organising committee include UHI STEM, UHI Inverness and Highland Council, and we are keen to ensure wider involvement in the planning & participation of IGNITE25.

If you would like more information or would like to get involved in IGNITE25, please contact email below.

Next Steps

We are looking forward to the launch of several new Lend-a-Lab boxes in 2024/25, including a set of three early years Mathematics activities, Maths Tales, which we will launch during Maths Week Scotland in September.

We will also launch a Lend-a-Lab box with marine themed activities (based on content from Scottish Association of Marine Sciences) to be followed in early 2025 by Lend-a-Lab boxes focusing on content and activities related to Hydrogen & Renewables & to Space.

As we are embedding and working with STEM partners at local level, we have identified various initiatives or developments that would enhance the STEM engagement offer to schools, inspiring younger children & supporting teachers.

One example is creating a geographical mapping of our STEM data, that captures our own STEM Outreach Programme activities and also has the potential at a local level to incorporate activity from other STEM partners. This could prove to be a very useful planning tool in that it will start to provide both a local and a regional picture about what is on offer to various age groups throughout their education journey.

We are capturing these potential ideas and opportunities and will progress those we can within the capacity of the Outreach Programme, supplemented with any grant funds that can be secured. However some of these will require additional funding and resources to project manage into reality, and ensuring delivery at scale.

Without industry support and funding, we would not have a UHI STEM Outreach Programme of the size and scale to cover the vast geography of the Highlands and Islands. It's great to be recognised as a model of best practice and we know our approach and impact works locally and that with support it can be replicated elsewhere.

As we enter our second year it's also timely to consider what we can do next. Regionally there are a significant number of economic developments like the Inverness and Cromarty Green Freeport, and will continue to work collaboratively with our partners in STEM, Education and Industry in considering our contribution as part of a wider coordinated and sustainable STEM and skills ecosystem.'

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https://www.uhi.ac.uk/en/about-uhi/stem

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https://www.youtube.com/@thinkuhi

Thank you . . .

And finally . . . a very big thank you to our team who took a concept and made it work, our STEM education partners nationally, regionally and locally, and most especially our industry donors for making this all possible.

The STEM Outreach Programme is hosted by the **University of the Highlands & Islands (UHI)** and supported by industry to inspire the next generation of Engineers, Scientists Technologists, and Renewable energy experts right across the north of Scotland.

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