

Title:	Building Curiosity For All: Informal STEM in Youth Work
Level:	4
Credit value:	5
GLH:	30
Unique Reference Number:	R/651/5846
Sector Subject Area:	13.1 Teaching and Lecturing
Aim:	The aim of this unit is to provide learners with the skills and knowledge to be able to understand the benefits of informal STEM activities in youth work and how they can implement these activities alongside their core youth provision to engage young people in new ways and reach non-engaged young people through a varied offer.
Assessment Type:	Assessment of this unit will be through an internally set and internally assessed portfolio of evidence.
Assessment Guidance:	Assessment decisions for skills-based learning outcomes must be made during the learner's normal work activity. Skills-based assessment must include direct observation as the main source of evidence and must be carried out over an appropriate period of time.

Learning outcomes

The learner will:

1. Be able to understand the barriers to wider STEM participation in education and employment and the impact of these sustained inequitable patterns.

Delivery content:

The aim of this learning outcome is to provide learners with the knowledge and skills to develop a critical understanding of the sustained STEM skills gap and its societal impact, while exploring the complex factors influencing young people's engagement with STEM. Learners will also reflect on their own knowledge, skills, and attitudes towards STEM in order to evaluate how these may shape their professional development and practice in Youth Work settings.

The learner must:

- 1.1 Explain the importance and impact of the **sustained STEM skills gap**.

1.2 Explore the **multitude of factors** that shape young peoples' participation and engagement in STEM.

1.3 Evaluate own knowledge, skills and attitudes towards STEM and explore the **potential impact** of these on own career trajectory and Youth Work practice.

2. Be able to understand the potential role of STEM in supporting youth and science-related outcomes among young people when delivered in informal settings.

Delivery content:

The aim of this learning outcome is to provide learners with the knowledge and skills to explore the value of informal STEM education in promoting both youth development and science-related learning. Learners will examine how informal STEM approaches can support wider outcomes—such as confidence, resilience, and problem-solving—and understand the importance of nurturing these skills in young people through engaging, empowering experiences.

The learner must:

2.1 Summarise the **key benefits** of informal STEM on both youth and science-related outcomes.

2.2 Examine how informal STEM education can support **wider youth outcomes**.

2.3 Discuss the **importance** of supporting young people to develop confidence to solve problems and respond to failure and the links to informal STEM learning approach.

3. Be able to draw on research evidence and own reflective practice to identify effective practice embedding informal STEM activities into Youth Work.

Delivery content:

The aim of this learning outcome is to provide learners with the knowledge and skills to understand how to design and deliver informal STEM learning that is inclusive, equitable, and rooted in social justice principles. Learners will explore practical considerations for structuring STEM activities in youth work settings and reflect on their own practice to identify opportunities for improvement and potential barriers to implementation.

The learner must:

3.1 Summarise **methods** to follow to ensure a social justice approach to informal STEM in youth work settings is being implemented.

<p>3.2 Explain key issues to consider when structuring and running informal STEM activities with young people.</p> <p>3.3 Reflect on own practice to explore what aspects of best practice in STEM could be introduced and identify any potential challenges.</p>
<p>4. Be able to gain experience setting up and running STEM activities and embedding STEM in own Youth Work practice.</p>
<p>Delivery content:</p> <p>The aim of this learning outcome is to provide learners with the knowledge and skills to apply learning by planning, delivering, and evaluating an inclusive informal STEM activity for young people. Learners will demonstrate a social justice approach in practice and critically reflect on their delivery to enhance the accessibility, impact, and effectiveness of STEM engagement for all participants.</p> <p>The learner must:</p> <ul style="list-style-type: none"> 4.1 Plan, deliver and evaluate an informal STEM activity for young people. 4.2 Demonstrate the application of a social justice approach to informal STEM within their own youth work practice. 4.3 Critically reflect on own practice to maximise the impact of informal STEM activities for all young people.

<p>Scope of Training</p> <p>The Scope of Training identifies areas that must be covered during the delivery of this unit. This is the minimum that is expected but tutors are expected to include other areas, knowledge of which will benefit their learners, based on location, types of work available and from the tutors own professional experience.</p>	
<p>Requirements</p>	
<p>Sustained STEM Skills Gap</p>	<p>The sustained STEM (Science, Technology, Engineering, and Mathematics) skills gap in the UK refers to the ongoing shortage of workers with the necessary skills, qualifications, and experience to fill roles in STEM-related industries. This gap has persisted for</p>

	<p>years and affects both the public and private sectors, from digital technology to engineering, healthcare, and advanced manufacturing.</p> <p>In the UK (and most developed countries) there is a widely accepted need for more people studying and working in STEM. Jobs in STEM are predicted to grow at double the rate; STEM graduates are more likely to be employed in full-time positions, earn more and are less likely to be underemployed. Yet, the STEM skills gap persists and is growing. There remains a lack of definitive and reliable data on supply and demand issues in STEM.</p> <p>The social injustices of the current STEM education system in the UK should be explored. Among these, gatekeeping practices in the English system which prevent many interested and capable young people from continuing through Double/Triple Science, the age at which GCSE subjects are picked and key decisions regarding trajectories are made, grade severity and its impact on the restricted entry to A level science course as well as the later impact of entry requirements to STEM subjects post-secondary could be discussed. Cross-cultural reflections and comparisons should be drawn wherever possible.</p> <p>Issues relating to views and attitudes towards science developed in formal education should also be discussed. Young people learn from a young age that science, especially physics, is only for the select (i.e. male, 'brainy') few and these views are often reinforced by teaching practices (i.e. males and students from more privileged backgrounds more likely to receive encouragement from teachers to continue with STEM, high STEM achievement explained different for female (hard work) and male students (natural talent).</p>
<p>Multitude of Factors</p>	<p>Young people's engagement with STEM is influenced by a wide variety of interconnected factors. These include personal interest,</p>

gender, ethnicity, social class, social influences, access to resources, and systemic inequalities.

Factors could include:

- Educational Factors
- Social and Cultural Influences
- Economic and Access Issues
- Identity and Self-Perception
- Wider Societal and Policy Factors

The uneven participation in physics, maths and computing relative to the other STEM subjects in higher education should be highlighted. Consideration should be given to the production of a narrow range of future scientists and people working in science-related jobs, and how this will reproduce the sustained dominant patterns.

There is a real need to broaden the gender, ethnic and social class profile of STEM students post-16, again particularly in physics and engineering. This is a key priority area for the UK government and other Western developed nations. The patterned nature of STEM participation and engagement (in both education and employment) and issues relating to social justice in formal STEM education should be considered. Social justice in STEM can be defined as ensuring that all young people see themselves as fully represented and supported members of STEM fields.

However, despite massive investments of time and resources to widen (and increase) participation, STEM participation remains dominated by the privileged (e.g. White, male, middle-class, able-bodied etc.). Most efforts have focused on changing the young people in some way, often through deficit models (e.g. change/increase a perceived 'lack' of interest or motivation). However, recent research has highlighted that lack of motivation is

	<p>not the main issue and that current STEM education in schools today plays a role in excluding and dissuading students from pursuing STEM education and employment.</p>
<p>Potential Impact</p>	<p>Learners could consider how their current STEM stance may:</p> <ul style="list-style-type: none"> • Open up new professional development opportunities (e.g., STEM outreach, STEAM initiatives, digital youth work). • Influence career ambitions (e.g., moving into education, policy, tech-enabled youth services). • Identify areas for growth or learning that would strengthen career options. • Shape their credibility as a facilitator or mentor in a digital or STEM-rich world. <p>In terms of the impact on Youth Work Practice, learners could explore how their attitudes and abilities in STEM may affect:</p> <ul style="list-style-type: none"> • The quality of STEM experiences they provide to young people. • Their ability to challenge stereotypes or engage underrepresented groups. • Whether they inspire or discourage curiosity, innovation, and exploration in others. • How effectively they can signpost or support pathways into STEM for young people. <p>Examples could include:</p> <ul style="list-style-type: none"> • Running or avoiding digital workshops • Highlighting STEM role models from diverse backgrounds • Encouraging girls or minoritised youth to take part in tech clubs or maker spaces.
<p>Key Benefits</p>	<p>There are calls to move informal STEM learning beyond inspiring more science workers, towards supporting more equitable outcomes. The Curiosity programme, among others, aimed to break down barriers to STEM education in youth work settings and identify some key benefits that informal STEM work can have on young people in informal settings. The programme was targeted towards a sample of young people who face a defined challenge or</p>

	<p>issue in their lives, however the findings are more widely applicable to the wider population of youth functioning in today's world. The programme showed that embedding informal STEM activities into youth work practices can broaden young peoples' understanding of what science can be and who 'does' STEM. This led to increased aspirations and widening STEM as a study and work discipline for 'people like me'.</p> <p>In addition to the STEM learning outcomes seen of increased STEM outcomes and aspirations and more positive attitudes towards STEM, the programme documented several other non-STEM youth outcomes; emotional wellbeing, improved resilience, higher confidence, more empowerment, increased self-belief, improved physical activity and local connectedness, better communication skills, and nurturing exploration to better understand the world around young people.</p> <p>The collaborative nature of science related delivery can result in young people engaging with more and different young people and achieving more positive relationships, stronger self-beliefs and can reduce social isolation often experienced by the young people who engage in these youth spaces. Working as a team to solve problems or during experiments encourages connections between peers but also with trusted adults and family members too, facilitated by the informal nature of STEM in these activities as they exclude the rigid structure of the school environment and allow connections to grow organically.</p>
<p>Wider Youth Outcomes</p>	<p>The exploratory nature of science, compared to the somewhat knowledge focused experiences that most young people are familiar with through formal STEM education will be highlighted. Learners could reflect on the structure of both formal and informal education and STEM education and explore how these structures support wider youth and STEM specific outcomes.</p>

In contrast to formal education curriculum, informal STEM opportunities encourage young people to independently research and present their findings in a more creative and playful approach to STEM, helping them develop confidence further. The practical nature of STEM projects also allows young people to have a hands-on approach (ie. cookie, craft, outdoor activities) acquiring practical skills that are applicable in their daily lives and interactions with the ever-changing world around them (reading instructions methodologically, using equipment safely). More specifically, the structure of informal STEM opportunities lends itself well to youth work and has the potential to switch young people on to STEM in a way that classroom learning may not have succeeded, as it is applicable, relatable and transferable.

Additionally, STEM sessions can be welcoming to a variety of different levels of literacy, learning styles and can be inclusive for children with additional needs, which can help reduce barriers to engagement.

Youth work intrinsically involves the young people often underrepresented in STEM, so participation in informal STEM activities could help to reach key groups needing more STEM support and exposure and ensure that more young people see STEM as for 'people like them'. Traditional forms of outreach may inadvertently exclude some young people from ethnic minority communities and may not be meeting the needs of many of these young people. Youth work's flexibility and capacity to engage young people and support cross-community interaction in creative ways. Like the STEM 'pipeline', an 'open door' policy is enough to support sustained participation of young people from ethnic minority communities, more active, targeted informed support is needed.

There does not need to be a specific focus on STEM content per se or the youth workers knowing the answers or very specific STEM content, but more focusing on collaborative exploration and

	<p>discovery, and the STEM journeys of the young people, alongside those of the youth workers. In this, STEM can be seen as another thing to explore with the young people. One of the key impacts of the Curiosity programme was that young people could be supported through STEM in youth work, but they didn't need to have to go into STEM to be successful. In this, STEM can be just another tool (like Arts and Sports) that youth workers can have at their disposal to help young people achieve several outcomes (including agency, skills, creativity, resilience, critical thinking). Whether young people go into, through or around STEM, would all be positive impacts of connecting young people more closely to science through informal practices in the community.</p> <p>Youth workers are the ones to take on STEM informal learning, not least because it takes down the barriers of formal STEM, has the young people operating in a safe environment where they can try and fail, involves trusted adults and a focus on peer relationships. Through this, young people can experience STEM in a different way to what they have maybe experienced in formal education, helping break down barriers further.</p>
<p>Importance</p>	<p>Another key youth outcome documented by Curiosity (i.e. by participation in informal STEM activities in youth work settings) was acceptance to failure while developing new skills. The nature of scientific exploration encourages mistakes and failure to be used as positive learning opportunities. Similarly, Youth work is set up to focus on developing confidence to fail, taking risks, and developing overall confidence skills in life.</p> <p>Informal STEM delivery is distinctive in that failure is also an achievement, i.e. learning from failure allows science to progress and evolve and is an essential aspect of the scientific process. Through this, achievement is redefined with the formal forms of achievement removed allowing young people to challenge what</p>

	<p>they can and cannot do, from their own perspectives. However, STEM is underused compared to the arts and sports in youth work.</p>
<p>Methods</p>	<p>Research suggests that simply making STEM more exciting and interesting for young people is not the only answer to the participation problems seen globally. Both informal and formal science spaces need to be welcoming and connected to young people’s lives, and science capital and equity are key to ensuring a social justice approach is taken.</p> <p>The idea of science capital, as a combination of socialised dispositions and science-related resources that produce a sense of whether science is for ‘people like me’ or not. A science capital approach should be outlined and explored, to support youth workers help young people find more meaning and relevance in STEM and therefore become more engaged in the activities. The Equity Compass should also be considered. Like the Science Capital Teaching Approach, the Equity Compass is a framework that can help encourage reflective and equitable practice when working with young people. Both of these approaches focus on changing practice, not the young people (i.e. they are not deficit approaches).</p>
<p>Key Issues</p>	<p>Beyond considering social justice issues relating to the structure and setup of informal STEM activities, learners should also consider aspects of good practice. Learners could also make reference to the STEAM and Digital Youth Work in Ireland report, from the National Youth Council of Ireland, which details key practice features to aim for when setting up these activities.</p> <p>Informal STEM learning is all about creating accessible, engaging, and inclusive experiences that inspire curiosity and build confidence. To do this effectively, youth workers must consider several practical, pedagogical, and ethical factors. Factors could include:</p>

	<ul style="list-style-type: none"> • Inclusivity and Accessibility • Clear Purpose and Relevance • Engaging and Creative Delivery • Role of the Facilitator • Planning and Structure • Voice and Participation • Safeguarding and Risk <p>Additionally, ensuring that young people understand the STEM opportunities and current issues relating to STEM around their local communities has been shown to improve engagement. In this, location specificity is key, learners should be encouraged to draw from community resources and interests, as well as the environmental and political context that their young people are operating within.</p>
<p>Reflect on own Practice</p>	<p>There is a lot of stigma and fear surrounding STEM, both from the young people themselves, but also among teachers/tutors. Both primary and secondary school teachers have voiced concern being nervous of skillset and perceived specialisation needed to teach science to young people. There are also fears around open-ended learning and how to support young people to work towards personally set goals. It is key to understand that STEM, both formal and informal, should not be intimidating and retaining the informal nature of the youth work settings, rather than a more formal education style that might be traditionally expected in science, can result in a rewarding experience for both staff and students. There is a real need to demystify science and emphasise the links between science and everyday life, make it transparent, and link STEM to possible careers and training opportunities for young people. Learners should explore how they can implement informal STEM activities with young people while being mindful of suggested teaching methods to ensure inclusivity.</p>

Learning Outcome 4	<p>The learning across many of informal STEM initiatives, Curiosity included, is that for informal science learning and STEM delivery to have the most meaningful impact on a wide range of underrepresented young people, it needs to also embrace principles of the FAIL framework (i.e. Friendship and connections, Achievement and aspirations, Independent and interested learning, and Life skills). Learners should be supported to ensure that their activities are structured with this framework in mind.</p> <p>The unit will culminate in students planning an informal STEM activity with young people. They will need to consider set up and implementation strategies learned throughout the unit with the aim of ensuring all young people are welcomed, safe and engaged with the STEM space created. Particular emphasis should be placed on understanding key aspects of ensuring a social justice approach to the STEM learning if taken. While topic areas of climate change, ecology, and cookery may be easy starting parts to ensure young people relate to material, all STEM disciplines and topics are possible and can be digested and engaged (i.e. Space science can be easy and engaging too!).</p>
-------------------------------------	--