Written evidence submitted by the Worshipful Company of Information Technologists (GAP0051)

Executive summary

WCIT has observed that the problem solving, team work skills, communication and independent learning are neglected in many current approaches to STEM. Moreover, opportunities for broader application of those skills within the wider learning community are missed. WCIT’s iSTEM+ (eye-STEM-plus) approach builds an effective ‘operating system’ to embed a world class tech education for all learners between 5-19, built on tied and tested components.

Submission

1. The Worshipful Company of Information Technologists (WCIT) is the 100th City of London Livery Company, a not-for-profit membership community of 800+ influential technology leaders which combines modernity, digital and information technologies, plus the thousand year-old charitable traditions of the Livery movement. The WCIT Charity makes grants of over £100,000 per year to assist charities and educational establishments help the lives of the disadvantaged. Education is at the heart of what we do. We have worked with Raspberry Pi foundation to help it reach the 54+ schools supported by Livery Companies & we have funded Code Clubs.

2. WCIT’s goals are simple: it works for the well being of society, through technology. Our members contribute their time, talent and financial donations to help improve disadvantaged lives. We improve education and training and nurture the IT profession.

3. WCIT is politically-neutral, believes in diversity, is neither an industry professional institution nor a trade association, although it does partner with such bodies. We have built a secondary school, the Hammersmith Academy (jointly with the Mercers’ Company), and support numerous other schools & educational establishments and have a strong focus on improving education.

4. That WCIT invests heavily in STEM reflects our belief that the UK’s future depends on the prowess of our workforce in those subjects. We will continue to work in this space to further the UK’s standing.

The STEM skills that were needed but were found to be in short supply or missing

5. While it is generally agreed that all students need improved education and skills, there is some disagreement about the actual STEM skills required. In The STEM Crisis Is a Myth, Charette contends that: “Rather than spending our scarce resources on ending a mythical STEM shortage, we should figure out how to make all children literate in the sciences, technology, and the arts to give them the best foundation to pursue a career and then transition to new ones.” In the House of Lords’ report Make or Break: The UK’s Digital Future the incoming Government was urged to “seize the opportunity to secure the UK’s place as a global digital leader by, among other things, making digital literacy a core subject at school, alongside English and Maths.” It also recognised the need for upskilling the current teacher workforce ‘on the job’.
6. “While the Committee welcomed the new computing curriculum, it was concerned about who was going to teach it, as many teachers are not confident or equipped to deliver relevant digital skills.”

How this particular skills need has been addressed

7. The engineering challenge we have been addressing is to design an effective ‘operating system’ for schools, academies and colleges seeking to embed a world-class technological education in the curriculum, available to all learners 5-19, which is built on tried and tested components. It needs to be user-friendly, flexible, easy to implement with minimal disruption and expense, and in the shortest possible time. A group of heads and STEM subject teachers have been working with employers on this over the last 5 years and have now formed the Engineering & Technology Education Partnership ETEP led by the IET to implement its introduction to as many UK schools and colleges as possible within 3 years. The approach is called iSTEM+, pronounced “eye STEM plus” and is shorthand for “integrated STEM and more”

where the “more” includes:

- more subjects, such as Computing, Geography, Art&Design, Sports, Enterprise, PSHE;
- more skills, such as practical and problem-solving, team work, independent learning, communication;
- more people, involving a wider learning community including families, peers, ambassadors etc.

8. The basic building block is the ‘Skilful School’ which commits itself to a strategy to embed integrated STEM into the normal timetable for all, complemented by a range of enrichment opportunities.

9. A key component of the iSTEM+ approach is a set of stimulating cross-curricular, topic-based, practical and problem-solving projects undertaken by small groups of learners leading to presentations and which build into each student’s iSTEM+ portfolio. In mentoring the projects teachers have the opportunity for professional development in their subject as well as widening their knowledge and understanding of its applications and contribution to our lives. Students similarly appreciate the relevance of these subjects and become better motivated learners. In the process they learn more about STEM-related careers and the range of qualifications available. The projects also engage a wider learning community extending into the home and workplace. This model has been successfully ‘marketed tested’ with many schools, colleges, employers, parents and politicians. The iSTEM+ approach is now being supported through the Careers & Enterprise Company’s national network of volunteer Enterprise Advisers, the Institution of Engineering & Technology’s network of Schools’ Liaison Officers, Tomorrow’s Engineers network of Employer Support Managers and the newly reorganised STEM Ambassador network.

10. In order to implement it in a locality we have developed the notion of an ‘iSTEM+ Cluster’ of schools and colleges offering full-time academic and vocational education and skills across the 5-19 age-range. This approach accords very well with a similar approach put forward by
the previous Industry Minister, Matt Hancock MP, in his speech on Industrial Strategy in Portsmouth in October 2014. Each member of a cluster nominates a senior member of staff to plan and coordinate the implementation of the iSTEM+ approach. The approach draws on the findings of the Royal Academy of Engineering’s “Thinking like an engineer” action research project. There is now an iSTEM+ group on the STEM Learning site. This draws on, and contributes to, materials in the National STEM Centre e-Library such as those developed through the RAEng project.

11. Any school or college can choose to become a Skilful School, and to team with neighbours to form a supportive local 5-19 ‘vertical’ cluster. But to make a significant improvement to the pool of STEM-skilled school and college leavers some form of regional and national planning needs to be put in place. Our proposal for England is to use work with network of 15 regional STEM Ambassador Hubs and the network of 39 LEPs. These include a sizeable number of conurbations (cities and towns usually with Mayors and a reasonably large population). The aim is for each of these (maybe 200 or so) to become an ‘iSTEM+ Innovation Hub’ within which a number of clusters can be launched in each of the coming 3 years or so. Each Hub would provide some physical space where teachers can meet and have hands-on access to IT resources such as 3D printers, as well as other materials. Ideally these would also be open for students, parents, Ambassadors etc. as well and become a community resource hosting events. Some cities, such as Winchester, Bristol and Cambridge already have hands-on science centres which might readily fulfil the role – others may need to find or build a location. Ideally these would be supported through the Local Enterprise Partnerships funding to contribute to the skills needs of the Government’s post-Brexit Industrial Strategy. Every DBEIS minister is now a Growth Champion for a group of LEPs.

12. The latest iSTEM+ initiative is the Student Digital Ambassador scheme. Through this, schools invite GCSE and A-level STEM students who are enthusiastic about their subjects to volunteer to work with their STEM teachers, supported by local experts (such as IET members, STEM Ambassadors, HE staff & students), to design inspirational cross-curricular STEM activities for younger students, particularly in Years 5-8. Pilot sites are supporting this with Silver CREST awards from the British Science Association. One pilot site has incorporated the scheme into the IB Diploma where every student undertakes a Creativity, Activity & Service project. One subject of considerable current concern to education is to see the million micro:bits, which were distributed free to all 11-year olds in state education in 2016, put to better educational use. SDA students are developing activities which promote the use of micro:bits for cross-curricular STEM. Another matter of current interest to very many schools is participation in the Bloodhound SSC Education “Race to the line” model rocket car challenge for primary and secondary schools. Every entry uses a micro:bit to record acceleration data. There is now a Student Digital Ambassador group on the STEM Learning website. The Bloodhound competition is supported by the Dendrite educational platform developed by the Learning Partnership. This now includes local communities for every primary and secondary school. The Learning Partnership fully supports the iSTEM+ approach and has established a national iSTEM+ Collaboration Community on the Dendrite site.
The cost of the measures and how they have been funded

13. The Gosport iSTEM+ cluster in Hampshire brings together a primary school, an 11-16 school, an 11-19 school and a 16+ further education college supported by local employers such as Airbus Space & Defence, STEM Ambassadors from the Winchester Science Centre and HE outreach from the Technology Faculty at Portsmouth University. This has been funded by the schools themselves, and supported by pro bono consultancy from individuals such as Roy Haworth (Airbus), Deborah Higginbotham (Opus International), David Hill (Portsmouth University), Richard Needham (IET), and Adrian Oldknow (CCITE). The local MP, Caroline Dinenage, is exploring with fellow minister, Jo Johnson, possible sources of support for the development of a pilot iSTEM+ Innovation Hub at Bay House. In 2017 Gomer Junior School and Brune Park Community School each received £1000 grants from the Worshipful Company of Glass Sellers. Both Bay House Academy and Brune Park have also received grants through Lego Education. Bay House is one of the UK schools participating in the Erasmus+ KIKS project (Kids Inspiring Kids in STEM) with partner schools in Finland, Hungary and Spain. This project is now receiving sponsorship from the newly formed Micro:bit Education Foundation. Bay House and Gomer are two of the lead schools in the current development of the Gosport & Fareham Multi-Academy Trust. The Micro:bit Education Foundation has agreed to provide sponsorship for this in 2017. Bay House and Gomer Junior are the hosts for the Portsmouth Hub of the current Bloodhound “Race to the line” challenge which is sponsored by Microsoft, the Army and other partners to provide free kits to the schools. Bay House is a pilot site for the iSTEM+ Student Digital Ambassador initiative which is also receiving support from the Micro:bit Education Foundation.

The results of any evaluation of the measures / schemes introduced

14. Schools in the Gosport iSTEM+ local cluster took part in the RAEng “Thinking like an Engineer” action research project. Gomer Junior’s gSTEM initiative is featured as a case study in its final report due to be published shortly. The WCIT is in discussion with the Education Endowment Foundation to develop this into a research project. The gSTEM initiative at Gomer Junior was visited by Caroline Dinenage, a minister at the DfE, in December 2016. She has arranged for the Skills minister, Robert Halfern, and the Secretary of State for Education, Justine Greening, to visit Gomer to see gSTEM in action this term. Gomer’s Head, Georgina Mulhall, commissioned an external evaluation of gSTEM on 2016, extract from which are on the gSTEM page of the school’s website. Georgina has nominated for a Pearson Award as Primary Head of the year, supported by Caroline Dinenage and Prof Adrian Oldknow. The school has been selected for a showcase event on the opening day of the BETT 2017 show in London, organised by the British Educational Suppliers Association. The gSTEM approach involves every student and teacher in practical group cross-curricular open-ended STEM projects on one morning each way. It has had a profound effect on the learning ethos of the whole school – all by organising just 10% of the weekly timetable. This is a model which any KS2 school in the country could and should be implementing to enthuse the next generation of engineers, technologists and scientists.

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