

Written Welsh Assembly Government Response to the Enterprise & Learning Committee Report on the Science, Technology, Engineering and Mathematics (STEM) Agenda

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Introduction

We welcome the Enterprise and Learning Committee's Report on the Science, Technology, Engineering and Mathematics (STEM) agenda and agree on the importance of driving this agenda forward. As stated in the report, a strong research base and a pool of workers with good STEM skills are essential for an innovative and modern economy. Increasing the take-up of STEM subjects at all levels is key to our future success.

Many recommendations contained in this report fit closely with our current policy direction. We are therefore pleased to be able to accept the majority of them. Some require further consideration given the current economic climate, but we generally support the intent of these proposed actions and believe that steps should be taken to achieve them. The STEM agenda is a priority for the Welsh Assembly Government as demonstrated by our response highlighting the actions we are already taking to address the huge challenges ahead.

We thank the Enterprise and Learning Committee for its Report. Set out below is our response to the Report's recommendations. The Committee's recommendations, and the evidence presented during its preparation, will be fully taken into consideration as we move forward with the STEM agenda in Wales.

Recommendation 1

We recommend that the Welsh Assembly Government should carry out a study of why science in primary schools may be experiencing a decline, and should explore with Estyn how best to assess science performance in the future.

Response: Accept in principle

The Welsh Assembly Government will discuss with Estyn the evidence that points to a possible decline in primary school science and consider any actions to be taken. The revised curriculum for science, which is skills-focused and learner-centred, was phased in from September 2008. The Welsh Assembly Government affirms that science remains a core subject and is therefore an integral part of the Core Subject Indicator (CSI). The curriculum aims to improve scientific literacy through learners transferring and

applying their skills. In order to ensure all learners fully benefit from the revised curriculum, a shift in pedagogy is necessary. The Welsh Assembly Government has supported teachers in making this shift with guidance documents, skills assessment materials and a development programme that focuses on developing higher order thinking and assessment for learning strategies. However, such a shift takes time in order to be comprehensive and sustainable. Therefore evidence from Estyn as to primary practice since the implementation of the revised science curriculum will be most welcome to help direct future strategies and policies.

Financial Implications: None identifiable at this stage but this will require further consideration.

Recommendation 2

We recommend that the Welsh Assembly Government should research the relationship between pupils' study of either combined science or separate science at GCSE and their final A-level grades.

Response: Accept

The Welsh Assembly Government notes the National Audit Office report from England as an indicator that this is a worthwhile area to study further. The report is not necessarily comparing like with like and we will attempt to move beyond the raw data to consider how learners of similar overall achievement achieve progress when taking two or three sciences. In addition to statistical analysis, we will seek evidence of the experience of both two and three science routes to A level success. We refer here to "two" sciences rather than combined (double) science which, of course, no longer exists.

Financial Implications: None. All costs will be drawn from existing programme budgets.

Recommendation 3

We further recommend that the Welsh Assembly Government should encourage more schools to offer triple science, but in those schools that do not, the Government should work with partners to ensure that pupils have access to studying triple science in nearby schools or colleges.

Response: Accept in principle

This further recommendation is, in essence, dependent on the outcome of the study suggested in the previous recommendation. We intend to take the results of that study to consider the extent to which triple science should be further encouraged, whilst maintaining breadth and balance in learners' studies. Inasmuch as there is a clear case for further support, we will engage with partners to identify and disseminate best practice.

Financial Implications: None identifiable at this stage but this will require further consideration.

Recommendation 4

We recommend that the Welsh Assembly Government should continue to explore the best means of monitoring the quality, independence and timeliness of advice offered to young people to inform their choice of subjects and STEM-related career paths.

Response: Accept

The Welsh Assembly Government fully supports this recommendation which aligns well with the recommendations in Future Ambitions: Developing Careers services in Wales, announced by Leighton Andrews AM, Minister for Children, Education and Lifelong Learning, as well as the action plan to deliver these recommendations.

Future Ambitions recognised that the careers service family is much wider than the professional, all-age, independent careers information, advice and guidance service provided by Careers Wales. This wider careers service family includes educational institutions such as schools, learning coaches, teachers and other educational professionals all of whom have a role or influence in careers advice.

The implementation of Future Ambitions will see Careers Wales work with partners such as schools to deliver the Careers and the World of Work curriculum framework, to provide appropriate careers advice when making subject choices in Year 9 and Year 11, and to ensure appropriate referral to independent, professional careers guidance from Careers Wales where appropriate.

Recognising that the young persons' underpinning knowledge of the world of work is as important as the advice they receive, arrangements are in hand for Estyn to carry out a thematic inspection of schools and other learning providers' delivery of Careers and the World of Work. It is planned that the results of this thematic inspection will be available by April 2012 to contribute to the development of careers services outlined in Future Ambitions.

Financial Implications: None. All costs will be drawn from existing programme budgets. Schools are already being funded to deliver the curriculum, and Careers Wales to provide the independent, all-age careers information, advice and guidance service for Wales.

Recommendation 5

We recommend that the Welsh Government should continue to ensure that implementation of its transformation agenda puts the needs of the learner at the centre so that young people have access to the range and quality of

opportunities that will take them along their chosen career or learning pathway.

Response: Accept

The Welsh Assembly Government continues to progress the transformation agenda, working with local authorities, schools, and further and higher education institutions in the development and implementation of plans for improving learner opportunities and quality of provision.

To date the agenda has stimulated and supported a number of change programmes across Wales, some of which are significant in scope and signal substantial improvements for learners once fully implemented. The majority of proposals are associated with post-16 reconfiguration and collaboration but some are linked with pre-16 reorganisation as local authorities increasingly take steps to reduce the number of surplus places in the system.

Some of these plans are elements of wider, radical and far-reaching local area change programmes, linking post-16 developments to major school reorganisation plans and sometimes to local higher education provision. Others are mergers of further education institutions (FEIs) which are critical to improving the regional delivery of further education, to strengthening the links with employers and to improving the employability of learners. By Summer 2011, merger activity will have reduced the number of FEIs from 18 to 13, with more mergers predicted for 2012. This reduction will support the movement of resources to front line services, helping to better meet learner needs.

The further education sector has been particularly responsive to the Transformation agenda in terms of developing 14-19 learning pathways, as well as working with schools and universities to ensure wider access to vocational and higher education provision. Likewise, there are also plans to seek to introduce more quality work-based learning provision pathways to ensure that the training supply meets increasing demand.

Within this context, transformation plans will complement the Learning and Skills (Wales) Measure 2009, where all local authorities will be required to provide 14-16 year-old pupils with a minimum of thirty learning programmes by 2012. This will include at least five vocational options which are becoming increasingly popular with young people. Twenty-eight percent of all 14 year olds participated in vocational programmes in 2008 and this rose to 42% in 2010. Similar local curriculum requirements at post-16 level will take effect from September 2011. By specifically targeting funding towards Welsh-medium and bilingual vocational provision, all Welsh-medium schools are predicted to offer the required five vocational courses in the time frames agreed.

Financial Implications: None. Where required, all costs will be drawn from existing programme budgets.

Recommendation 6

We recommend that the Chief Scientific Adviser, through the National Science Academy, should evaluate initiatives aimed at addressing negative perceptions and gender stereotypes of STEM subjects and should promote good practice within the school system, starting at the earliest possible age.

Response: Accept

The Careers Wales companies, in their role as the Education Business Partnerships (EBPs) in Wales, already carry out a considerable number of activities that increase young people's awareness of the world of work. These include links with STEM employers and Sector Skills Councils such as Construction Skills to develop young people's knowledge and perception of the modern workplace and the opportunities available.

Delivery of Future Ambitions will see the EBP brand revitalised within Careers Wales, and will enhance the links between schools and STEM employers, Sector Skills Councils and providers. Embedded within the Careers Wales remit is the need to challenge such issues as gender stereotyping, and the need to help schools introduce teachers and young people to the modern work place as part of the Careers and the World of Work Curriculum.

To achieve this, Careers Wales work with a number of existing providers such as the Engineering Education Scheme Wales and the F1/Bloodhound Challenge. Within its overall remit, the National Science Academy is committed to addressing negative perceptions and gender stereotypes and is working with organisations such as Techniquet Glyndwr to ensure that such issues are dealt with effectively throughout the STEM supply chain.

Financial Implications: None. All costs will be drawn from existing programme budgets.

Recommendation 7

We recommend that all the Sector Skills Councils should be charged with identifying gender imbalances in their respective sectors and where there are problems, should develop an action plan for addressing those issues.

Response: Accept in Principle

Sector Skills Councils (SSCs) already have a primary role in the collection, analysis and effective communication of up-to-date labour market information and intelligence for their individual sectors. In completing this work, SSCs provide a clear profile of the gender make-up of their respective industries. Such information is then used to inform the content of specific skills responses required by their employers.

A strong example of this process in action is demonstrated by Energy and Utility (E&U) Skills: the SSC for the gas, power, waste management and water industries. In their 2009 Sector Skills Assessment for Wales, the SSC

identified that the number of female employees in their sector was 22% lower than the overall average for Wales, with less than 10% of women in technical or managerial roles.

To address this gender imbalance, E&U Skills are now implementing a project funded by the Welsh Assembly Government's Sector Priorities Fund Pilot (SPFP), which was announced last year and is backed by the European Social Fund (ESF). The project will identify women and allow them to access a suite of training courses focusing on industry specific skills and knowledge for women working in the sector.

All SSCs in Wales have already developed specific sector action plans in conjunction with key stakeholders and are continuing to deliver these plans based on their core remit. Where relevant, actions to address gender imbalances are taken via this existing process, with actions informed by information and intelligence produced by SSCs on the gender make-up of their industries

Financial Implications: The funding for Sector Skills Councils is dealt with at a UK-level. Activity described above is based on existing requirements of SSCs and therefore does not require any additional resourcing.

Recommendation 8

We recommend that the Welsh Assembly Government should, through implementation of the Welsh medium education strategy, place higher expectations on local education authorities to offer teachers with Welsh language skills the opportunity to increase their confidence to teach in a Welsh-medium school.

Response: Accept

One of the key aims of the Welsh-medium Education Strategy is to ensure a more coherent direction and effective planning of Welsh-medium, bilingual and Welsh-language education. Local authorities will agree targets, to include targets related to teacher supply and practitioner training, with the Welsh Assembly Government as part of the new Welsh in Education Strategic Plans.

Ensuring an appropriate workforce to deliver Welsh-medium and Welsh-language provision across all phases of education and training is another key aim of the Welsh-medium Education Strategy. The Strategy contains an objective to develop a national and local training framework that will provide Welsh-language and Welsh-medium Continuing Professional Development training for all practitioners across Wales, including STEM practitioners. In this way those who now teach through the medium of English will be enabled to teach bilingually or through the medium of Welsh.

The Welsh Assembly Government's Welsh-language Sabbatical Scheme will be a key component of the national training framework. The Scheme enables practitioners to develop their Welsh-language skills in a professional context.

From September 2011, Local Authorities will be expected to identify and target practitioners who could benefit from the Sabbatical Scheme. This will ensure that, wherever possible, STEM practitioners will be identified to participate in the training in order to improve their Welsh-language skills and increase their confidence to teach through the medium of Welsh or bilingually.

Financial Implications: Welsh-language training for practitioners is funded through the current programme budget which supports the implementation of the Welsh-medium Education Strategy. There are no funding implications provided that the implementation of the Welsh-medium Education Strategy continues to be funded at current or higher levels in the future.

Recommendation 9

We look forward to Estyn's report on engineering in post-16 education, which is expected in spring 2011 and recommend that Welsh Ministers should act on its findings, including developing measures to improve the link between industry and education institutions.

Response: Accept

The aim of this report is to review the current standards of engineering learners and the quality of the provision of engineering in Further Education colleges and Work-based learning providers. This is the first review in a cycle of thematic reports on learning areas by Estyn.

Engineering as a profession makes an enormous contribution to the economic wellbeing of any country and Wales is no different in this regard. All manufacturing, service and infrastructure sectors rely heavily on technical and engineering trained staff to design, manufacture, support and maintain our products and services.

The remit will use nationally held and agreed performance data on engineering learners over the past 3 years to establish current standards and to compare them with other learning areas.

A questionnaire has been distributed to all providers of engineering programmes. The results from the questionnaire and visits to a sample of providers will help in reviewing the nature and range of engineering disciplines offered and how provision for advanced/specialist technologies is meeting the specific needs of industry. The remit will consider the effectiveness of provider links with industry, employers and schools. The levels of sponsorship by businesses and level of commercial activity will also be considered. Providers have been asked to undertake a SWOT analysis of their provision and explain how they have responded to Welsh Assembly Government-supported initiatives.

The main findings and recommendations for improvement will be published as an Estyn remit report in December 2011.

Financial Implications: None identifiable at this stage but this will require further consideration.

Recommendation 10

We recommend that the Welsh Assembly Government should publish a continuous professional development plan for teachers in Wales, including those in Welsh medium education, aimed at improving in-service training and updating for STEM teachers and heads of department, not only to enhance their subject knowledge but also their understanding of how to teach specific subject topics up to GCSE level at the very least.

Response: Accept in principle

In order to teach as a qualified teacher at a maintained school in Wales regulations require that, in addition to academic qualifications, a person must be assessed as meeting the Qualified Teacher Status (QTS) standards. As well as covering teaching skills and standards of professional conduct and practice, the QTS Standards also have requirements regarding knowledge and understanding of the subjects being taught. To gain QTS, students must demonstrate that they know, understand and can teach the curriculum in the phase and subject they are studying.

As part of our Review of Professional Standards, Performance Management and Continuing Professional Development (CPD) we have considered ways to ensure that teachers are supported to develop their practice and improve their teaching throughout their careers. We want to ensure that CPD is focussed on national priorities such as literacy and numeracy and on tackling priorities set out in the School Development Plan. This will enable head teachers to make STEM CPD an appropriate priority for their school.

We provide grant support for Techniquest and Techniquest Glyndwr as part of our wider aim to motivate and engage people with science. This partnership is targeted primarily at enhancing the delivery of the science curriculum in primary and secondary schools with the aim of improving standards and motivating young people to continue with the study of STEM subjects. Through an annually agreed work programme, support for schools includes provision of centre based programmes and outreach enrichment activities to support the teaching of science and mathematics in schools from the Foundation Phase through to sixth form A/AS level qualifications. CPD opportunities are provided for STEM practitioners in both primary and secondary schools.

Financial Implications: None. Where required, all costs will be drawn from existing programme budgets.

Recommendation 11

For the longer term we recommend that the Welsh Assembly Government should produce definitive data on the quantity and quality of STEM teachers

and develop measures for encouraging and recruiting high quality physics, chemistry and mathematics teachers where there is an identified need.

Response: Accept

The General Teaching Council for Wales (GTCW) publishes data in its Annual Statistics Digest on the numbers of qualified teachers registered with the Council who are working in the secondary sector and the subjects being taught at the time the data was taken. The GTCW also publishes data which compares the subject in which they trained with the subject being taught. At present this data includes a proportion of teachers for whom the subject in which they trained is unknown, but this is diminishing as successive intakes of newly qualified teachers are registered.

The Welsh Assembly Government covers the promotion of careers in the school workforce at the national level. We have an agreement with the Training and Development Agency for Schools to promote teaching as a career in both Wales and England. Their work includes a specific focus on STEM subject careers, particularly physics, chemistry and mathematics.

The Welsh Assembly Government has a role in managing teacher supply for maintained schools in Wales at the national level by forecasting demand for newly qualified teachers and setting intake targets for recruitment to initial teacher training (ITT) courses in Wales. ITT numbers in all areas have been reduced since 2004/05 to better reflect demand for newly qualified teachers, not least against a background of falling pupil numbers. However, within reduced ITT numbers, the proportion of places in STEM subjects has increased from 38% in 2004/05 to 43% in 2010/11.

For the 2011/12 academic year a total of 165 postgraduate mainstream ITT course places are available in physics, chemistry and mathematics at higher education institutions. Additionally, physics, chemistry and mathematics ITT can be undertaken through distance-learning courses at the Open University. We offer training incentives in specific areas in order to help attract the best quality, highly committed students to train in Wales. For new eligible students starting postgraduate ITT courses in the 2011/12 academic year in physics, chemistry and mathematics, £9,000 training grants will be available.

The Welsh Assembly Government also supports the Graduate Teacher Programme (GTP), an alternative employment-based route into teaching. Under the GTP, people with appropriate qualifications but without Qualified Teacher Status (QTS) can follow an approved training programme to enable them to meet the QTS Standards whilst working as teachers in schools. The GTP provides an alternative qualifying route for those who want to change to a teaching career but need to continue earning while they train and helps to support a more diverse range of trainees. For the 2011/12 academic year secondary placements will be targeted at specific subjects, including physics, chemistry and mathematics.

The identification of specific staffing needs and the recruitment of individual teachers is a matter for schools or Local Authorities. They are also best placed to make decisions about the individuals to select for vacant posts, weighing up the relevant skills and experience of the candidates who apply. Under the provisions of the School Teachers' Pay and Conditions Document, employers may make payments or provide other financial assistance, support or benefits to a teacher that they consider necessary as an incentive for the recruitment of new teachers and the retention in their service of existing teachers.

Financial Implications: None additional to existing commitments.

Recommendation 12

We recommend that the Welsh Assembly Government should contract the Education Business Partnerships (Careers Wales) to develop strategic partnerships between schools and industry in order to increase opportunities for teacher and lecturer placements or sabbaticals with STEM employers as part of teachers' continuous professional development.

Response: Accept in Principle

This recommendation actually addresses two distinctly different issues. CPD for teachers is the responsibility of the individual teacher, school and local authority. Some funding is made available by the GTCW and the Welsh Assembly Government, including through the National Science Academy, for this purpose.

In addition, Careers Wales facilitates teacher placements into industry and business to provide teachers (who have often not worked outside of the academic environment) with experience of the real world of work and to bring real world examples back into the classroom and teaching materials through their experience. This experience then enriches the delivery of the curriculum.

Teacher placements into industry and business are dependent on employers engaging with schools and facilitating organisations such as Careers Wales to provide a sufficient number of quality placements. This is a call on employers' resources which is a considerable challenge in the current economic climate. This will also need to be considered in terms of future priorities for Careers Wales given the recommendations in Future Ambitions: Developing Careers services in Wales.

Financial Implications: None. All costs will be drawn from existing programme budgets where this is possible given other priorities.

Recommendation 13

We recommend that the Welsh Assembly Government should commission research on why STEM graduates do not progress into STEM jobs, and on whether this is an issue for concern or not.

Response: Accept

HEFCW is aware of much anecdotal evidence surrounding the numbers of STEM graduates employed in non-STEM sector jobs. Independent research would be a way not only of verifying the extent to which this is the case both in Wales and other parts of the UK, but also in evaluating the added value to be gained from a degree, irrespective of the immediate subject of study. This potentially important evaluation could occur as part of the HE dimension of the next DCELLS Research Plan, which is currently the subject of discussion between DCELLS and HEFCW.

Financial Implications: None identifiable at this stage but this will require further consideration.

Recommendation 14

We recommend that existing good practice by some of the Sector Skills Councils should be extended so that there are more strategic partnerships between employers and educational institutions to align curricula and qualifications more closely and to better equip students with the knowledge and the skills required for STEM employment.

Response: Accept

As described under their core remit, SSCs aim to enable employers to articulate the skills and productivity needs for their sector. The aim is that employers have a greater impact on policies through strengthened dialogue with government as well as influence over the public investment in skills through interaction with education and training partners.

SSCs produce distinct national plans which represent specific skills requirements for their sector identified in each of the nations. We will seek to ensure the integration of STEM related priorities as part of SSC action plans where such activity is within their core remit.

The core remit for SSCs also requires them to support qualification development across the UK. This includes the delivery of a Sector Qualification Strategy which is driven by evidenced employer demand and incorporates generic as well as sector specific skills needs. The purpose is to ensure that the right type, quality and volume of economically valuable qualifications exist at all levels in the system.

We will seek to ensure that the National Science Academy also takes a lead in this area through its role in developing a strategy to create positive attitudes towards STEM subjects and careers. SSCs will engage in this work as part of their action plans.

Careers Wales have been charged in Future Ambitions and its action plan to revitalise the EBP brand and facilitate links between Sector Skills Councils,

employers and schools. Careers Wales would thus be in a good position, as it moves to a unitary structure, to provide links to SSCs to help them deliver this on an all-Wales basis.

Financial Implications: The funding for SSCs is dealt with at a UK-level. Activity described above is based on existing requirements of SSCs and therefore does not require any additional resourcing. Funding for the NSA has already been agreed with Welsh Ministers. All other costs will be drawn from existing programme budgets where this is possible given other priorities.

Recommendation 15

We further recommend that the Welsh Assembly Government should proceed in its proposals to commission a formal skills audit of the supply of and future demand for STEM skills in Wales so that the two sides can be better matched accordingly.

Response: Accept

The Welsh Assembly Government has commissioned the UK Commission for Employment and Skills (UKCES) to produce a Strategic Skills Audit for Wales (2011). We acknowledge that it does not specifically quantify the issue of STEM skills supply but it will be a valuable source of data on supply and demand of skills. SSCs also produce assessments of skills deficits and emerging needs at a broad sector level which feed into the Skills Audit.

The Skills Audit report identifies STEM skills demands and deficits from a sectoral and occupational perspective. Evidence points to a continuing demand for STEM-related occupations, particularly higher skilled roles in specialist areas and likely intensification of competition between sectors for such recruits despite modest growth in the volume of HE students studying STEM.

The report identifies a need, for example, for high and intermediate level STEM skills to meet the increasing Research and Development activity featuring in advanced manufacturing. It also highlights the need for Wales to boost and retain in Wales the decreasing pool of STEM graduates to meet the needs of the growing low carbon sector. The electronics sector relies heavily on STEM-related skills but the Skills Audit flags up the need for these skills (and the teaching of the skills) to be constantly refreshed to keep pace with technological developments.

Finally, a table in the Skills Audit sets out Wales' most pressing skills deficits in order of priority of action required and references occupations with STEM skills deficits.

There is a need to build a picture over time of skills demand, supply and mismatches in Wales. The opportunity exists, therefore, to review whether future Strategic Skills Audits for Wales could provide a greater focus on STEM

skills issues (demand and supply) or whether a more specific audit of STEM skills is required.

Financial Implications: None. Any additional costs will be drawn from existing programme budgets.

Recommendation 16

We recommend that the Welsh Assembly Government should work with the Sector Skills Councils and Careers Wales to develop a framework for a continuum of learning from the Foundation Phase onwards in which schools and employers can be linked together more effectively in providing stimulating programmes to complement the STEM curriculum, including high quality, meaningful work placements that can give young people a taste of the skills they will need to be productive and successful in the world of work.

Response: Accept in Principle

Careers Wales have been charged in Future Ambitions: Developing Careers services in Wales and the action plan to revitalise the EBP brand and facilitate links between employers and schools and other organisations such as the SSCs. The level of Careers Wales service in this area will depend on future budget levels and will also require the active engagement of SSCs and employers across Wales if it is to be a reality.

Financial Implications: None. All costs will be drawn from existing programme budgets where this is possible given other priorities.

Recommendation 17

We recommend that higher education degree courses should put greater emphasis on practical application and independent experimental work, and that assessment frameworks need to reflect this emphasis.

Response: Accept

HEFCW facilitates debate via its Student Experience, Teaching and Quality (SETQ) Committee, coupled with dialogue with Wales' Pro-Vice Chancellors (Teaching) Network and the Higher Education Academy to find ways of producing more employment-ready STEM graduates.

Welsh engagement in the UK-wide National HE STEM Programme also provides a vehicle for HE (and FE) institutions to work more closely with business partners to ensure the production of work-ready STEM graduates. In addition Wales will be appointing a Part-Time Teaching Fellow from each STEM discipline to undertake a review of current practice in a specific area with Welsh HEIs, eg maths for physics students. The review will cover student support, teaching and assessment, and curriculum content. The Teaching Fellows will work across Wales to identify good practice and make recommendations for future developments.

HEFCW also actively supports the work of the National Science Academy to promote STEM provision and study across Wales from primary to higher education and is looking carefully at new ways to make STEM study more appropriate to student and employer needs. The Higher Education sector play an important role in trialling and piloting new approaches. The Wales Institute of Mathematical and Computational Sciences (WIMCS) at Swansea University is a hub in the National HE STEM Programme as well as the National Science Academy which enables a coherent and integrated approach.

Financial Implications: None. Where required, all costs will be drawn from existing programme budgets.

Recommendation 18

We recommend that the Welsh Assembly Government should ensure that Wales capitalises on non-domestic funding opportunities so that higher education institutions can work with local authorities and with high-tech industries in their areas on joint bids to develop innovative projects aimed at encouraging the take-up of STEM in education and employment.

Response: Accept

Officials from the Department for Children, Education, Lifelong Learning and Skills (DCELLS) and the Department for the Economy and Transport (DE&T), with support from the Department for Health and Social Services (DHSS), carried out a joint review of R&D in Wales led by the Deputy Minister for Science, Innovation and Skills. The resulting R&D Review Panel report highlighted the importance of increasing income from external R&D funding programmes. It recommended that the Assembly Government should provide advice and assistance to clients on external R&D programmes, work proactively to develop high quality bids, facilitate industry/academia links and proactively engage in the development of future frameworks e.g. EU Framework Programme 8.

The Innovation team within DE&T supports clients with proposal preparation as well as providing general information and advice on external sources of R&D funding including schemes delivered by the Technology Strategy Board and the European Commission's Framework Programme.

However, we cannot accept that this important work should be linked to the take-up of STEM education and employment. This work will accelerate the transfer of knowledge from higher and further education institutions to SMEs and other companies and we will hope to see a significant economic impact, but this does not necessarily directly relate to increasing the take-up of STEM subjects.

Financial Implications: None. All costs will be drawn from existing programme budgets.

Recommendation 19

We recommend that higher education institutions and individual academics in Wales should be challenged to lever their academic STEM success into economic and educational areas through collaborative working with businesses and schools, and that the Chief Scientific Adviser for Wales should play the key role in joining up and providing quality control of different initiatives in this area.

Response: Accept

This has already been the thrust of much Welsh Assembly Government activity in recent years, such as through the Academic Expertise for Business (A4B) programme. More needs to be done, however, and the new Sector Panels, with the Sector Teams that work with them, will focus very much on getting the best and most appropriate engagement on commercialisation of research, on technology transfer and on delivery of higher level skills between higher education and businesses across Wales.

The Chief Scientific Adviser will be leading on development of a new Science Policy with publication (after consultation) planned for the Autumn of 2011. This will cover the important area of University engagement with businesses and with schools, but at a high level. Implementation plans will follow where the lead will lie more with policy departments, and the Sector Panels and Teams, to put in place the detail. While the Chief Scientific Adviser will keep these important issues under consideration and will be keen to see collaboration and joint working he is not placed to play the key role, although he would expect to be involved in these vital agendas for higher education in Wales.

Financial Implications: None identifiable at this stage but this will require further consideration.

Recommendation 20

We recommend that in taking forward its work the Science Advisory Council for Wales should also promote the other three STEM disciplines as well as closely engage with Welsh employers and industrialists in those sectors.

Response: Accept in Principle

The Science Advisory Council for Wales (SACW) is a resource to support the Chief Scientific Adviser for Wales. It is not an Assembly Sponsored Public Body, but is, like it's Scottish counterpart, an independent expert body which decides, in consultation with the Chair (who is the Chief Scientific Adviser for Wales) and Co-chair (presently Professor Christopher Pollock) what issues it needs to consider and advise upon, and what external evidence and engagement is required. The use of Science in the title is a shorthand and SACW can potentially advise right across the broad interpretation of 'science' (including social sciences) that the Welsh Assembly Government has taken

since 2006, as well as technology, engineering and mathematics issues. Its make-up allows for this, given that it includes senior business people from some highly technical industries and very highly regarded and qualified experts from the fields of engineering, mathematics with a broad range of scientific expertise.

In addition, Careers Wales have been charged in Future Ambitions and its action plan to revitalise the EBP brand and facilitate links between SSCs, employers and schools.

Financial Implications: None identifiable at this stage but this will require further consideration.

Recommendation 21

We recommend that the Welsh Assembly Government should, through the Chief Scientific Adviser, develop and monitor performance against an action plan to promote the whole STEM agenda in Wales, through setting clear long-term objectives, and shorter-term priorities and targets.

Response: Accept

The Chief Scientific Adviser for Wales has an advisory role. The development of any action plans would be for Welsh Assembly Government Ministers and the departments which support their portfolios to address STEM-related issues in the economy, education, health and the environment. The Chief Scientific Adviser for Wales is working to consult upon and publish a new Science Policy for Wales, which will set, for all appropriate areas of STEM-related activity, the broad direction, objectives and aspirations under which implementation (or action) plans will be developed. The Chief Scientific Adviser for Wales would expect to provide some strategic advice on planning in these fields and also on the subsequent monitoring of them, as well as giving more detailed advice where scientific expertise is needed, but is not resourced to undertake detailed or long-term development or monitoring work.

Financial Implications: None identifiable at this stage but this will require further consideration.

Recommendation 22

We also recommend that in formulating his future work programme, the Chief Scientific Adviser should be charged with taking forward the recommendations of our report.

Response: Accept in part

The Chief Scientific Adviser for Wales is not in a position to take forward all of the recommendations of the report. He has an advisory role and is neither a policy nor an operational delivery civil servant. His own staff support his role

and work, as does the Science Advisory Council for Wales. He is, however, closely engaged at the highest level in most of the areas where recommendations have been made, and so can and will provide advice and strategic guidance to those departments which are taking forward the various accepted recommendations of the report.

Financial Implications: None identifiable at this stage but this will require further consideration.