Abstract

Prepared for the Commons Select Committee on Closing the STEM skills gap inquiry, this paper is an account of actions taken by an individual, who is proactive in supporting skills acquisition in the STEM area of Computer Science, in England. The paper gives an account of personal experience relating to supporting skills acquisition relating to a number of initiatives over a 10 year period.

This report provides a detailed narrative account of personal experience of engagement with skills acquisition ‘grass roots’ communities of practice, and highlights issues which relate directly to the development of skills in STEM curriculum areas.

Introduction

My name is Dawn Hewitson and currently I am employed in ITT provision in STEM Subjects at a Teacher Training institution. Although I trained as a Design and Technology teacher, my career has been mainly in computing related industries, and has prior to teaching, I was a web developer and also worked in National Savings in the Computing department. My career in education, has to date been mainly involved in delivering ICT and Computing related curriculum in English schools, colleges and higher education institutions, ranging from Primary Schools to Post Graduate Level and ITT provision.

On a voluntary basis I am involved with many organisations which proliferate the development of skills in computer science, these have included:-

- The British Computer Society
- Codebug
- Stemettes
- Python Software Foundation
- The National STEM Centre
- SSAT
- Google Rise Initiatives
- CAS Include
- Raspberry Pi Educators scheme

I am passionate about a two main issues:-

1. Providing opportunities for people to engage with technology, particularly women.
2. Children staying safe online, I am actively researching the phenomenon of image sharing as part of my PhD studies.

To further these interests I have volunteered for a number of organisations outside of my academic role to support children and adults engaging in skills acquisition and E Safety initiatives.
1. Background

This is a narrative account of activities undertaken to date on a personal level to try to narrow the skills gap.

1.1 As a senior lecturer and teacher trainer in Computer Science and Information Technology, and also in my previous role as a teacher in schools, I have long recognised the skills gap between the classroom and industry. Initially, with limited success as a teacher, I contacted large organisations asking for trips for pupils, and managed to acquire access to companies such as Volkswagen, Astra Zeneca and the TUI group via Laterooms, because I knew people who worked in these organisations and this facilitated my access to senior leaders within the organisation, who would help me to acquire information relating to the skills needed to enable me to pass this information on to pupils.

1.2 I then realised not all teachers could acquire access to this and looked for opportunities to create resources which could help other teachers to access information relating to the kinds of jobs which exist in the technology sector, particularly in relation to programming and computing.

1.3 I then encountered the Specialist Schools and Academies Trust and applied for the Lead Practitioners role. They funded me to produce a Case Study which was subsequently published on the Internet and widely used by teachers. The case study involved me going into the TUI group, filming processes and interviewing various IT executives, to discuss their roles. I had the opportunity to discuss at length, issues senior leaders within technology based organisations had with recruiting staff with the necessary skill sets. I used this information for two purposes:-

1. to demonstrate to children how tech industries work and educate them on the variety of opportunities available to them, to broaden their horizons.
2. To change my own personal curriculum delivery to enable children to have a valid link between industry and the classroom. Effectively so that they could see directly how what they produced and learned in the classroom related directly to the working environment in the hope of encouraging them to seek IT related careers.

This project was funded by an initiative for a series of vocational qualification, which were eventually disbanded and the material was not available then to practicing teachers. So I used the materials on a personal website, shared with other teachers, so they could use this in the classroom. Eventually this project concluded and the ICT curriculum was disappplied, the information needed updating, and the Computer Science curriculum took precedence in my professional working life.

1.4 To support the skills gap in computer science, I have engaged with a number of activities and initiatives. Primarily under the auspices of the British Computer Society, I have worked alongside teachers who have facilitated putting together the Network of Excellence, which is a series of Universities who provide support primarily for teachers, but this has also extended to private individuals who have
needed skills updates to further their career aspirations. I was one of the initial supporters of this initiative and I have dedicated many hours of volunteer time to this to help teachers to set up and run Hub communities in their local areas to support skills acquisition. This has included running workshops at events, talking to teachers and advising them, effectively supporting them through the application process.

1.5
Additionally, I have utilised the Raspberry Pi Foundation, initially making use of their computers to try and address the skills gap. Again on a voluntary basis I have attended and supported events, which have enabled both adults and young people to engage with skills acquisition, and use technology to educate themselves. This has led to my becoming an ambassador for the Raspberry Pi foundation in English schools and I have personally purchased and loaned equipment out to schools for student teachers to be able to run code clubs in school-based settings. I have trained teachers to support the running of code clubs in schools.

1.6
Difficulties arising from setting up code clubs, led me to explore further avenues, whereby, I worked with an electronics engineer, who was one of Steve Furber’s PhD students, to produce an artefact, which would effectively make electronics ‘cuddly’ and appealing. This project was part of a 3 year study, which was instigated with a view to trying to make the barrier to entry less onerous. The product we developed known as the Codebug, was demonstrated to the BBC, and became the catalyst for the Microbit. I have not engaged with the Microbit, because I have been too busy with my voluntary commitment to the Codebug initiative and supporting computer science knowledge acquisition.

1.7
In addition to this, I have been involved in an organisation which addresses issues related to ‘Diversity in Computing’ which is an arm of the British Computer Society, called CASInclude. The group is a body of people who are committed to the proliferation of computer science for all and not just those people with mathematical skills. This organisation has supported many events around the UK, but mainly in England, by delivering workshops related to computer science skills acquisition. These events have been attended by both children and adults, and have been at various locations across the country.

2 Issues Encountered

There are a number of issues which should be highlighted as part of the experience discussed above. Although the information is anecdotal and I have limited access to metrics to support the claims I am making as issues, these are real issues encountered on a personal level, which significantly restrict the momentum of initiatives to address skills acquisition and therefore limit the success of skill building initiatives.

2.1
Access to facilities and relevant people. I have been fortunate enough in my career to be able to have access to individuals who have been able to signpost me towards initiatives which have enabled me to contribute to skills acquisition. These facilitators have often been head teachers, or other well positioned professionals, who are not readily accessible to members of the skill building community. By engaging with these people on a professional level, and being personally confident in acknowledging my own skills deficits, I have been able to speak with individuals who can help me. However, there are access barriers to individuals who would like to engage in both the proliferation and acquisition of skills. Primarily these are gaining access to people and facilities who can help:-

- Within timescales that allow for minimum disruption to day to day working practices. Skillsets can often be time critical, needed for a period of time and then the opportunity to upskill disappears because of alternative solutions being deployed.
- Restricted access to industry specialists who could support skills acquisition initiatives.
- Personal barriers to acknowledging skills deficits.

2.2. Resource limitations. Primarily this concerns three areas:- Technology, People and Places. To tackle Technology first, and this will be further addressed in this document. When upskilling individuals, there is often a technological element to supporting the process of acquiring skills. This is a costly exercise, and access to funding, to support equipment acquisition is often down to individuals or groups of people. People like Peter Lomas (Raspberry Pi Foundation), myself and others often have to use personal finance to fulfil this need, which again limits the acquisition of skills. Individuals do not have access to budgets which facilitate skills acquisition on a large scale. Whilst there are in inner city areas, spaces available for skills acquisition, such as Fablab, Madlab, and Makerspaces, these spaces have their limitations. Location is an issue, because these are often seed funded by low budget initiatives and the acquisition of accessible premises create a barrier.

2.3 Identity Issues. Some areas where there are skills gaps often have identity issues. These issues can include perceived barriers to entry, such as the level of skill required to perform a particular task, Gender issues in tech areas, which are widely acknowledged. In areas, where there are shortages of skills, often large organisations will not invest in those areas, because of the cost/benefit/return cycle. For example computing based skills require the use of a computer, the cost of the computer is only one small part of the investment, staffing is then needed and often there are hidden costs such as licences, which make the initial investment to start the process of skill building deemed as having limited viability.

2.4 Funding Initiatives. There are some funding initiatives available but bidding for funding is often a difficult and protracted process, with funding often being directed towards organisations, with the capacity to deploy specialist bid writers. This process often deters skilled people from engaging with skills based initiatives because of the processes, and this often creates a missed opportunity cost, where the target audience have become otherwise engaged due to time lag.
3. Conclusion

It would be enormously helpful if there were more specialist advisors, who could signpost those people with the capacity to address skills shortages, to be able to access funding channels. There are a plethora of Business Innovation Advisors, with access to start up funds and grants. If this facility could be extended to Skills Innovations Advisors, with access to support for funding initiatives and bid writing. This skills shortages could then be tailored to area shortages based on geographical locations.

Investment in both equipment and premises, would also be beneficial to proliferate skills based initiatives. Perhaps large organisations could make available facilities to support such initiatives for skills acquisition, particularly digital skills.

Perhaps Government organisations, such as schools, or Universities, could be provided with funding to support skills shortage areas for evening classes and learning hubs.

Finally, those organisations who hold staff with shortage key skills, could be provided with incentives to release staff on an 80/20 basis, to encourage skills proliferation.

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