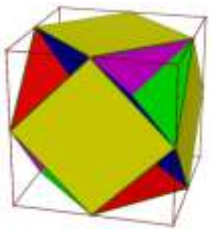

A world-class technological education for all pupils 8-18

The Centre for Innovation in Technological Education in Cambridge www.ccite.org

The current STEM education strategy has not fulfilled the skills needs of UK industry. The CBI has called for business and industry to support schools in meeting its `Ambition For All In Schools' education campaign. We urgently need to restore the UK's position as a world leader in technological education as speedily, effectively and economically as possible, with minimum disruption. The CBI and ASCL (the Association of School and College Leaders with over 17,000 members) have asked CCITE to develop a school based response to reform technological education for all pupils aged 8-18 in schools, colleges and academies. Under current DfE proposals schools will start teaching the new Programmes of Study in Science, Design & Technology (D&T), Art & Design, Computing and Mathematics in 2014 with new public examinations in 2016. In the words of John Cridland, CBI Director-General: "*Government reforms are heading in the right direction, but are not sufficient on their own and must go further and faster. As well as academic rigour, we need schools to produce rounded and grounded young people who have the skills and behaviours that businesses want*." In order to achieve this, CCITE has developed a strategy, in partnership with the main STEM subject teachers' professional association, based upon best practice in STEM education in the UK and abroad.

The key component in the CCITE strategy is the provision of the know-how and support for schools to offer half-termly group cross-curricular creative problem-solving projects for all pupils at Key Stage 2 (8-11) and Key Stage 3 (11-14). Sir James Dyson observes: "*We need to develop children who can think with their hands and their brains to plug the 60,000-strong deficit of engineers in Britain... Good coursework gives children the space to formulate their own ideas and arguments*." We also need scientists, mathematicians, technicians, computer scientists etc. if we are to achieve HM Treasury's `Plan For Growth' aim of "*Creating a more educated workforce that is the most flexible in Europe".* The `20-20 CCITE STEM projects' will be mentored by teachers, supported by parents, employers, employees and senior pupils, who will thus be enabled to update their knowledge of the applications of their own disciplines and to enhance their own subject teaching. The pupils will perceive the importance of the STEM disciplines to their own lives and the future well-being of society and hence be better motivated and informed in their further studies and qualifications in STEM subjects. Their projects will involve making artefacts, writing reports, designing displays and making presentations – all important skills not otherwise addressed in the proposed examination system. Their portfolios of evidence will be accredited. Pupils and teachers will be enabled to learn and support each other through the use of modern technology in the ways professionals already do in business and industry.

Half the projects will have the explicit aim of covering aspects of the Computing and D&T curriculum while the others will provide practical applications for aspects of Science and Mathematics. They will be developed and trialled in schools from September 2013 ready for dissemination in 2014. Schools have the autonomy to organise the curriculum as they see fit. CCITE will provide advice for school leaders on effective ways to integrate a reformed technological education within the normal timetable for all pupils. The whole programme will be managed by ASCL. In order to fund the initiative we need 40 companies, organisations and philanthropists each to sponsor the development of one project with a donation of £50k. We need to convince school managers and governors to engage in reforming their school's technological education for all pupils and students as:

a. the country needs better skilled school-leavers to maintain international economic competitiveness;
b. all pupils deserve the opportunity to develop their full potential and to access rewarding careers;
c. schools have the autonomy to develop a broader, more coherent and relevant curriculum;
d. better motivated students and better informed teachers will result in better examination results and
e. our society will benefit from the contribution skilled technologists make to improving our lives.

"We applaud what CCITE is doing to draw attention to the issues of Computer Science education and the role that engineering and technology can play in Britain's future economic growth. We need both to ignite children's passion for science, engineering and maths and to address the shortage of teachers equipped to teach Computer Science in UK schools." **Peter Barron, Director, External Relations, Google**

Supporting the ASCL/CBI/CCITE "Technological Education for all Pupils" strategy

CCITE, on behalf of ASCL and the CBI, is seeking sponsorship to develop and trial 40 cross-curricular theme-based projects for pupils aged 8-14 in 2013/4 for dissemination to all UK schools in 2014/5. Each project takes around 20 hours, usually within half a school term, and is designed to be pursued by a class working in small teams of 4/5 pupils supported by a teacher and other mentors such as senior pupils, STEM Ambassadors, family members etc. The ensemble of projects will be carefully coordinated so that between them they span most of the major applications of science, technology, engineering, mathematics and computing (STEM+C) in our daily and future lives, see e.g. https://www.innovateuk.org/-/knowledge-transfer-networks. This provides the essential Practical activities, Problem-solving and Project work ("the 3Ps") required to support effective learning in the national curriculum subjects of Science, Design & Technology, Mathematics and Computing, as well as encouraging the development of personal skills such as team-work, self-learning and communication sought by employers. *"Michael Gove must combine his admirable plans for academic rigour in GCSEs ... with room for creative problem solving. We need to develop children who can think with their hands and their brains to plug the 60,000-strong deficit of engineers in Britain."* Sir James Dyson, letter to The Times June 17th 2013. Schools have the autonomy to decide the detail of their curriculum – CCITE will equip them with the know-how and support to embed technological education in the timetable for all pupils. Before embarking on their GCSE and deciding on their further studies and career path, students will have a much better understanding of how technology permeates all walks of life and have experienced ways in which science, mathematics and computing are fundamental to these. They will have gained insights into how products are designed and made, and how companies work.

Sponsors could be companies, organisations or philanthropists. We are seeking £50k to sponsor each project which will be clearly badged with the sponsor's name and accompanied by information about who the sponsor is, what they do, and why they support this strategy. The £2m raised in this way will be used to cover the development costs of the projects, to provide the core infrastructure to support the overall strategy, to support the schools participating in the trials and to ensure an effective roll-out in 2014/5. The range of the 40 sponsors together will impart a clear message about the importance to UK business and industry of having a world-class technological education available for all pupils. We do not just want to raise cash – we seek the active involvement of each sponsor with their chosen project so that each is developed to the highest possible standards. We do not seek to reinvent wheels – there are many good examples of existing materials which have been developed to support STEM education but which are not widely in use. So where practicable projects will draw on that resource bank as well as encouraging the use of appropriate free and low-cost IT tools. What we offer in return for our sponsors' engagement is the multiplying factor of being a key participant in a cutting-edge, cohesive reform of technological education capable of reaching all schools and all pupils across the UK. We have a unique opportunity to take a giant step forward and we very much look forward to working with our sponsors to take it.

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