STEM Education in Europe

The Way Forward

Policy Recommendation for Decision Makers in VET

United Kingdom

STEM Education in Europe - The Way Forward
Policy Recommendation for Decision Makers in VET - this publication is the outcome of the Erasmus+ project Shaping, Enhancing and Nurturing STEM in Europe.

Editors: Ian Crawford, Brian Martin

Edition: 2021

Co-funded by the
Erasmus+ Programme
of the European Union

PROBLEM STATEMENT

Background

The promotion and development of STEM initiatives remains a government priorty at both national and regional level. The UK continues to stress the central priority for STEM developments and Careers Education. Despite this drive significant difficulties still remain in the recruitment of women into STEM related careers and representation of minority groups such as those from BAME backgrounds and those with disabilities. Skill shortages are still an issue. This is despite job availability with good career structures and a plethora of initiatives. The need to fully embed many of these initiatives remains a challenge.

Whilst there has been increases in young women entering some Science based subjects at Advanced Level and a number of university degrees courses the outcome has not seen significant advances in women entering STEM careers or the numbers in management significantly increasing. Government requirements for large businesses to publish profile data of staff backgrounds should have an impact in the medium to long term but plans have been suspended due to the pandemic (11/02/2021).

Problems- areas for development (and opportunities):

1) A skills shortage and skills gap exists in the UK. Recruitment of women and under represented groups therefore is a priority. How do we continue to encourage more women and disadvantaged groups into STEM education and careers more effectively with better outcomes including higher entry career levels?
2) How do we utilise our networks of STEM supporters into the *new opportunities* offered by government?
3) How do we navigate the post Brexit and post Covid worlds in the UK ? Opportunities for supporters are currently limited by Covid 19 but the needs for young people are *current and now.* ***Until Covid is managed effective long term planning for STEM engagement is problematical.***
4) How do we encourage education institutions and employers to address skills shortages more effectively?

What institutions and on what levels are dealing with the problem?

The recent government *Skills for Jobs White Paper* of HE was a response to the 2019 Agar Report. A White Paper acts as a consultation document indicating government direction of travel. This will of course be subject to funding in the Post Brexit and Post Covid 19

economy. A comprehensive funding review is imminent and this will solidify many of the recommendations made by the White Paper.

Skills for Jobs recommends that University activity and funding is directed towards STEM as a national priority. In addition the White Paper encourages additional modularisation of degrees– this may encourage more part time degrees and thus encourage more women and underrepresented groups into STEM degrees and learning.

In addition the government is renewing a commitment to lifelong learning:

As part of the Lifetime Skills Guarantee, announced by prime minister Boris Johnson and set out in January 2021 Skills for Jobs White Paper, the government plans to give everyone access to a "lifelong loan entitlement", giving adults access to the equivalent of four years of post-18 education. (TES 21st January 2021)

Supporters working in STEM may well be able to access additional funding opportunities to develop their own CPD and skills set.

The government is committed to the introduction of T Levels in the UK. T Levels are an alternative to traditional Level 3 qualifications and offer an alternative route into technical education. Equivalent to three A Levels, T Levels offer young people 45 days of work experience and 20% of learning will be in the workplace. T Levels are overwhelmingly STEM based – a full list can be found here: T Level subjects | T Levels

This shift in focus towards technical qualifications, and by definition STEM education, represents a new opportunity for STEM supporters to work with schools, colleges and apprenticeship providers. The demand for work placements and skilled vocational inputs will be significant and industry based STEM supporters will be able to support this new demand.

STEM Learning in the UK a national organisation with government funding which delivers through the use of 30000+ supporters (STEM Ambassadors) reported in January 2021 from an evaluation activity the following:

- Certain types of activities seem to be more beneficial in achieving certain types of outcomes – for example, STEM Clubs are best placed in inspiring and informing young people about STEM, whereas STEM careers talk / advice session is best in supporting organisations to develop links with schools / communities.

● Certain activities seem to have less impact than others – for example, providing advice and guidance for Senior leaders is rated as having less impact for STEM Ambassadors; however, this type of activity was valued by organisers and therefore still has value.
● The amount that certain activity types are delivered varies – for example, hands on practical and supporting an exhibition or event are popular, whilst hosting workplace visits and providing information to Senior school leaders are less popular.

● There is little variation in the quality of activities developed nationally, suggesting a consistently high level of support is being delivered nationally and supporters are well equipped.

What has been tried in the past? Why didn't it work?

What has been tried in the UK has worked to varying degrees and has proved popular. It has had value and a high profile. There is now a need to focus on the most effective methodologies.

In secondary education it has now been identified that:

- "Certain types of activities seem to be more beneficial in achieving certain types of outcomes – for example, STEM Clubs are best placed in inspiring and informing young people about STEM. Whereas STEM careers talk / advice session is best in supporting organisations to develop links with schools / community".

  Businesses enjoy the self contained nature of STEM Club activities and the opportunities to work with young people. Organisations such as BP, Shell, Barclays, etc have heavily invested in STEM Club opportunities

  Problems remain with the capacity of schools to support these activities in terms of staff time.

- Parents are a key influencer in shaping aspirations of young people and yet they are *rarely involved in activities*. WISE People Like Me activities are specifically aimed at female students and their mothers in recognition of this problem: Inspiring girls with People Like Me - Welcome to the WISE Campaign

Higher Horizons (HH) Linking Higher Education with Schools

Universities have working in partnership with schools addressed this issue through the Higher Horizons (HH) programme – see Higher Horizons+ - Part of the Uni Connect Programme . This scheme aims to work with young people and inspire particularly disadvantaged groups to engage in Higher Education learning. Schools and therefore learners are identified by post code and related deprivation levels. Women are a priority group.

The full impact of this Programme remains to be seen but HH has been the powerhouse of much recent STEM learning and engagement with HE STEM Supporters engaging on a regular basis (data capture and activity drives the funding of this project). Partner schools have engaged with this project – it is free to schools and therefore offers schools

inspirational activities (free of charge), and staff much needed CPD and contact with Universities across our region. NB SES 13-19 have delivered activities free of charge to schools and Colleges including Amazing STEM Careers and People Like Me.

Higher Horizons have provided significant resources for remote STEM Learning and the provision of digital resources. See Resources – Higher Horizons

RECOMMENDATIONS

In this section, you describe a number of possible ideas (typically 3) for solving the problem cited above. Your ideas should be creative and well-planned. Each recommendation (which should be described in 1 paragraph) should include the following information:

We have identified 3 challenges to address:

1. A skills shortage
2. A lack of representation of girls and other disadvantaged groups in STEM subjects, higher education and jobs possibly exacerbated by little work with parents/carers.
3. Issues of Covid and remote teaching/learning interaction

Solutions and Actions to address above interrelated challenges:

1. *Blended learning for STEM volunteers*
2. *More parental workshops*
3. *STEM Access to Higher Education*

Engaging remotely through blended learning with young people is still critical; especially with the current isolation of young people (students in the UK have lost nearly 6 months of time due to national lockdown and many students have experience additional loss of teaching time due local lockdowns – whole school or year groups).

Working with parents again through online learning, workshops, and case studies.

The role of the STEM Supporter in promoting STEM is more essential than ever**.**

Encouragement of repeated engagement through STEM Clubs is likely to have the most impact in future. STEM Club engagement was rated as the highest activity by STEM Learning in the UK and positively impacted on STEM supporters and organizers. Currently, there is a focus on delivering STEM clubs remotely.

More focus should be placed on STEM *supporters work with and informing parents* about study options and job opportunities within STEM.

STEM Supporters may wish to provide:

1) Case Studies and Role Models– available electronically.

2) Remote learning opportunities through digital platforms such as Microsoft Teams and Zoom.

3) Mentoring programmes to give students support, inspiration and direction.

   Preventing the sense of isolation has been crucial.

4) CPD opportunities for teachers and careers advisers.

Our focus groups at both school and FE level indicated a student appetite and willingness to engage with STEM supporters working with young people to promote and inspire education.

STEM Learning guidance confirms this approach:

STEM Learning in the UK have indicated two priority areas at this point in the COVID crises:

1) Supporting Remote Teaching and STEM Clubs – led by teachers and supported by STEM supporters.

2) Supporting Home Learning – led by parents, and often directed by teachers and supported by STEM supporters.

Within these strands areas for STEM supporters activity include:

- Production of case studies and videos

- Remote CPD experiences for teachers (upskilling their knowledge base about specific career areas.)

- Development of STEM Club resources and activities

- Ask STEM Learning – a new mechanism for QA with supporters.

National charities aligned to our work such as WISE (Women in Science and Engineering) have set themselves a target to engage with 200000 women learners through their volunteer networks.

Addressing the Digital Divide in STEM COVID Education

These activities listed above have the potential to support teachers and remote learning.

Ensuring students can access digital platforms is an **ongoing priority and recommendation**.

Key concerns remains around the digital divide:

1) Access to technology (hardware – laptops and appropriate devices)
2) Access to suitable Wi-Fi and bandwidth

Here the government has offered additional support for access to hardware and software

Get laptops and tablets for children who cannot attend school due to coronavirus (COVID-19) - GOV.UK (www.gov.uk) (as at 29/01/2021)

3) The digital divide (Prensky, 2001) continues to be a real issue where digital natives (post internet) and digital immigrant. Much home learning relies on the skill set of the parents(Digital immigrants) to access and support learners. Without the confidence or skills issues around remote home learning can be exacerbated.

STEM supporters can play a vital role in supporting the accessibility of carefully constructed resources and case studies for home learners and their parents.

Reading

H. Sapiens Digital: From Digital Immigrants and Digital Natives to Digital Wisdom by Marc Prensky 2001

EVALUATION CRITERIA

In this section, you outline criteria for evaluating your recommendations. The criteria should be based on the information outlined in your problem statement, e.g. the problem is "girls don´t find the STEM subjects attractive", the recommendation might be "support for girls in STEM subjects", evaluation criteria could be "10% more girls interested in careers in STEM"

Precise targets during the Pandemic are difficult to predict and new baselines for recording activities and engagement will need to be drawn once the pandemic has ended.

Living with the impact of COVID may last another 10 years (scientists are now referring to annual endemics of the virus) and learning to work with COVID a new, ongoing challenge.

Nevertheless, we will need to **evaluate our recommendations**:

1. *Blended learning for STEM volunteers*
2. *More parental workshops*
3. *STEM Access to Higher Education*

Evaluation data will include:

i) Number of online workshops and activities delivered online and in person where safe. Activity needs to be recorded against age (Engagement with primary schools– evidence from various national evaluations suggests that capturing the hearts and minds is essential for directing aspirations into STEM careers), level of learning and subjects (Physics and Maths are target areas for engagement with women learners)

i) Number of case studies produced and accessed (including feedback from schools)

ii) Types of activities recorded – STEM Clubs, demonstrations, talks, etc.

iii) Target groups reached and long-term impact (longitudinal studies)

iv) Access information re devices and Wi-Fi – how many students can access information and what is being done to access hard to reach learners (especially a problem in remote and rural areas)

v) Parental access and engagement data

Further Development and Evaluations:

1) Maintaining existing contacts and relations throughout the duration of this COVID pandemic is a priority – predicting the educational landscape post COVID-19 is difficult with the switch to homeworking (for both supporters and learners) and the increased capacity for home learning.
   We need to ensure that existing contacts and relationships with supporters is maintained and developed to take advantage of both synchronous and asynchronous learning when COVID-19 restrictions are lifted.

2) Continued support and deeper engagement between Higher Horizons, STEM Learning and providers such as ourselves (and in STOKE community providers such

as Wavemaker) will provide synergy, stop the duplication of activity and enable the sharing of information to help schools provide improved STEM Opportunities for learners and STEM Supporters.

3) Post COVID STEM providers will need to re-establish data, baselines and KPI around their activities:

Longitudinal evidence- data collected from schools and Universities - will confirm whether more young women are engaging with STEM subjects at GCSE, A Level and Degree level.

Finally:

The role of the STEM Supporter remains central to the growth in women into STEM Careers. Community led initiatives also remain powerful in influencing schools, parents and young people.

Collaborative approaches remain the way forward with local partnerships of STEM Supporters opening the minds and doors of women and disadvantaged young people into high quality STEM education and careers.

Ian Crawford and Brian Martin

SES 13-19 Ltd

12/02/2021