



**Cynulliad Cenedlaethol Cymru
The National Assembly for Wales**

**Y Pwyllgor Menter a Dysgu
The Enterprise and Learning Committee**

**Dydd Mercher, 8 Rhagfyr 2010
Wednesday, 8 December 2010**

Cynnwys
Contents

- 4 Cyflwyniad ac Ymddiheuriadau
Introduction and Apologies
- 5 Yr Agenda Wyddoniaeth, Technoleg, Peirianeg a Mathemateg
Science, Technology, Engineering and Mathematics (STEM) Agenda
- 38 Cynnig Trefniadol
Procedural Motion

Cofnodir y trafodion hyn yn yr iaith y llefarwyd hwy ynddi yn y pwyllgor. Yn ogystal, cynhwysir cyfieithiad Saesneg o gyfraniadau yn y Gymraeg.

These proceedings are reported in the language in which they were spoken in the committee.
In addition, an English translation of Welsh speeches is included.

Aelodau'r pwyllgor yn bresennol
Committee members in attendance

Christine Chapman	Llafur Labour
Jeff Cuthbert	Llafur Labour
Andrew Davies	Llafur Labour
Nerys Evans	Plaid Cymru The Party of Wales
Brian Gibbons	Llafur Labour
Gareth Jones	Plaid Cymru (Cadeirydd y Pwyllgor) The Party of Wales (Chair of the Committee)
Darren Millar	Ceidwadwyr Cymreig Welsh Conservatives
Jenny Randerson	Democratiaid Rhyddfrydol Cymru Welsh Liberal Democrats

Eraill yn bresennol
Others in attendance

Leighton Andrews	Aelod Cynulliad, Llafur (y Gweinidog dros Blant, Addysg a Dysgu Gydol Oes) Assembly Member, Labour (the Minister for Children, Education and Lifelong Learning)
Bob Cater	Cyfarwyddwr Cenedlaethol, Cynllun Addysg Beirianeg Cymru National Director, Engineering Education Scheme Wales
Owen Evans	Cyfarwyddwr, Sgiliau, Addysg Uwch a Dysgu Gydol Oes, Llywodraeth Cynulliad Cymru Director, Skills, Higher Education and Lifelong Learning, Welsh Assembly Government
Rachel Garside-Jones	Pennaeth Ariannu Ymchwil, Cyflogadwyedd a Pholisi Sgiliau, Llywodraeth Cynulliad Cymru Head of Skills Policy, Employability and Research Funding, Welsh Assembly Government
Lesley Griffiths	Aelod Cynulliad, Llafur (y Dirprwy Weinidog dros Wyddoniaeth, Arloesi a Sgiliau) Assembly Member, Labour (the Deputy Minister for Science, Innovation and Skills)
Yr Athro/Professor John Harries	Prif Gyngorydd Gwyddonol Cymru Chief Scientific Adviser for Wales
Chris Tweedale	Cyfarwyddwr, Plant, Pobl Ifanc ac Effeithiolrwydd Ysgolion, Llywodraeth Cynulliad Cymru Director, Children, Young People and School Effectiveness, Welsh Assembly Government

Swyddogion Cynulliad Cenedlaethol Cymru yn bresennol
National Assembly for Wales officials in attendance

Dan Collier	Dirprwy Glerc Deputy Clerk
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Joanest Jackson	Uwch-gynghorydd Cyfreithiol Senior Legal Adviser
Victoria Paris	Gwasanaeth Ymchwil yr Aelodau Members' Research Service
Siân Phipps	Clerc Clerk

*Dechreuodd y cyfarfod am 9.00 a.m.
The meeting began at 9.00 a.m.*

Cyflwyniad ac Ymddiheuriadau Introduction and Apologies

[1] **Gareth Jones:** Bore da i chi i gyd a chroeso cynnes i'r cyfarfod hwn o'r Pwyllgor Menter a Dysgu. **Gareth Jones:** Good morning to you all and a warm welcome to this meeting of the Enterprise and Learning Committee.

[2] Dylwn groesawu Darren Millar, ond nid yw wedi troi i fyny eto. Bydd ef yn cynrychioli'r Ceidwadwyr yn lle David Melding. Yr wyf yn siŵr y caniatewch i mi fynegi yn absenoldeb y ddau ohonynt ein diolchgarwch i David Melding am ei gyfraniad unigryw ac arbennig i weithgarwch y pwyllgor hwn. Nid yw hwn yn adlewyrchiad ar Darren o gwbl, ond bydd colled ar ôl David, ac yr ydym yn dymuno'r gorau iddo. Fodd bynnag, byddwn yn estyn croeso cynnes i Darren Millar. I should welcome Darren Millar, but he has not turned up yet. He will be representing the Conservatives instead of David Melding. I am sure that you will allow me, in the absence of both, to express our gratitude to David Melding for his unique and special contribution to the work of this committee. This is no reflection on Darren at all, but David will be greatly missed, and we wish him all the best. However, we will extend a warm welcome to Darren Millar.

[3] Mae'r cyhoeddiadau arferol i'w gwneud, fel y gwyddoch. Mae'r cyfarfod yn ddwyieithog gyda chlustffonau ar gael i dderbyn gwasanaeth cyfieithu ar y pryd o'r Gymraeg i'r Saesneg ar sianel 1 ac i chwyddleisio'r sain ar sianel 0. Bydd Cofnod dwyieithog o'r cyfan a ddywedir yn gyhoeddus. Yr wyf yn atgoffa pawb i ddiffodd ffonau symudol ac unrhyw ddyfais electronig arall. Nid oes angen i ni gyffwrdd y meicroffonau yn ystod ein trafodaethau. Nid ydym yn disgwyl ymarfer tân, felly os bydd larwm yn seinio bydd yn rhaid i ni adael yr ystafell dan gyfarwyddyd y tywysyddion. Cawsom ymddiheuriad am absenoldeb oddi wrth Paul Davies ac nid oes dirprwy wedi dod i law. There are the usual announcements to make, as you know. The meeting is bilingual with headsets available to receive the simultaneous translation service from Welsh to English on channel 1, and to amplify the sound on channel 0. There will be a bilingual Record of everything that is said publicly. I remind everyone to turn off mobile phones and any other electronic devices. We do not need to touch the microphones during our discussions. We do not expect a fire drill, so, if an alarm sounds, we will have to leave the room under the guidance of the ushers. We have received an apology for absence from Paul Davies and no substitutes have come forward.

[4] Cyn i mi droi at weddill yr agenda, neithiwr, yr oedd rhai ohonom yn bresennol pan gafodd Andrew Davies wobwr am fod yn Aelod Cynulliad y flwyddyn. Llongyfarchiadau mawr i Andrew, eto, yn ei absenoldeb. Hefyd, dyma'r tro cyntaf i mi fel Cadeirydd gael cyfle i longyfarch Jenny. Before turning to the rest of the agenda, last night, some of us were present when Andrew Davies won an award for being the Assembly Member of the year. I congratulate Andrew, again, in his absence. In addition, this is the first time that I have had an opportunity as Chair to congratulate Jenny Randerson.

Randerson.

[5] I congratulate you on your elevation to another place, Jenny, and, when the time comes, we wish you all the best in that particular House.

9.02 a.m.

Yr Agenda Wyddoniaeth, Technoleg, Peirianeg a Mathemateg Science, Technology, Engineering and Mathematics (STEM) Agenda

[6] **Gareth Jones:** Trown at eitem 2, yr agenda wyddoniaeth, technoleg, peirianeg a mathemateg, neu STEM fel y'u gelwir. Dyma ein sesiwn olaf fel pwyllgor yn y broses o graffu ar yr agenda STEM. Yr ydym yn falch o groesawu'r Dirprwy Weinidog dros Wyddoniaeth, Arloesi a Sgiliau, Lesley Griffiths, y bore yma. Yr ydym yn estyn yr un croeso cynnes i'r Athro John Harries, sydd yn Brif Gynghorydd Gwyddonol Cymru, ac un sydd yn eithaf cyfarwydd â'r pwyllgor hwn. Croeso hefyd i Owen Evans, sydd yn gyfarwyddwr sgiliau, addysg uwch a dysgu gydol oes. Yr ydym yn falch o'ch cwmni'r bore yma a hefyd yn ddiolchgar am y dystiolaeth ysgrifenedig gynhwysfawr yr ydych wedi ei chyflwyno i ni. Yr ydym wedi cael cyfle i'w ddarllen, ac yr oedd gwaith darllen ar y dystiolaeth, ond yr ydym yn hynod ddiolchgar am y manylion a'r ffordd yr ydych wedi ymateb. Ddirprwy Weinidog, mae i fyny i chi os ydych eisiau gwneud cyflwyniad byr ac wedyn bydd yr Aelodau yn gofyn cwestiynau yn ôl y drefn arferol.

Gareth Jones: We will turn to item 2, the science, technology, engineering and mathematics agenda, or STEM as they are known. This is our final session as a committee of scrutinising the STEM agenda. We are pleased to welcome the Deputy Minister for Science, Innovation and Skills, Lesley Griffiths, this morning. We extend the same warm welcome to Professor John Harries, who is the Chief Scientific Adviser for Wales, and someone who is quite familiar with this committee. We also welcome Owen Evans, who is the director of skills, higher education and lifelong learning. We are pleased to have your company this morning and we are also grateful for the comprehensive written evidence that you have submitted. We have had an opportunity to read it, and there was plenty to read, but we are very grateful for the detail and the way in which you have responded. Deputy Minister, it is up to you if you would like to make a brief introduction and then Members will ask questions as per the usual order.

[7] **The Deputy Minister for Science, Innovation and Skills (Lesley Griffiths):** Thank you, Chair and committee, for the opportunity to contribute to this important inquiry. As we highlighted in 'Economic Renewal: a new direction', a strong research base and a pool of workers with good STEM skills are essential for an innovative, modern economy. For individuals, qualifications in the STEM subjects offer a passport to a huge range of well-paid and rewarding careers. The skills learned in the STEM subjects are vital for not only scientific careers, but are also valuable across the labour market. It is no surprise that STEM qualifications are rewarded handsomely in the labour market. A study commissioned by our economic research unit in 2006 showed that the STEM subjects are among the degree subjects with the highest wage returns in Wales. As we face ever-increasing tuition fees, that will focus young people's minds as they decide which course to pursue at university.

[8] While we cannot plan the supply of labour in a market economy, it is important that the education and training system is able to provide a pipeline of people with STEM skills and that young people have excellent information on the opportunities offered by STEM qualifications. It is also vital that employers have the skills that they need in order for their businesses to flourish. That is one of the reasons why we have established the National Science Academy, with which Professor Harries is very involved. This will promote the future take-up of STEM subjects at all levels in the future, from primary school through to postgraduate study. It is an exciting national initiative and we hope that this will further

improve the supply of scientists, technologists, mathematicians and engineers in Wales. I hope that the committee supports the action that we are taking to address the STEM agenda. I hope that you will recognise the progress that we have made to date, and we look forward to your questions.

[9] **Gareth Jones:** Diolch, Ddirprwy Weinidog. Estynnaf groeso hefyd i Rachel Garside-Jones, sydd yn bennaeth ariannu ymchwil, cyflogadwyedd a pholisi sgiliau, a newydd ymuno â ni. Croeso cynnes i chi. Trof at Christine am y cwestiwn cyntaf.

Gareth Jones: Thank you, Deputy Minister. I also welcome Rachel Garside-Jones, who is head of skills policy, employability and research funding, and has just joined us. A warm welcome to you. I turn to Christine for the first question.

[10] **Christine Chapman:** There have been an awful lot of initiatives over the years with STEM subjects. For many years, we have said that we need to address this agenda seriously. What assurances can you give that we will suddenly have this big change now? What is going to happen now to cause this big change? There have been some excellent initiatives over many years, but we are still addressing the same old problem. How do you think that we will now make that step change?

[11] My second question relates to the graduate unemployment rate. I understand that we have had evidence that states that unemployment rates are far too high among graduates in STEM subjects. However, employers are telling us that they are still looking for appropriately qualified graduates. So, there is this contradiction. Will you comment on that?

[12] **Lesley Griffiths:** In relation to initiatives, you are right; I have been in post for a year now and I have come across fantastic initiatives across the country. One of the reasons why we have set up the NSA is to bring all those initiatives together. I visited Swansea University last week, where the Wales Institute of Mathematical and Computational Sciences is based. It is our link to the higher education STEM scheme, and its staff are going out into other institutions to draw down skills from right across FE and HE. We also have the NSA now, as I said, which is an exciting initiative. Through that, we will have hubs right across Wales where this level of information will be going out, not just to teachers, but to anyone who wants to access it. For example, we have a fantastic website that draws these initiatives together. We have done a lot of good work.

[13] On your point about employers and graduates, we have GO Wales, which you will be familiar with. As part of the NSA, we have also just given a contract to the British Science Association to enhance the CREST awards in Wales, which enable young people aged 11 to 19 to explore real projects and gain experience in the real world. That will be a really good stepping stone to further STEM subjects.

[14] **Christine Chapman:** We have had evidence of some good projects. However, we heard a comment from a teacher who said that although the young people enjoy these projects, they have to come back to science in the mundane school situation. So, it is about trying to maintain it. Do you feel that we can sustain this?

[15] **Lesley Griffiths:** That is a good point about the curriculum and ensuring that it is linked to employability. That might be a good question to put to the Minister when he comes to your next session. I visited a school in Islwyn that had won a Rolls-Royce science award. The award was for designing rockets, and had been won by three schools in the UK out of 15,000 entries. You could see that the pupils were completely engaged with it and were telling me all about these rockets that shot 100 ft in the air. However, when I asked them whether they would like a career as a scientist or an engineer, they could not see the link. You are right; we need to make it more relevant to them.

9.10 a.m.

[16] **Professor Harries:** On the first question, which is the one that I can address, you are absolutely right. I spent the first six months trying to learn about the system, meeting people, and so on, and I have been to award ceremonies for various STEM initiatives, and Big Bangs, and innovation awards, and it is absolutely fantastic—the quality of the work is brilliant, and the enthusiasm of the teachers is admirable. They deserve medals. That side of it seems to be going well, but the conclusion that I have come to so far is the same as yours: there is a lot going on, and, importantly, we must not damage that—whatever we do, we must not kill the goose that lays the golden egg, which is the enthusiasm and motivation of the teachers, first, and, secondly, the enjoyment of the children—but there is an issue. These things are going off, and it is wonderful that they are, and they are being helped by Welsh Assembly Government officials, which is all good, but I want to see a much more systematic picture of the whole thing. We have a wonderful opportunity with the NSA because it allows us the chance to take an overarching view of everything, so that if someone comes along and asks what is going on in an area, we know immediately what is going on, and we know immediately where the gaps are.

[17] There are four points that I would like to see going forward with the NSA. First, we need a regular, systematic and transparent process for funding, and choosing who will be funded to do what. That should be set against clear objectives. We need a clear and comprehensive information system so that anyone can find out easily about STEM, and how they can get involved and so on. We need a much more powerful campaign to tell not just the good schools—good in the sense that they want to be involved—and the children about this, but everyone. Most importantly, we need an objective way of measuring the quality of what we are doing, and feeding that back to show that a school or organisation needs to improve in a particular area. So, we can move forward in the ways that I have described. The NSA gives us the chance. It is not an automatic win, but if we organise it properly then it will bring the missing part of the picture to add to the enthusiasm in the community. Sorry that I went on a bit.

[18] **Lesley Griffiths:** May I go back to Chris's second question? Sorry, Chris; I did not really address that. We need to do more pertinent research in our universities to ensure that we have the graduates coming out, and there need to be more links between employers and academia in order to ensure that the research is what they want, and that there is more collaboration between the two.

[19] **Gareth Jones:** Before Brian comes in, may I just comment on one important point that Professor Harries just referred to? I totally agree about the enthusiasm. There is an overarching element here and we need to get as many people on board as possible as it comes down onto the system. I endorse that, and have no problems whatsoever with it. The question or the challenge may be: how do we promote STEM so that students are ready to achieve? It is not about imposing STEM on them, but making them aware that it is available to them. Unless they are alerted through the groundwork, they will not be in a position to avail themselves of the excellent provision from above, if I may put it that way.

[20] **Professor Harries:** There are several ways of doing so, but one is the fact that we should have a National Science Academy. The choice of words is made now. There should be this thing called a 'National Science Academy', and anyone who hears about it should be able to press a button and, without going through page after page of the internet, should have it presented to them, and it should be easily accessible. Just making it known more would be helpful. For example, when I went to Big Bang in Swansea and helped the Deputy Minister—did I help?

[21] **Lesley Griffiths:** You did.

[22] **Professor Harries:** It was ringing with enthusiasm, but when I came away I did not feel that even the local population, let alone the national population in Wales, had really heard about it. I felt that it should be screamed from the rooftops.

[23] **Mr Evans:** One of the positive things from the NSA that I am looking at currently—to come to Chris’s question about employers specifically—is how we engage with people under the age of 14 in particular in trying to get them to understand that this is a career pathway that is likely to lead to meaningful jobs locally for them. We have significant anecdotal evidence that employers are searching for skill levels from level 2 up, not only level 5-plus. However, we are finding that too many young people are switching off to STEM subjects, despite the good work of the various initiatives. We are finding that, at school level, which is perhaps more pertinent for discussion in the next session, kids are switching off. Part of that is because the link between employers and schools is fairly fractured. That is one of the things that we are trying to address at the moment, which I can speak about later. The other bit is about providing evidence to young people on where, particularly in a recession, future jobs are likely to lie and that, if they are to pursue career pathways that are likely to lead to their being able to work locally, the pursuit of STEM subjects in particular is likely to provide them with a better chance of gaining good career-oriented employment—more so than other subjects.

[24] Part of this is about trying to make the curriculum itself more alive to young people. There is probably too much teaching at the moment that has an emphasis on teaching what the curriculum says, rather than understanding why they are learning it. That is one of the programmes that we will be looking at.

[25] **Gareth Jones:** It is good to hear that you are looking at that specifically.

[26] **Brian Gibbons:** To pick up on the points that Owen made at the end there, and the point that Chris made in her question, employers are looking for people and we are being told that there is 10 to 20 per cent unemployment among STEM graduates. The circle is not being joined up somewhere. Whether it is that graduates are not properly trained, I do not know, but the story does not make sense—it is not coherent. However, I was very pleased about what Professor Harries was saying in response. In their paper, one of our next witnesses has said that all of the various initiatives that we have

[27] ‘lack coordination and validation and are not, in total, either efficient or effective and do not give a complete coverage of all schools’.

[28] That has been a consistent message that we have heard, not just from one witness, but from a number of witnesses. There clearly is a problem. Professor Harries has said that one of his priorities will be to bring a bit of order to this. So, can we assume that the number of initiatives will be significantly rationalised, that the existing initiatives will be validated as doing what they say on the tin, and that there will be greater co-ordination and coherence involving all schools across Wales? Is that your job description?

[29] **Professor Harries:** Not exactly, but I can say that it seems to me that, by having the NSA created before I came—and no credit to me—we now have an opportunity whereby we can look over the whole programme and try to match what it contains against what we really believe that we need in a consistent way. That is a singular opportunity, and I intend to push that.

[30] **Lesley Griffiths:** If I may come in here, when I took up the portfolio, the national science academy was in ‘One Wales’. It was a one-off amount of money; it is not a recurring sum of money, so it is a sort of virtual academy, if you like. We had to do the best that we

could with the money available, and I hope that what we have set up will bring all of those initiatives together. One of my very first visits was to Techniquet in Cardiff, where I came across STEM ambassadors, of whom I had never heard as an Assembly Member. As Members might remember, I wrote to everybody to try to encourage us all to write to our schools. In my constituency, I have seen a rise in the number of STEM ambassadors. Owen and I were talking before about the fact that 43 per cent of STEM ambassadors going into our schools now are women, who are great role models and part of trying to address the gender imbalance, given the lack of female engineers and lack of women in all STEM subjects. The purpose of the NSA is to draw all those initiatives together, which is a long-term project that we will be monitoring very closely.

9.20 a.m.

[31] **Brian Gibbons:** How long is long-term?

[32] **Lesley Griffiths:** We started the NSA in April, so I would look to do an evaluation next April to see how we have got on in the first year. After that, we will have to see about funding. As I said, this was a one-off amount of money, but we need to look for further sustainable funding to continue it.

[33] **Brian Gibbons:** In terms of co-ordinating, validating, sorting out the chaff and promoting the good, what is the timescale? That seems to be a consistent criticism, and one of the reasons why this is not happening. It would seem to be one of the priority messages that we are getting.

[34] **Lesley Griffiths:** I will want to see an annual evaluation next April.

[35] **Gareth Jones:** It is not all about funding, though, is it? You have the mechanism in place to be more efficient and effective, because that was the message that I was receiving from the Professor.

[36] **Lesley Griffiths:** We are going to have a series of hubs across Wales. Three hubs are up and running, and we still need to get the other two hubs up and running. We are going through a grants process at the moment where organisations can bid for some of the money to promote their initiatives. It is early days, although we have been going since April. However, you are right that we need to make sure that we can evaluate, and I will certainly be looking to do that by the end of this Assembly term.

[37] **Gareth Jones:** There is clear co-ordination between your department's skill side through to the curricular side of education that Owen referred to. That link is vital for that possibly to be improved—I do not know.

[38] **Nerys Evans:** Gan ddilyn o gwestiwn Chris ynglŷn â blaenoriaeth y Llywodraeth, mae'n dda gweld bod y Llywodraeth wedi creu eich portffolio. Dyma'r tro cyntaf yn hanes y Cynulliad i wyddoniaeth, arloesi a sgiliau ddod at ei gilydd. Beth oedd yr ysgogiad tu ôl i greu'r portffolio? A wnaethpwyd hynny er mwyn dangos bod angen blaenoriaethu'r maes hwn? Un o'r beirniadaethau a wneir o Lywodraeth Cymru, llywodraeth lleol a Llywodraeth Llundain yw fod datgysylltiad rhwng portffolios. Yr ydych yn amlwg yn

Nerys Evans: Following on from Chris's question on the Government's priority, it is good to see that the Government has created your portfolio. This is the first time in the Assembly's history that science, innovation and skills have been brought together. What was the rationale behind the creation of the portfolio? Was it done to show that this area needs to be prioritised? One of the criticisms that is made of the Welsh Government, local government and the London Government is that there is a disconnect between portfolios. You obviously work closely with education

cydweithio'n agos iawn gydag addysg ac adran Ieuan Wyn Jones. A allwch esbonio eich perthynas â hwy? Mae cydweithio rhwng y ddwy adran hynny yn hanfodol i lwyddiant yn eich maes. A ydych yn gweld y ddwy adran yn cydweithio ar gyfer eich portffolio? Mae hynny hefyd yn bwysig ar gyfer llwyddiant yr academi. Cwestiynau cyffredinol yw'r rhain ynglŷn â lle mae eich portffolio yn gorwedd o fewn agenda'r Llywodraeth.

and Ieuan Wyn Jones's department. Can you explain your relationship with them? Collaboration with those two departments is essential to succeed in your area. Do you see the two departments working together for your portfolio? That is also vital to the academy's success. These are general questions about where your portfolio lies within the Government's agenda.

[39] **Lesley Griffiths:** I do not know what the rationale was behind creating the portfolio—you will have to ask the First Minister—but it certainly raised the importance of science. As you said, the science portfolio previously sat with the previous First Minister. I can see that it all gels together beautifully, and I suppose that I am the bridge between the Department for the Economy and Transport and the Department for Children, Education, Lifelong Learning and Skills. On the skills side, I see my role as looking at the demand. So, I talk to employers and the sector skills councils, and we look at the labour market intelligence coming in to make sure that I can go to the Minister for Children, Education and Lifelong Learning so that he can then look at the supply side of the skills. So, the two aspects sit very well together, because, to have a flourishing economy, we need to make sure that we have the skills to support and encourage businesses to invest in Wales, and the businesses here need to have those skills to flourish. We also need to ensure that individuals have the skills they need to have that lifestyle in Wales.

[40] **Jeff Cuthbert:** I identify myself with the remarks that you made about David Melding earlier. I have worked with David for a long time, and we disagree on many issues, but that is politics. There is no doubting his sincerity and interest in this matter, however, particularly in the STEM subjects.

[41] Deputy Minister, we have alluded in part to what I wanted to talk about, namely the transition from school or learning into industry, where learning continues, one trusts. This is against the background of the very disappointing Programme for International Student Assessment figures, which we are not in denial about; I totally agree with the statement made by the Minister for education, as it is a matter for all of us to address seriously. That includes employers, because they will be the main beneficiaries of our getting more young people through with a good background in STEM subjects. You mentioned the sector skills councils, and that is a matter that I raise constantly—I probably bore the pants off everybody on this. However, it is critical, especially when you are dealing with small and medium-sized enterprises, that their voice is heard through the sector skills councils in identifying audited and organised skill needs. They have a crucial role to play in promoting the STEM subjects in schools and colleges, so that it is absolutely clear to young people why they should give serious consideration to the STEM subjects, and so that they can see that they can be interesting. I am aware of various initiatives. I think that you, Professor Harries, mentioned the Big Bang even; we have the F1 challenge, and now the Bloodhound challenge is under way—all of them are imaginative and motivational. How confident are you that the sector skills councils are engaging properly on behalf of their occupational areas in this regard? I know that well-established ones such as SEMTA—the sector skills council for science, engineering and manufacturing technologies—Asset Skills, ConstructionSkills and so on are well-organised and established, but do you feel that they are the exceptions, or are they typical?

[42] **Lesley Griffiths:** You have mentioned what are, from my dealings with them, probably three of the best ones, and I have met them all in the past year. In fairness to them,

some are one-man bands and cannot go out and engage with everyone. It is up to employers to seek them out and engage with them. Some pilot projects have been run in collaboration with sector skills councils and training providers to trial new forms of training provision. One example is the creative industries sector, which is one of the economic renewal priorities, and it has developed new creative apprenticeships. So, some good work is going on there. I will continue to work with the SSCs, because I rely on them to give me good labour market information in order to make sure that we have the skills. Curricula need time: if they need to be changed, there needs to be a run-up of time. Green jobs are a good example, because we will need the electricians with the skills to install solar panels, so we have to ensure that the framework has that as part of their apprenticeship. I rely on them a great deal. Some of them are performing better than others. I am not criticising them, because it is very difficult for some of them, because, as I said, they are one-man bands.

[43] **Jeff Cuthbert:** On that issue of one-man bands, as you call them, namely the very small organisations, in terms of resources, what are you able to do, if anything, to rectify that? Clearly, some of the SSCs represent important industries for the future. If it is the case that they are seriously under-resourced, whether in respect of people power, equipment or contacts, what can we do to try to improve that? Is it primarily a matter for the employers in that occupational area, or could more Government intervention be carried out to improve the situation—or would it be a combination of the two?

[44] **Lesley Griffiths:** It is a combination. We will continue to work closely with the UK Commission for Employment and Skills and other employer fora. The sector panels will be set up as part of the new economic renewal policy, so we can continue to work with those, and I would hope that that would have an effect as well.

[45] **Mr Evans:** It is a very live arena at the moment. Research conducted by the Federation of Small Businesses has proven that 90 per cent of employers do not know which SSC is theirs, which is a concern. The system was set up to be self-funding within 18 months—

[46] **Jeff Cuthbert:** Sorry, what percentage was that?

9.30 a.m.

[47] **Mr Evans:** Ninety per cent. The system was set up on a UK-wide basis, and there is a realisation that it has not served Wales well, despite the fact that some of the sector skills councils have done some very good work. We have tried to react to that as a Government. We have set up the sector priorities fund, which has helped certain sector skills councils to bolster their activity. However, what you still have is a system that you are trying to patch. The UK Commission for Employment and Skills is currently, as part of the comprehensive spending review, reviewing its operations across the UK, and we are in negotiations about its future direction as it looks to rationalise how the sector skills councils perform. We are going to end up with—and this, as the Deputy Minister mentioned, is about seeking to get better market intelligence to plan with—a situation where we will use the UKCES to be able, in January, to publish a report on labour market information across the UK that will canvas 80,000 employers; the proper percentage of that will be Welsh employers. We will be looking, either through the sector skills councils or through other bodies, if they exist, to provide locally enriched data so that we can go out to vice chancellors and to principals of colleges and headteachers to say ‘Look, this is what the economy is demanding; what are you doing to meet it?’ However, as I said, at the moment, this is a fairly live area as the UKCES decides what it is going to do about the sector skills councils.

[48] **Gareth Jones:** Does this tie in with the recent review of Careers Wales? How do you relate to that in terms of the sector skills councils? What is the relationship here?

[49] **Mr Evans:** Estyn reports on the Careers Wales service have all been excellent. The issue that came out in the Haydn Edwards research was that it was not providing the type of LMI, at careers advice level, that was needed for young people to decide on what they wanted to pursue. That was not a criticism of Careers Wales; it was just the fact that we do not have the LMI data. What we are doing in tandem—we are having discussions at the moment on how to marry these two up—is seeing a Careers Wales service rather than Careers Wales, taking that LMI and ensuring that it is acted upon locally. Going back to the question of how long this could take, for universities for example, this could take three to five years, by the time that 14-year-olds who decide to take these options get to higher education level.

[50] The other approach—the planned economy approach, which the UK Government tried about a year ago—was just to ramp up the number of STEM places at university level. The problem with that is that, unless you have young people who wish to pursue those subjects, those places will sit empty. So, at the moment, we are looking at setting up the LMI unit, across the board, which will inform using the sector panels from the Department for Economy and Transport and whatever happens to the SSCs, but also patching the bits that we need to do ourselves. It will have emphasis on, for example, the Welsh language, which will be different to what happens in the UK. We will then use that information and drive it through to schools and parents, along with the various elements of the careers services across schools, FE and HE, to ensure that the information gets through to the learner.

[51] **Brian Gibbons:** On the sector skills council, the statistic of 90 per cent of employers not knowing which sector skills council represented them must bring the credibility of the model into question, fundamentally. As I understand it, these are supposed to be employer-led organisations if they are nothing else. If 90 per cent of employers do not know about them, there is something fundamentally wrong with the way that the system operates. Presumably, even with the 10 per cent of employers who are involved, the question must be asked how typical they are of the sector. They could, in fact, be completely distorting the sector, because they may be pursuing very narrow interests. Historically, it has always been the case that a few big industries have carried the burden of training for virtually the whole economy; the vast mass of business has really had no interest in training and has relied on offering attractive wages or whatever to take people from the big employers. Clearly, that worked to a certain extent, but it is not a very systematic way of doing it. However, that is the way in which it was traditionally done before these sector skills councils and so on. How bust do you think the model is?

[52] **Mr Evans:** I do not think that it is quite that bad. First, on the figure of 90 per cent, remember that that is 90 per cent of businesses. Statistics can always tell us a different story, depending on how you perceive them. If that 10 per cent of businesses are the largest businesses in Wales, that would probably cover 50 per cent of employment, which brings us to the issue of how we deal with SMEs, which is why we are in discussions with the Federation of Small Businesses at the moment on how we can best, with limited resources, understand what SMEs want as well. We are running various programmes at the moment that are helping the SME sector, such as the shared apprenticeship scheme. An SME going to a further education college, for example, might say that it wants to run an apprenticeship for three people. Quite legitimately, the FE college might say that it cannot run it for three people, because it just does not make financial sense, so we are sharing apprenticeships through that. It is interesting that over half those apprenticeships are delivered in engineering.

[53] On whether the system is bust on the employers' front, it was very interesting looking at statistics on redundancies in this recession compared with redundancies in the last recession. The pattern this time has been that employers have twigged how important skills are to them and are retaining employees to the nth degree. In the last recession, they were possibly happy to get rid of people. One of the problems that we are facing with youth

unemployment is understanding why we have such a problem there while employers are holding on to the people they employ. The average age of people on apprenticeships in Wales is 26, and we have a number of programmes that are trying to bring that figure down, to bring young people through. We need to ensure that young people are making the right subject choices at the age of 14 that will make them employable.

[54] To go back to employers, there is a big role with regard to how we engage with those young people. That is why we are in the process of asking all sector skills councils in Wales to identify the 15 top employers that they work with. If you take that bank of information, combine it with working with the FSB, combine it with working with the sector panels that are being set up by the Department for the Economy and Transport, and combine it with the labour market intelligence we will be getting from the UKCES on a macro level, we will start to get to the position where we have information that we can use to start planning, but also to hold the education sector to account.

[55] **Lesley Griffiths:** If I may come in here, looking at what skills are required across Wales, you see that employability skills come up all the time. One thing that we must do is create better links between businesses and schools. Initially, I was told by schools that businesses do not want to come in, probably because they do not have time. Businesses tell me that they try to get into schools and that schools do not want them to come in. That is something that we have to look at, because, until we do, employers are not going to have the skills that they want.

[56] **Gareth Jones:** I agree. That is why I picked up on careers. Owen spoke about getting in touch with the headteachers, but that is only part of the answer. Somehow, they need to share the urgency and the culture involved here. There are one or two follow-up questions from Christine and then Jeff.

[57] **Christine Chapman:** To echo what Brian said, I was quite alarmed to hear that statistic about the sector skills councils. Obviously, there are a lot of employers out there—small businesses—and they will not think to contact them. I think that it should be the other way round, with the sector skills councils out there promoting that sector. So, I would prefer that to happen. We understand the limitations of sector skills councils, being a UK model, but the impact of that is disproportionately worse for Wales. If it is not working particularly well throughout the UK, it is going to be worse in Wales. So, again, I am quite alarmed by that, and I would like to see faster change and improvement.

[58] On careers and sector skills councils, over the years, since SSCs started, there has sometimes been a bit of confusion and muddying of the water. Careers services have totally different roles to the sector skills councils; they exist to inform on the basis of the best labour market information. They are there to serve the individual. Sector skills councils are totally different and exist to promote an industry. That needs to be said, because, sometimes, there is confusion. They should work together very closely, but they have distinct roles.

9.40 a.m.

[59] **Jeff Cuthbert:** On this issue of employability skills, I assume that we are talking about what we sometimes wrongly call the soft skills, those of working with others, communication, and problem solving—the key skills, in other words. It is a little disappointing to hear that that is still the case, because the key skills have been around for a long time. We know that the Welsh baccalaureate is not in all schools, but that is part of the core of the Welsh baccalaureate. Is it still a constant complaint by employers, large and small, that, while they will teach the technical skills that are needed for a job, the key skills are still not coming through?

[60] **Lesley Griffiths:** Sadly, yes. That is what large employers are telling me. Unfortunately, when they look at apprenticeships, for instance—a company like Airbus will probably have 3,000 applications for 80 apprentices—one of the things that they look at are the basic skills, the soft skills, the key skills, or whatever you want to call them. Unfortunately, at times, they are concerned about the skills that are coming out. It needs to be addressed. To return to Chris's point about sector skills councils, if they cannot give us relevant and robust LMI, which is one of their purposes and the thing for which I look to them, it is something that, as a Government, we fed through to the UK careers service that is currently doing this review. As I said, it is very difficult for them to go out to promote. If you are a one-man band, how do you do that? Some of them are not even based in Wales, which is another cause for concern.

[61] **Ms Garside-Jones:** I will just add that they have a strategic role. Some of them are one-man bands, and you would not expect them to go out to every employer, one to one. It is important to remember their wider strategic role; we have to keep that UK-wide. They are responsible for approving apprenticeship frameworks. We have the Pathways to Apprenticeship programme for young people, which is undertaken directly with the sector skills councils—there is a very good one on engineering. I agree that we need to work to get robust labour market information for Wales, but also national occupational standards—things that go across the UK that are also relevant to Wales. We need to keep that wider strategic role in the picture.

[62] **Mr Evans:** The model, as it was envisaged, was the correct model. It has not been resourced at a UK level sufficiently to make it do what it was set up to do. For example, the more successful sector skills council, which is Construction Skills, charges a levy on employers—it is a well-funded organisation. If you have six people or one person, it is difficult to be strategic and it is quite easy to go down the route of just going to careers fairs and not actually doing what you were set up to do. As the Deputy Minister said, we will be looking at where the gaps are, and how we will bridge them.

[63] **Lesley Griffiths:** I think that Chris is right; Careers Wales and the sector skills councils have very different roles. Careers Wales needs to be very clear on what its remit is from our point of view.

[64] **Gareth Jones:** That co-ordination is important.

[65] **Jenny Randerson:** I have two questions, and as they are not related to each other I will ask them separately. STEM graduates do not spring out of nowhere; they are the product of the school system, good foundations in primary school, a good GCSE range and so on. We have had plenty of evidence on the lack of people taking the separate sciences and on people taking IT rather than computer science for GCSE and A-level—so they are not going into depth, even on computing, with which young people, as we all assume, are so familiar. The evidence that we have is that they come out with a qualification but without understanding how it works, the programming and so on.

[66] Jeff has already referred to yesterday's PISA results, which show us, in terms of score, at -12 in mathematics and -9 in science. It does not look like a good picture in terms of the foundation. How are you working with the Minister for Children, Education and Lifelong Learning to ensure that we make the necessary changes, either in the curriculum or in the requirements that we have of schools, to improve on a picture that is getting worse, not getting better?

[67] **Lesley Griffiths:** In relation to the PISA results that came out yesterday, the Minister made a statement yesterday and he will be coming before you in the next session, so you can question him on that. Yesterday's results were extremely disappointing and major questions

will be asked about the reasons for them. My own children were taught maths by teachers who were not maths teachers. So, there are questions to be asked, but that is for the Minister.

[68] In relation to how I feed in to the Minister's work, as I said, I look at the demand side, so that I can tell him what is needed and then it is up to him to decide what changes he wishes to make within the curriculum. Curriculum changes can take a long time.

[69] What you said about information technology is very interesting. I had not heard that, but I heard last week, in relation to mathematics, that further mathematics is not being taught in our schools or in our FE institutions and we do not have many teachers who can teach further mathematics. There is an initiative in Swansea, with the Welsh Institute of Mathematical and Computational Sciences, looking at a further mathematics support programme that will, hopefully, raise skills in mathematics. That will take a little while to feed in, but schemes such as that will be incredibly important as we take forward our response to yesterday's results.

[70] **Gareth Jones:** Is the WJEC not working on some kind of development with mathematics at GCSE level, bringing in a more applied kind of mathematics?

[71] **Mr Evans:** My colleague in the next session will probably be better placed to answer that question.

[72] **Gareth Jones:** In its evidence to us, the WJEC referred to a different approach being taken to mathematics at GCSE level. It is important that we understand what is happening in that respect. It has a bearing on what Jenny was saying, especially if there is a dearth of computer science teachers. That element is so important. Sorry to interrupt, but I thought that I would make that point.

[73] **Jenny Randerson:** I will move on to my second question, which is about digital research hubs. We received evidence from BT that, when the UK Government invited bids and applications, Wales was not awarded one. One was awarded to Scotland and two to England. The reason that we were given for that by BT was that our universities compete with each other, because of a lack of leadership. I am interested in finding out how you will ensure that that does not happen in future and that we get the opportunity for research money of that sort. Clearly, not having a digital research hub in Wales sets us back relative to the other countries.

[74] **Lesley Griffiths:** I understand that there were problems with the bid, and that it was too small. However, officials are in discussion with the Welsh European Funding Office. I assume that you are referring to the Newport University hub. I am confident that we will get over that and that we will have a hub. I chaired a research and development review panel earlier this year, and this issue of bids that are too small and there not being enough collaboration came up time after time. If we are to draw down more research and development money, we have to ensure that the bids are larger and of a higher quality. We need to ensure that Cardiff is not competing with Swansea and that they collaborate. It does not necessarily have to be those two universities collaborating, but we need to ensure that Welsh universities are not competing against each other.

[75] A number of recommendations came out of the panel, and I am monitoring that on a quarterly basis. Research council funding will be an ever-decreasing pot of money. However, we are getting only around 3 per cent of the research and development money, when we should be getting around 5 per cent. We will have to up our game. Cardiff University's research and development funding was up 79 per cent this year, while Swansea's was up 29 per cent, so there are examples of improvement on this.

9.50 a.m.

[76] **Professor Harries:** I agree with what the Deputy Minister just said. I will throw in the fact that we recently set up the Science Advisory Council for Wales to advise me, and that is a group of experts, not a statutory body. We had our first meeting last week, which went very well, and I was very pleased. We have some marvellous people on the council. I will not go into all that, but it is relevant to say that there are several key issues that we have discussed and that will be discussed by the new council. One of the issues on which it will advise me is the question of funding and why we are not doing as well as perhaps we ought to with all the research councils. The same applies to European Union funding. In fact, that situation is more serious in that regard than it is with the national research councils. So, there are people on the council who are from universities, industry and the third sector—enthusiasts all—and they will look at this. Already, some pointers came out of last week's discussion on what makes a successful bid. So, there may be some input from the advisory council to the Deputy Minister.

[77] **Gareth Jones:** Briefly, I have looked at the list of advisers on the council and it is very impressive, but in view of the cycle and the joined-up approach—and I know that the council has a specific remit, which I do not dispute—I cannot see anyone representing the school sector or that part.

[78] **Professor Harries:** There is one specific person.

[79] **Gareth Jones:** Is there? I may have missed him.

[80] **Professor Harries:** It is a 'her': Wendy Sadler.

[81] **Gareth Jones:** I see. From Science Made Simple, at the university.

[82] **Professor Harries:** That is right. There is also Professor Hope from Bangor and there are other people on the council who have a particular interest in the connection—

[83] **Gareth Jones:** Okay, that is fine. I thought that that might be the case.

[84] **Professor Harries:** In particular, there are two industrialists, Kevin Bygate and Simon Bradley from Corus, as was, and EADS. There will be a particular discussion point at our next meeting in late January on STEM subjects—

[85] **Gareth Jones:** That interface. That is the important aspect for us. What I am picking up on in the Chair is the linkage or the lack of it, sometimes, and the need for that to be strengthened. You clearly have the right people on the council, but it is about taking that message through into other departments or sectors.

[86] **Professor Harries:** We are working on that. It is particularly important to make the point that, because I had to keep this council finite, and it is already big, I could not get representatives from any or many small and medium-sized enterprises, so we will keep a watching eye on that.

[87] **Lesley Griffiths:** May I return to Jenny's question about research and development funding? One thing that came through very quickly, and I think that it was from Simon Bradley from EADS, was the language that is used in the bids, particularly with the European framework programme 7 funding, which will go on to FP8. When Professor Harries came, he gave me a simple piece of advice that I was able to pass on, which is that you should repeat back what they are asking for in the bid. Use the same language. It is a simple thing, but we hope that even that will increase the level of funding. Perhaps forms were not being filled in correctly, and we just needed to express the bids more simply. I know that Professor Harries

has really helped in that way.

[88] **Jenny Randerson:** We have such a variety of universities in Wales that it has consistently disappointed me that we have failed to achieve our appropriate potential. One wants to go above the 5 per cent mark, but we are consistently well below that in research bids generally.

[89] As a final comment, you said that you had not heard about the issues on computing GCSEs and A-levels, Deputy Minister. I advise you to look up our evidence on that. It was very interesting, because we were told by people dealing with computing at universities that students are not coming in with the depth of background that they need, which is a simple curriculum issue, is it not?

[90] **Gareth Jones:** I mentioned earlier that Darren Millar would be joining us and that David Melding would be leaving. Now Darren is here in person. Croeso. I believe that you have a question, Darren.

[91] **Darren Millar:** I am delighted to be joining the committee. I know of its high reputation, and I have been following what you have been up to.

[92] **Gareth Jones:** That is a good start. [*Laughter.*]

[93] **Darren Millar:** I am delighted to be here. I must apologise for being a little late, but my involvement with another committee required a delay, I am afraid.

[94] Deputy Minister, one thing that you mentioned in your paper and in your remarks earlier was the focus on growth sectors, such as photovoltaic cell installers, which we need to be geared up for, as and when they become popular and as more people request them. You mention in your paper the energy island concept in north Wales, and renewables have a significant future in Wales. There is cross-party consensus not just on microgeneration, but on the need for us to step up to the plate and become a leader in renewables in the future. This sector offers huge opportunities for the economy of Wales in the future. How will you ensure that the necessary skills will be available for this particular sector, so that we do not have to import people to do some of those important jobs? The energy island concept is a lovely one, and I do not think that anyone would have any difficulty supporting what is going on in Ynys Môn. However, what are FE and HE institutions doing to ensure that we are fully geared up? Potentially, we are talking about thousands of people being needed in those industries, not just in Anglesey, but across the country.

[95] **Lesley Griffiths:** It is a good question, actually. I went to visit Coleg Menai, where they are extremely forward thinking—probably because they are on Ynys Môn, which has the energy island concept, which, as you say, is very exciting. The difficulty is that it is a long-term project and we need to get training providers and employers engaged now with the skills that will be needed in two, three, four or five years' time. It is good that they are engaged at an FE level and an HE level, because I know that Coleg Menai was looking for a university to link in with, and that they are thinking about that already. However, it is an issue that we are having to look so far into the future, but employers do not want to be putting money into skills that they do not need at present. So, the Government has a huge role to play in ensuring that those skills are available when the time comes.

[96] **Darren Millar:** So, what practical steps are you taking? It is all very well to say that it is three or four years down the line, but what practical steps are you taking to ensure that these skills are marketed in the right way to those people whom we need to get them? We need to make sure that they are seen as 'sexy' skills, as it were, rather than something that boffins would be interested in, which I suppose has traditionally been the view. As for the

decision making on the ground, Coleg Menai might be engaged, but it will not be able to deliver those skills on its own for Anglesey, for example. We need to ensure that there is a proper collaborative approach to making the necessary courses and apprenticeships available, and so on. I just do not see it happening. I am a regular visitor to colleges in my constituency and I have visited colleges in other parts of Wales, and they just do not appear to be grasping the need to step up to the plate. That is not to say that there is not some good work going on. There are the centres at Llandrillo and Rhos-on-Sea, for example, which are trying to gear up on the microgeneration stuff, which is important. However, these larger-scale operations are the ones that we are just not preparing for.

10.00 a.m.

[97] **Mr Evans:** This is a trial, but we think that it will be successful. The question came up earlier about which departments we were working with, and we are working not only with the Department for the Economy and Transport, but with Sustainable Futures and the Department for Social Justice and Local Government as well. We have been working for a couple of years now on the Universities Heads of the Valleys Institute initiative, and one of the big concepts in that is trying to get people from deprived communities in particular into higher education. Our clear focus is that if we can get them into higher education, then they will eventually want to get into work. We have been working with 25 employers in the Heads of the Valleys area to work out where the next phase of growth will be, which is very difficult to predict.

[98] With the money that the Welsh Assembly Government is currently spending on renewing the housing stock, particularly with its new targets in the WHQS Plus, which has brought sustainability into it, we have outlined to the 25 employers the type of work that will be coming up over the next few years, and working with housing associations and bodies such as Business in the Community, we have asked them what skills they will need. In fairness to them, they were unaware of the volume of activity coming up, which includes renewables, cladding and other technologies that are starting to come into vogue. They have produced a paper stating, first how many jobs they think that they will create, and secondly, what skills those jobs will actually need. Through the Universities Heads of the Valleys Institute, we have created a curriculum team that is interfacing directly with employers, scoping, by talking to HE, FE and schools, how they would provide a progression from schools onwards. That would also include getting the employers involved in the schools to try to get young people interested in pursuing those jobs.

[99] I think that it is exactly your point that if we are spending a lot of money in the local economy, we do not want to have vans coming across the border to do those jobs, when we have economically inactive people in the area. So, hopefully, this programme shows a lot of promise, which we might be able to replicate in other areas.

[100] **Gareth Jones:** I am conscious of the time; the Minister waiting outside.

[101] **Lesley Griffiths:** Could I just say something briefly, Chair?

[102] **Gareth Jones:** Very briefly.

[103] **Lesley Griffiths:** The work is ongoing. Owen mentioned officials working with the curriculum team, and we are always making sure that the skills are there with regard to any announcements that come out of the Department for Environment, Sustainability and Housing. So, the work is being done.

[104] **Brian Gibbons:** I have a brief question on Darren's point. I suppose that I should declare an interest, in that there is an active project in Port Talbot with universities, Neath

Port Talbot College and ConstructionSkills to try to develop a construction academy for Wales, which would do precisely that kind of work. My question is very simple—I will pick up some of the others later. Is there any formal audit of skills needs here in Wales? ELWa, through Careers Wales, used to do that in the past, certainly when the Assembly was established, but I have not seen any formal report. It would seem fundamental to what we are about, but do we have that?

[105] **Lesley Griffiths:** There has been no audit, but we are planning to have one.

[106] **Gareth Jones:** Thank you, on that point, and for being so succinct—Brian and Darren also. I am sorry that we had to rush it there, Deputy Minister. We are grateful to you for your responses and for your attendance this morning. We wish you all the very best in what is a very challenging area, as we all know. Diolch yn fawr iawn.

[107] Symudwn ymlaen at ail ran yr ail eitem ar yr agenda STEM. Mae'n bleser gennyf ar ran yr Aelodau estyn croeso i Leighton Andrews, y Gweinidog dros Blant, Addysg a Dysgu Gydol Oes, a Chris Tweedale, y cyfarwyddwr plant, pobl ifanc ac effeithiolrwydd ysgolion. Yr ydym eisoes wedi croesawi Owen, a oedd yn rhan o'n trafodaethau blaenorol.

We now move onto the second part of the second item on the STEM agenda. It is a pleasure to extend a warm welcome on behalf of Members to Leighton Andrews, the Minister for Children, Education and Lifelong Learning, and Chris Tweedale, director for children, young people and school effectiveness. We have already welcomed Owen, who was involved in the preceding discussion.

[108] Yr ydym wedi derbyn papur cynhwysfawr ar y cyd rhyngoch chi a'r Dirprwy Weinidog, Lesley Griffiths. Yr ydym yn ddiolchgar am hynny; yr ydym wedi cael cyfle i'w ddarllen a chraffu ar rai agweddau ar y dystiolaeth. Diolch am y dystiolaeth fanwl, sydd wedi bod yn gymorth inni yn ein trafodaethau. A ydych yn dymuno gwneud cyflwyniad byr? Gwelaf nad ydych. Cyn imi droi at y cwestiynau, llongyfarchais yn gynharach Andrew Davies, sydd newydd ymuno â ni, ar gael ei wobrwyo fel Aelod Cynulliad y flwyddyn am ofyn cwestiynau heriol. Llongyfarchiadau i chi, Andrew, ar eich gwobr neithiwr. Gyda hynny, trown at yr Aelodau am eu cwestiynau, ac at Nerys Evans yn gyntaf.

We have received a comprehensive joint paper by you and the Deputy Minister, Lesley Griffiths. We are grateful for that; we have had an opportunity to read it and to scrutinise some aspects of the evidence. Thank you for your detailed evidence, which has assisted us in our discussions. Do you wish to make a brief opening statement? I see that you do not. Before we turn to questions, I earlier congratulated Andrew Davies, who has just joined us, on being named Assembly Member of the year for asking challenging questions. Congratulations to you, Andrew, on last night's award. We now turn to the Members for their questions, and to Nerys Evans for the first.

[109] **Nerys Evans:** Yn dilyn eich datganiad ar ffioedd yr wythnos diwethaf, mae'n ymddangos bod popeth yn ddibynnol ar y bleidlais yn Llundain yfory. Mae pryder yn Lloegr y bydd hawl gan sefydliadau i godi tâl gwahanol am gyrsiau gwahanol, a fydd o bosibl yn effeithio ar bynciau STEM, gan ddibynnu ar y gyfundrefn ffioedd y mae prifysgolion yn ei harddel. A allwch gadarnhau eich meddylfryd ynglŷn â'r mater hwn yng Nghymru? Beth yw'r sefyllfa ddiweddaraf o ran codi tâl gwahanol am

Nerys Evans: Following your statement on fees last week, it appears that everything is dependent on tomorrow's vote in London. There is concern in England that institutions will have the right to raise different fees for different courses, which might affect the STEM subjects, all depending on the fee regimes that universities adopt. Can you confirm your thinking on this issue in Wales? What is the latest situation regarding the levying of fees for different courses within the same institution?

gyrsiau gwahanol o fewn yr un sefydliad?

[110] Yn ail, clywsom dystiolaeth rhyw fis yn ôl mewn perthynas â dysgu pynciau STEM drwy'r Gymraeg. Dywedodd rhywun o gwmni yng Nghaerdydd na ddylid dysgu pynciau STEM drwy'r Gymraeg ac nid oedd hi'n ymwybodol o unrhyw gwmnïau oedd yn defnyddio'r sgiliau hyn yn y Gymraeg—nid wyf yn siŵr am yr union eiriad. Ceisiais herio ei sylwadau, oherwydd nid oeddent wedi eu seilio ar unrhyw dystiolaeth. Teimlad oedd ganddi, nid tystiolaeth; yr oedd yn derbyn bod pobl ledled y byd yn dysgu pynciau STEM mewn ieithoedd gwahanol ac yn medru addasu, ond nid yn achos y Gymraeg. A oes gennych farn ar bwysigrwydd dysgu pynciau STEM drwy'r Gymraeg yn ein hysgolion Cymraeg a dwyieithog?

Secondly, we heard evidence about a month ago regarding teaching STEM subjects in Welsh. A representative of a company in Cardiff said that STEM subjects should not be taught in Welsh, and that she was unaware of any companies that use those skills through the medium of Welsh—I am not sure of the exact wording. I sought to challenge her comments, because they were not based on any evidence. She had a feeling rather than evidence; she accepted that people worldwide are learning STEM subjects in different languages and are then able to adapt, except in the case of Welsh. Do you have an opinion on the importance of teaching STEM subjects in Welsh in our Welsh-medium and bilingual schools?

[111] **Leighton Andrews:** I will start with your first point. At present, there are a number of known unknowns in this situation with regard to charging for university courses in England, although it appears that universities in England will be able to charge differential fees by course. That is not the policy that we are adopting in Wales; we have said that there will be an ability to charge higher fees by institution, but not by course, and that remains our position. We will reinforce our commitment to STEM in the next remit letter to the Higher Education Funding Council for Wales, as we did this year.

[112] On the question of teaching science subjects through the medium of Welsh, I am the step-parent of someone who went through the education system in Wales, who studied science subjects through the medium of Welsh and who then went on to university in England to take a degree in physics and astrophysics. I see no reason why we should want to discourage people from studying through the medium of Welsh. I do not know whether we have the necessary evidence to support this claim, as I suspect that much of it is anecdotal, but there may well be innovative companies in Wales that are exploring developments in science through the medium of Welsh, and we would not want to discourage that.

10.10 a.m.

[113] **Brian Gibbons:** Had this been the first paper to come before the committee, I would have suggested that we should not bother continuing with this review, because it seems to suggest that all is well in this particular area and that, other than a tweak or two, nothing much more needs to be done. However, all of the evidence that we have heard has been to the contrary. This occurred to me straight away: if you look at the table at the bottom of page three and the two tables on page four, in which we are told that students in Wales are exposed to more teaching time on science and so forth, you would expect Wales to be doing very well in the international tables, shown in figures 1 and 2. However, if you look at figures 1 and 2, you might legitimately ask why, if the pupils are spending so much time getting extra exposure to science, the performance is so poor. However, the conclusion did not seem to say that; it seemed to be that pupils are getting lots of time and it looks at the tables to prove the benefit, when the contrary is the case. The table at figure 4 shows the number of advertisements for teachers taking up posts in the various STEM subjects. The consistent message that we have in the evidence so far is that too many STEM subjects are not being taught by specialist teachers. However, if you look at table 4, there is no way that you would be able to come to that conclusion. Table 4 seems to suggest that there is a need, that the

teachers are joining up and we are getting 95 to 100 per cent of take-up in physics and so forth. There is no feeling in this table of the evidence given to us. The other evidence that we have received states that while the numbers of pupils doing STEM subjects are increasing before GCSE, those pupils are not being converted into A-level students and graduates in a consistent number—less than half of the pupils who take GCSEs in STEM subjects do them at A-level. The evidence that we have received has been pretty negative, whereas this paper seems to be unduly optimistic and seems to go against all the evidence that we have received so far. How can you explain the dichotomy between the two positions?

[114] **Leighton Andrews:** How long do I have? That was quite a long question and there were quite a lot of points to which I would wish to respond. On the data from the Programme for International Student Assessment, these are the previous PISA results and we have done marginally worse this time around on science, although our science performance, paradoxically, is better than our performance in any other areas. I do not think that I can be accused of being less than robust in my reaction to the PISA data. The issue that is being reflected here is that we are holding our own in terms of science, as the tables suggest, although the performance is not as good as I would like it to be, and we have figures here that demonstrate that.

[115] The issues that you raised about the tables contrasting with your evidence would depend on what you are trying to measure. We are seeing an increase in the numbers taking GCSEs in STEM subjects. We have also growth in this area at undergraduate level—the growth over the past four years is 11.8 per cent in Wales, which is more than other parts of the UK. So, some of those things are going right. The more challenging issue is less the formal qualifications such as GCSE, A-level and the numbers going on to undergraduate study, and more to do, from the evidence that I have read, with the relevance of what is being taught to the industry experience, and the need of industry for certain kinds of STEM-qualified individuals at whatever level of qualification they hold. In that regard, people have been right to identify issues in terms of recruitment between industry and schools and issues about the perception of STEM careers, such as engineering within schools. Those are real challenges, and they are things that we are very focused on.

[116] On the issue of teaching specifically, as you are aware, we are incentivising, through a number of means, the teachers into specific subjects. You can see from the figures in the tables that although the overall number may have declined for secondary pupils on ITT courses, the STEM subjects have seen a rise in proportion, and that is important. However, these will not be seen in the system yet—these are people who are just going through ITT in 2008-09, so their impact on the system has only been in the last year or so, so I think that it is early days in terms of seeing what impact that has on the teaching in schools.

[117] **Brian Gibbons:** I am very pleased with your answer because it indicates clearly that you are much more concerned about the issues and challenges in the sector than is indicated by the rather glossy picture that is painted in this paper. Maybe the positive spin that is put on the information does not reflect the more critical attitude that you are taking to this subject.

[118] **Leighton Andrews:** I think that it is important, however, to document what has been done in recent years and what is being done within the system to try to promote STEM. Sometimes that tends to get overlooked in the anecdotal comments that you are likely to get in inquiries such as this.

[119] **Brian Gibbons:** That is a fair comment. We must beat our drum; we are excellent at kicking ourselves even when we are still standing up, so it is useful to celebrate what we are doing. However, the lack of balance and the lack of self-criticism in the paper was very worrying, but I am assured—

[120] **Leighton Andrews:** There would be a lack of balance if you were kicking yourself while you were still standing up. [*Laughter.*]

[121] **Brian Gibbons:** That is the point that I am making. I am assured that your approach to it is much more robust than suggested by the paper itself.

[122] **Gareth Jones:** Thank you. Andrew, I think that you had a follow-up point on this.

[123] **Andrew Davies:** I am still struggling with Brian's mixed metaphors. Thank God, I am sitting down.

[124] Minister, I also welcome Owen Evans's appointment in your department; it is an excellent appointment. I was visiting a primary school in my constituency last week and the head was talking about the new inspection framework for primary schools. She expressed some concern that science would no longer be a core part of the assessment framework. She expressed concern that, as a result, it may be perceived that science is not a priority. Given that young people's attitudes are formed at an early age, and that attitudes towards inquiry and scientific inquiry are often developed at an early age, I wondered whether you think that might have an effect on the attitudes of teachers and pupils.

[125] **Leighton Andrews:** Since you have raised it, I will discuss it with Estyn next week when it comes in for its quarterly meeting. By next week, it will have completed the first term of the new common inspection framework, so it will be interesting to get its observations on the point that you have made. What we have from Estyn is a much more rigorous and robust inspection framework that started this year, and that will have an impact in due course on the performance, not just of schools, but of local authorities and others. I welcome what it is doing in terms of the new common inspection framework, which obviously results from much of the work that was done by the previous inspector, Bill Maxwell. There are a number of ways in which we have to encourage the take-up of science in primary schools. Some excellent work has been undertaken by the education business partnerships, for example, the Mid Glamorgan Education Business Partnership—I know that Christine Chapman will be familiar with that—where very significant progress has been achieved in the development of science clubs in primary schools, for example. However, the whole point of the common inspection framework, and the changes that Estyn has made to it, has been to align more directly to our school effectiveness framework. We have said that we are putting more emphasis in that on literacy and numeracy, and it may be that that is having an impact on what is being observed in other subjects, but I will certainly explore that with Estyn.

[126] **Andrew Davies:** Thank you for your answer. You mentioned literacy and numeracy as being core and part of a rigorous framework. I am told by the head that science, because it is not core, will be subject to teacher assessment as opposed to a standardised assessment, and the head's fear is that it will not have the same rigorous assessment. I am not necessarily expecting an answer today, but it may be something that you could raise with Estyn.

10.20 a.m.

[127] **Leighton Andrews:** I will do. We have been basing measurements of performance in schools on teacher assessment for some time in any case, since we abolished SATs. So, I am not sure that there is necessarily a significant change in that regard.

[128] **Christine Chapman:** My question is linked to that point. Some weeks ago, we took evidence—and you will have read it, Minister—from a science teacher who was talking about the STEM initiatives that have been undertaken for many years, which have been very popular. However, it was said that there was a feeling that the momentum could not be maintained once the pupils came back to school, to their usual Monday lessons. Do you have

comments to make on that? I was alarmed to hear that, because it seemed to be the reason why many of our young people seem to be switching off from STEM subjects in school. It is not just about saying that it would be good for employment, because any subject should be taught in an inspiring way: the teachers should be inspiring, as should the lessons. So, are there plans to look at that? They are good initiatives, but quite often they seem to be disconnected. We know of the good work that EBPs do, but sometimes they are one-offs, and there needs to be a little more co-ordination. What is happening with regard to science teaching when the children go back to the classroom?

[129] **Leighton Andrews:** Children are introduced to the STEM subjects from the foundation phase onwards, which clearly gives a framework in which teaching and learning are geared towards pupils' needs and interests. That is an effective way of rolling that out at that age. There is a difficulty here, namely that, frequently, people will make assertions based on anecdotes, which are difficult to track back and measure against what is actually happening. I am sure that, for every anecdote that is produced, we can produce anecdotes that go in a different direction. It is true that the science clubs that are generated through education business partnerships require commitment from teachers, because they are often run out of school hours, but we are seeing quite a lot of good work in the classroom, including on information and communication technology. So, I am a little sceptical about the evidence that you have been given.

[130] **Gareth Jones:** I want to briefly pursue the point that Brian referred to on teaching and the qualifications of science teachers. Much as I agree with you that we have to sustain morale, one striking piece of evidence that was presented to us related to the availability of staff who are qualified in, say, physics, and stated that, although I cannot put a figure on it, quite a substantial amount of science up to the end of key stage 3 is taught by biologists. That was presented to us as being not totally in keeping with the character of STEM. I would find that slightly worrying, unless you could cater for that in continuous professional development, which could be a successful approach. Do you have any comments to make on that?

[131] **Leighton Andrews:** Again, I would want to see documentary evidence on that. As part of what we are doing to incentivise initial teacher training, for example, we now offer the biggest grants in initial teacher training for physics and chemistry, and we have reduced the grant that is available for those wishing to teach biology. So, I would hope that, as a result of the policies that we have adopted, we are heading in the right direction to address that issue.

[132] **Gareth Jones:** Thank you for that, Minister. Brian has the next question.

[133] **Brian Gibbons:** Estyn did say that the teaching of science and maths is poorer than that for all other subjects, and produced some tables to demonstrate that. So, Estyn's view was not anecdotal. It was saying that the fundamental reason for that was that the people who were teaching before key stage 4, as the Chair said, were non-specialist teachers and that was completely demotivating a whole cohort of secondary school pupils. Estyn was saying that even though the number of pupils taking STEM subjects in secondary school is rising, those pupils are not being converted into A-level students in any significant numbers because they have been completely demoralised and demotivated by the mismatch of the teachers and the learning experience.

[134] **Leighton Andrews:** Yes. I have seen the Estyn report, which was produced in 2008, and I understand what was being said in it. If you look at the PISA results, you will see that we are doing better in science than we are in reading and other domains. There is something there that I want to pursue with Estyn with regard to the outturn. I said yesterday that there are some systemic issues that we have to tackle. The imbalance between what is happening in PISA and what Estyn has said on the teaching of those subjects is something that I will want to explore with it.

[135] **Brian Gibbons:** However, the PISA results are not good. They are only good in relative terms, but in international terms the PISA results even in maths and science are not good.

[136] **Leighton Andrews:** No, they are not good in maths, but in science I would say that they are better. However, if Estyn is saying that the teaching of science is worse, that has not been borne out by the PISA results. That is what I am trying to say.

[137] **Jenny Randerson:** To pick up on that last point, Minister, our PISA science results were -9 last time and I would argue that that bears out Estyn's judgment that there is a decline. In fact, it is my recollection that it said that there was a decline in primary schools as well.

[138] **Leighton Andrews:** Perhaps I could come back on that point, since you want to make it. The point that I was responding to was what Brian said about science teaching being worse. On the PISA results—I accept what you say about the decline and I am certainly not going to hold back in my views on that—if we are being told that science teaching is worse, when we are doing better in the international scores in the science domain, I would like to understand that a bit more. I think that that is what I am saying.

[139] **Jenny Randerson:** My main point relates to your evidence where you say that only 16 per cent of overall entrants for GCSE take triple science. There was a National Audit Office report for England last month that bore out a great deal of the evidence that we have had, which is that pupils who study triple science are more likely to choose and succeed in science at A-level and degree level than those studying double science. Indeed, my anecdotal evidence is that, for some science courses at university, they will not consider people who have taken only combined science, because they do not believe that that provides the GCSE background needed for the A-level, which is needed to cope with the course. We have received that evidence, and you have confirmed the very low number of schools offering triple science.

[140] We also had evidence, Minister, that people wishing to study computing at university are taking the wrong sort of qualification. They are not taking computer science, which they should be, which teaches you how it works. Instead, they are taking IT, which teaches you how to use it, if you see what I mean. Those representatives of research and computing who came to talk to us were absolutely clear that we need more people taking computer science. All this is a matter of the curriculum, and I am sure that your mind has been concentrated on that in recent weeks and months, not just this week. I wonder what steer you are going to give to ensure that schools are offering the best set of options for pupils so that they are well prepared when applying to universities.

10.30 a.m.

[141] **Leighton Andrews:** You have touched on something that is not about the choice of subjects alone, but also the advice that pupils are getting on careers and the qualifications pathways that they will need to follow; I will try to deal with both issues. In the first instance, we are looking at the curriculum all of the time; I tend to look at the curriculum in much more detail and I might say a bit more about that later. We have seen a doubling in the number of pupils taking chemistry, biology and physics at GCSE level since 2007, which is a significant improvement. We revised the GCSE science suite, and six new science GCSEs will be available from September 2011: science, additional science, additional applied science, biology, chemistry and physics.

[142] You raised a question on careers options and what pupils need to have in order to take

a particular subject at university, and I would like to ask Owen to comment on the way that we are starting to think about the need to engage better in our careers input to schools.

[143] **Mr Evans:** This picks up on some of the points that we discussed in the last session. We are taking a far more engaged approach in trying to understand what the labour market is seeking and in trying to communicate that understanding, while holding higher and further education institutions and schools to account on how they are trying to shape provision in a way that will be biased, through careers service advice, so that young people choose subjects that are more likely to lead them into employment. We are going to get employers involved, particularly in trying to bring the curriculum to life. One thing that we are talking about with colleagues is an Estyn review over the next year—as part of refreshing what Estyn is looking at—of the extent to which schools, in particular, are liaising and having proper relationships with local employers. Whereas most schools will say that they have influence with employers, when you dig down into that assertion, you find that it is probably the same old candidates who are involved. We are looking at a random sample of businesses; instead of going out into the schools sector, we will go to employers to ask them what they are doing with schools. If we feel that we need to bolster that engagement, we will look at programmes that marry employers with schools directly. This will ensure that young people are not only getting the advice that they need on where their likely career paths are going to take them, but that they understand employability and the skills that employers will need. We will also use an emerging model seen in examples of best practice worldwide, where employers are used to enrich the existing curriculum. Instead of young people asking a teacher, ‘Why are we learning this, Miss?’ in a mathematics lesson, and being told that it is because it is on the curriculum, there will be tangible real-life examples of the skills that industry needs on a daily basis.

[144] **Mr Tweedale:** I turn to computer science, which is a very specialised course for a school to offer. One of the advantages of the new work for 14 to 19-year-olds is the attempt to establish a range of courses, so that young people can specialise in an area that is right for them. The intention is to provide somewhere that they could study a very specialised and well-taught computer science A-level, for example, that may be a good starting point for a computer science degree. One thing that young people often tell me is that, having studied specialist A-levels in courses such as law or computer science, they go to university and the lecturers say that they do not like the way that they have studied a part of the syllabus, so they start again. One tension is that, in many cases, universities prefer to do the specialist teaching themselves, rather than expecting it to already have been done at the A-level stage. So, there is a balance to be drawn between keeping a broad and balanced curriculum, but having high-quality inspirational teaching in STEM subjects in schools, and trying to get too many young people to specialise too soon in their school careers.

[145] **Jenny Randerson:** University lecturers always pinpoint things in students who have been badly or wrongly taught when they get them. I would have thought that, in the case of computer science, for example, a whole approach that is not tackled would be tackled in some other IT-related A-levels and GCSEs. So, I am just passing on to you what researchers in the field are saying, which is that people are not necessarily equipped for the courses that they are going to university to study.

[146] **Leighton Andrews:** There are two issues on that. The first is with regard to the advice that they have been given with regard to the kind of course that they should pursue; they need unbiased careers advice. One of the challenges that remains across the 14-19 agenda is how we ensure that young people have access to unbiased advice, which means that they do not necessarily end up doing the course that their institution is able to teach, but the course that they need to advance in the career that they choose. I still think that we have cultural issues on the bums-on-seats mentality, if I can put it like that, and retaining people within a particular school or institution. That is a challenge.

[147] Secondly, we want people to have access to the specialist teaching that they should have, and for that to be provided on a collaborative basis. We will never have a situation where every institution teaching in the 14-19 age range will cover every subject, and nor should we. So, we must get out of the rhetoric of learner choice, which has dominated education thinking in the past decade or probably the past 20 years, and really look at the quality of what is being offered. I would much rather see a focus on quality than on choices, which, at the end of the day, are not quality.

[148] **Jenny Randerson:** You are getting to the nub of what I was homing in on. Owen Evans told us about careers advice, but that is only one end of the problem. The other end, as we understand from the evidence that we have received, is that the three sciences are not being offered by schools, because, very often, those schools do not have the people who are in a position to teach them. So, pupils might have received information about a potential career that requires the three separate sciences, but they are not offered those subjects in their schools. That is the key thing that needs to be tackled.

[149] **Leighton Andrews:** The issue is this: if they need to be studying it, where can they study it? We have a general issue about provision, which takes us straight to the heart of the collaboration agenda that I will be talking about in my statement on the Proposed Education (Wales) Measure this afternoon. We cannot have a situation where young people's ambitions are fettered, but nor can we have a situation where they are misled—where they are told that provision is relevant when it is not, and it is simply a device to keep them within a particular part of the system, rather than opening up opportunities for them that might be provided on a more collaborative basis.

[150] **Gareth Jones:** Darren and Christine have supplementary questions on that issue.

[151] **Darren Millar:** I want to pick up on the issue of careers advice. You are absolutely right that young people are getting a jaded view that is leading them to conclusions about what and where they should study. That has traditionally been a problem, which the Learning and Skills (Wales) Measure 2009 sought to address with regard to the requirement for independent and crystal clear advice to pupils. How are you monitoring whether that independent advice is being delivered? It appears that the Estyn inspection regime does not necessarily touch on that issue when inspectors go into schools. Should that not be one of the fundamental things that Estyn looks at when it undertakes an inspection in a secondary school?

10.40 a.m.

[152] **Leighton Andrews:** If you leave it to the inspection regime, you are in danger of picking it up only at moments of crisis on a periodic basis. There is a broader issue about accountability that goes to the heart of some of the things that I was talking about yesterday on PISA. Accountability must be built in for the delivery of the Learning and Skills (Wales) Measure and in a number of areas. It has to be built in to the reporting that goes to school governors and into the work that is undertaken by local authorities through their school improvement services and elsewhere, so that they are continually checking the quality of the careers service that is being offered to young people. It also has to be built in to our contracting with the Careers Wales companies to ensure that this is taking place. We must find ways of challenging, at different levels, whether that is happening. Ultimately, I may have to be more dirigiste and prescriptive.

[153] **Darren Millar:** May I come back on that? You mentioned the role of governors and local authorities, which may have a specific view, because of the bums-on-seats mentality, and will still not encourage the independent advice that is necessary to ensure that our young

people have every opportunity to follow the career path that best suits them. I do not see how, even if you are prescriptive—let us face it, there is a legal obligation—this will be done. It is also about how you monitor that independently, is it not? It seems that Estyn is best placed to do that, in an in-depth way, when it goes into schools and undertakes inspections. I appreciate that Estyn is not there regularly enough to ensure that the quality and independence are maintained, but something must change about the way in which careers advice is delivered to pupils in secondary schools. Frankly, it is not that independent at the moment and its availability is also limited—they get most of it from their teachers, whom they see every day, while careers advisers might pop in; that is how it happens.

[154] **Leighton Andrews:** We are spending £40 million a year on Careers Wales, which is a substantial amount of money.

[155] **Darren Millar:** I appreciate that, it is just that the relationship of someone coming in suddenly and for a short period of time to give careers advice is different to—

[156] **Leighton Andrews:** I am all for Estyn looking at this when it goes into secondary schools. However, it will not do it on a frequent enough basis to ensure that that is delivered. That is why there must be other measurements and challenge. We are talking about the role of governors; I agree that there is a danger that governors are far too loyal to the institution in which they sit, which is why I want to make amendments in due course—I cannot do so through this proposed Measure—so that governors have a responsibility not to the institution in which they sit, but to the learner and the wider community.

[157] **Christine Chapman:** I was a careers adviser for many years, and while I cannot say that I am totally up-to-date with how it works now, any good careers adviser would be guided by their code, which is about independence. This problem is that, once the advice is given, the young person may be influenced by parents and peers. That is why it is complex. You are right, Darren, that they go in to schools and are not there all the time, as teachers are, but any good careers adviser—I am not saying that they will all be good—would be guided by that independent, unbiased approach. It is more complex than saying that they are not—

[158] **Darren Millar:** To be clear, I am not suggesting that careers advisers out there are not giving independent advice. What I am suggesting is that pupils do not always have the opportunity to access that sufficiently—

[159] **Gareth Jones:** I accept what you say, but the challenging part is that you are dealing with pupils as well. Let us not forget that they have their own ideas as well, whoever talks to them.

[160] **Christine Chapman:** The point that I wanted to make—and I am sorry if I missed some of this—is that Owen talked about an audit of schools and employers and how they work, which is a good suggestion, but I wondered whether you had factored in the social mobility aspect. In the Minister's own constituency, there are areas such as Maerdy where there are very few employers, so are we limiting the pupils who live in that area to a small hub of employers? That has always been my concern about this. It should be equitable, because it is about raising aspirations and using a broad range of employers—and they could be in this area as well. We need to factor that in. Otherwise, our young people will not have that broad range of opportunities. I read a report a few days ago about the social mobility element, and it is not just about qualifications; it is also to do with all the other support that goes on, and the networks that some young people manage to access. We want that for all our young people.

[161] **Leighton Andrews:** First, we want high aspirations for all, and that has to be the starting point. On social mobility, you often find that well-connected, middle-class parents are

able to obtain a much broader range of work experience opportunities for their children than others. We have to ensure access to schools for employers if we are to do more in that area. We are talking, as Owen was earlier, about the question of what the labour market wants, and taking a broad perspective on that within travel-to-work areas, which will be broader than just north of the Rhondda Fach.

[162] The challenge is broader than that, though. When I was responsible for the Môn a Menai programme, a number of important companies had an engineering base there, ranging from contractors to the air force, right the way through to the nuclear power station at Wylfa. Yet I was continually being told by engineering employers that there appeared to be cultural issues with the way in which their work was interpreted in schools, and a reluctance to bring them in. Not until the head of the Wylfa facility himself started going out and doing talks and bringing to life the STEM subjects did the schools broaden the range of opportunities for young people to hear about those things. So, there are some issues with bringing employers in to talk, which Owen is fully engaged in.

[163] **Jeff Cuthbert:** I wish to return briefly to the issues that Jenny raised and that Chris Tweedale responded to. I agree with the Minister on collaboration. Jenny referred to higher education institutions in particular requiring students to start again, and I suspect that that has far more to do with the ease of organising learning patterns than anything else. In these days of credit transfer, developing proper systems for accrediting prior learning ought to be the norm, because there is nothing more demoralising for learners than to have to start again when they have already acquired a certain level of knowledge. It is wasteful as well, so I would certainly argue that we need to invest more time in ensuring that, when students progress from one institution to another, there are proper systems for accrediting the knowledge that has already been acquired at all levels of learning, rather than their having to start again. That certainly applies to employers, apprenticeships and work-based learning.

10.50 a.m.

[164] The specific point, though, is on the extra support that is available. We know that we are underperforming on FP7 and as we move into FP8, and I wonder whether any thought has been given to using or developing innovative projects with higher education and with high-tech industries to ensure that better ways are identified, using European moneys, for projects that can encourage interest and development in the STEM subjects right through to employment. That will link in to the work of the Department for the Economy and Transport, but that seems to be a way that we could help to improve the situation for the next two years.

[165] Incidentally, a report that has come to the Committee on European and External Affairs has identified that a key partner in FP7—and, I presume, FP8—in other parts of Europe are local authorities or municipalities, which hardly applies in the UK. I was not aware that authorities could engage in this programme until I read the report. However, if there can be a role for them, surely local education authorities should be encouraged to work with HE institutions and high-tech industries in their areas to develop joint bids.

[166] **Leighton Andrews:** I would certainly welcome that. The work that the Deputy Minister is leading through the National Science Academy perhaps provides us with a framework for that, giving us a flexible programme to take forward some of those initiatives. If it is helpful, we can certainly give you a note on some of the work that we are doing in that area.

[167] **Brian Gibbons:** GE Aviation, which I am sure that you know well, made an interesting point. It said, in line with your own evidence, that we are doing quite well in certain areas of the STEM agenda. However, it perceived that we were weak in those elements of the STEM curriculum that involve more of the applied sciences. So, for example,

in something like maths, which is essentially a classroom subject, we do very well, but where there is more of an applied element to the science, we do not do very well. One reason that it gave for that was that applied sciences often require a bigger time commitment from the pupil, often involving working during the lunch hour or in after-school clubs and so on, to encompass the applied element of the course. You have said that you are looking at the curriculum in this area. Are you taking that issue on board? While we are not doing too badly in sciences, we are weak in the applied sciences, and that is possibly contributing to the lack of joined-upness between the education system and what industry wants, particularly at the apprenticeship level.

[168] **Leighton Andrews:** We have only recently started the work on the curriculum, but I am certainly happy to look at that. I go back to the point that I made earlier. It is all very well encouraging wider learner choice, but if you are not able to give people the quality and depth that is relevant to their future progression routes, having a wider choice is ultimately meaningless, and I would rather that we focused on quality and depth, whether on a practical or an academic basis. As we look at what we are doing in 14-19 education, that is certainly an aspect that I want to focus on.

[169] I question whether we should be supporting as wide a range of subjects across the piece as we currently are. The whole point of the Learning and Skills (Wales) Measure 2009 was to achieve a strategic shift towards more vocational qualifications. We have seen a doubling from 1,000 to 2,000 over the past three or four years, which is excellent. I am not sure that the point was to offer every subject under the sun if resources were to be stretched thinly, or if it is just going to be an excuse to extract additional credits under the national planning and funding system. So, we will have to be a lot more focused on this, and I question whether an emphasis on choice has been allowed to develop at the expense of quality.

[170] **Brian Gibbons:** First, do you think that the weighting for the credits is right? Secondly, we asked some witnesses—although I cannot remember who, but they must have been from a trade union group or something—whether financial incentives would help to address the quality of teachers, but they did not think that that was the predominant issue. They thought that the predominant issue was to provide support for teachers to go on placements and so on for their continuing professional development. However, there was a cost to that, in employing supply teachers, for example. So, many teachers could not enhance their skills simply because they were tied down to maintaining the curriculum, and because there was not enough flexibility in the teaching roster to allow them to get away for personal and professional development and so on.

[171] **Leighton Andrews:** I have put money into the budgets over the next three years for continuing professional development.

[172] **Brian Gibbons:** Is that with a focus on STEM subjects?

[173] **Leighton Andrews:** Not at this stage. All that I have done so far is allocate the money, but I will get around to looking at what the balance should be as we move forward. My priorities for CPD are linked to literacy and numeracy. They must be our focus, given the challenge that they evidently present, because, unless you have literacy and numeracy, you will not be underpinning developments in STEM subjects in any case.

[174] We have put financial incentives into the system in initial teacher training, and I do not think that we would want to move away from those. You asked about the credits and the national planning and funding system, and I am currently looking at what we do with that over the next few years. There are significant challenges before us in respect of our budgets, which everyone is aware of, and I do not want to operate a system that might produce perverse incentives at a time of difficult public finances.

[175] **Gareth Jones:** Ar y nodyn hwnnw, Weinidog a swyddogion, diolchaf i chi am eich cyfraniad ac am y sesiwn hon gyda chi. Teimlaf ein bod wedi cael sesiwn werthfawr, o ystyried eich cyfraniad chi a chyfraniad y Dirprwy Weinidog yn yr awr flaenorol. Yr ydym wedi gweld y darlun cyfan. Derbyniwn fod y maes hwn yn un heriol, ac yr ydym yn ddiolchgar i chi am ymuno â ni er mwyn inni allu gofyn cwestiynau. Dymuniadau gorau i chi.

Gareth Jones: On that note, Minister and officials, I thank you for your contribution and for this session with you. I feel that we have had a valuable session, given your contribution and the contribution of the Deputy Minister in the previous hour. We have been able to see the whole picture. We accept that it is a very challenging area, and we are grateful to you for joining us so that we could ask you questions. We wish you well.

[176] Mae un papur i'w nodi, sef cofnodion y cyfarfod blaenorol.

There is one paper to note, namely the minutes of the previous meeting.

[177] Under Standing Order No. 10.25, I suspend the meeting for 10 minutes to allow the next witness to arrive.

*Gohiriwyd y cyfarfod rhwng 10.58 a.m. ac 11.13 a.m.
The meeting adjourned between 10.58 a.m. and 11.13 a.m.*

[178] **Gareth Jones:** Symudwn yn awr at ran olaf yr eitem ar bynciau STEM. Ar ran y pwyllgor, mae'n bleser gennyf groesawu Bob Cater, cyfarwyddwr cenedlaethol cynllun addysg beirianeg Cymru. Bob, yr ydym wedi derbyn eich tystiolaeth ysgrifenedig; diolch yn fawr i chi am hynny. Felly, gan fod amser yn brin, symudwn yn syth at gwestiynau Aelodau.

Gareth Jones: We now move on to the final part of the item on STEM subjects. On behalf of the committee, it is my pleasure to welcome Bob Cater, national director of the engineering education scheme Wales. Bob, we have received your written evidence; thank you for that. As time is short, we will move straight to Members' questions.

[179] **Jeff Cuthbert:** We have spoken a lot about the F1 challenge and initiatives such as Bloodhound and Big Bang. How well are those initiatives not just understood by the participants, but also how well do they resonate more broadly with FE, HE and industry with regard to their value in helping to promote the STEM subjects? Obviously, more could be done, but are you familiar with FP7 and the FP8 European funding streams available to support innovation, particularly science development, within member countries? Unfortunately, in Wales we underperform in that regard, possibly because we get structural funds, which may be a reason why that is ignored. Do you think that more that could be done by drawing in extra resources from outside—I say outside, but we are members of Europe—or non-domestic money to help to promote the take-up of STEM subjects?

[180] **Mr Cater:** First, going back to F1—which is where you started—you will have seen it, as will others here. For me, and for those who see it, it is STEM in a wonderfully contextualised situation, where pupils certainly are motivated, and where they have the hook of exciting activity. It is broader than that: they have to do presentations, so there are all sorts of wider learning opportunities. To my knowledge, everyone who has seen it and experienced it thinks that it is a wonderful model of learning. I am not saying that it is the only model, but it is a good model in that you have an exciting context and quite a good gender mix taking part. In fact, there was a lot of publicity, as you probably will have seen, for a team of girls who won and represented Wales this year in the international finals in Singapore. When people see it, it is recognised as a useful learning opportunity. It certainly encourages an interest in STEM subjects; having spoken to those girls, two or three are interested—one in particular—in F1, not that they want to race a car or be an engineer, but they have seen the

hundreds of support activities that go on around F1. Others have expressed an interest in engineering.

[181] The problem with industrialists is getting them to events where they can experience some of our educational activities, but, again, where they have been involved—we certainly have the support of people like members of the automotive forum in Wales and the aerospace forum—they see that activity and value it and think that it is of great value to the pupils and to the STEM agenda in encouraging an interest.

[182] **Jeff Cuthbert:** If you are not familiar with the FP7 or—

[183] **Mr Cater:** No, I am not familiar with FP7 and FP8. I would be if there was an opportunity to get funding. You will probably be aware, and I mentioned it in my written evidence, that we have recently been lucky enough to get some European funding, although it took us three years to get there—but that is another story. However, that has certainly helped, in that we have been able to set up additional F1 manufacturing centres. One of the big problems with state-of-the-art manufacturing and engineering for schools is that the equipment that enables that to be done is expensive. So, what we have done is set up regional manufacturing centres with the European funding, and there is a lot more that we could do in education, certainly in terms of technology and engineering, to ensure that our schools, in particular—I think that colleges do quite well—keep up and give pupils those exciting experiences. Most pupils are interested in ICT, but, unfortunately, in schools, ICT seems to be totally focused on Microsoft Office. There are exciting bits of drawing something and being able to make it, with 3D printers and so on, but they are expensive. If we can get other funding, it will certainly help.

[184] **Brian Gibbons:** Thank you for your paper; I think that the recommendations at the end have given us a broad skeleton for our report. That has been very helpful.

[185] **Mr Cater:** I did not want to be precocious, but they are things that are dear to my heart and need looking at.

[186] **Jeff Cuthbert:** Can you have a broad skeleton?

[187] **Brian Gibbons:** Yes, I think so. Anyway, I suppose that you felt better getting that off your chest.

[188] **Mr Cater:** Yes.

[189] **Brian Gibbons:** One point that you made very well, and we have had lots of evidence in support of it, is that, even though the number of pupils doing GCSEs in the STEM subjects is going up, a lot of that early enthusiasm seems to dissipate after the age of 16, and does not really translate itself, to any significant extent, into A-levels and university courses. You have made the case very strongly and the evidence bears it out. However, the Minister, when he gave evidence before you came was not quite as convinced, and he pointed to the fact that there has been an increase of over 10 per cent in the number of graduates in STEM subjects in Wales. What is your diagnosis of why that translation from pre-16 education to post-16 and higher education is not taking place?

11.20 a.m.

[190] **Mr Cater:** It is a complex question, which has a complex answer. My background is in education—I taught for 18 years, and I was a senior lecturer in teacher training, and then became a schools' adviser and inspector. So, I know schools quite well. Having been exercised by this conundrum for many years, I think that there are so many factors involved:

schools, teachers, the body of teachers and so on, but you cannot get away from peer and parental pressure and influences. I do not know whether this sounds wrong, but particularly in the Valleys—and I taught in a Valleys school—there are attitudes towards girls going into engineering, for example, which are difficult to put right. The schools can do as much as they can, but when there are strong parental and peer pressures on pupils, that affects what they do, the way that they go and the decisions that they make.

[191] I mentioned in my written evidence that I am concerned that there are two letters in the STEM acronym that seem to be the weaker brethren, namely technology and engineering. Everything that comes out is about science; that is fine, because it is important, but, generally, engineers have a slightly different mindset and different skills, which we need to encourage. I tried to find out the number of pupils who were sitting engineering examinations in Wales, but it was difficult to do that, and I am not sure that I have yet had the complete answer. The WJEC does not offer engineering. When I asked about engineering, I found out that only 265 students in Wales did engineering, and, given that we have around 220 schools, that figure seems to change rapidly. Of those students, only 11 were girls. So, there are many issues, and I am not sure that they are easy to solve. I am not sure whether that response is helpful to you. I wish that I had the answer, because I could retire and be very wealthy if I did. However, it is about that mixture of influences on pupils, and, for whatever reason, girls do not seem to like or enjoy those subjects, particularly A-level maths and physics. When we run the scheme for sixth formers, we struggle to attract girls in particular. The last figure that I saw—I am guessing; this is a shot in the dark—in relation to the uptake of physics among girls nationally was lower than 20 per cent.

[192] **Brian Gibbons:** You said in your evidence that the more applied sciences presumably take up more time because of the applied part, as opposed to subjects that involve just sitting and listening, and that that seems to be an area of weakness. Again, your evidence is not unique on that, as GE Aviation, for example, made exactly the same point. The Minister indicated that he is looking at the curriculum. I think that engineering and technology would fall into the category of applied—

[193] **Mr Cater:** I think so, yes.

[194] **Brian Gibbons:** How would you redesign the curriculum to give sufficient time to develop that applied side of the course? Clearly, there is only the school day, and if the applied sciences suddenly expand exponentially, other things will be squeezed out.

[195] **Mr Cater:** Again, it is difficult, because the school curriculum is crowded and overloaded, and it is difficult to get things in. The evidence shows that maths teaching and, to a large extent, science teaching is not working because pupils are losing interest in it. For example, my daughter has done quite well, but she did not like mathematics. One reason for that—there were other factors—was that she did not see that there was a purpose for it. She asked ‘Why am I doing all this maths?’, so, because of my background, I said, ‘Look, you can use your maths for this and for that’. As you said, there is a lack of application, but could we not use some of the time that is spent in boring mathematics lessons to contextualise it and give pupils activities related to technology and engineering? On the F1 challenge, for example, we are producing a booklet because teachers, especially primary school teachers, through no fault of their own, often have not had the training, and do not realise that there are opportunities to develop mathematical and scientific skills within a context.

[196] A little car goes down a 20-metre track in 1.3 seconds. What is that in miles per hour or kilometres per hour? You have a block. What is the density of it? What is the weight of it? There are strict rules. There are lots of things like that where we could put practical maths in the curriculum. The percentage pass rate in maths is high. I cannot remember the figure, but, certainly, grades A* to G are achieved by probably more than 90 per cent of pupils. It is a

tragedy that, despite that, we are told that, when pupils leave school, a high percentage of them are not at key skills level 1 in numeracy. There is something wrong there. How can you get a GCSE at whatever grade and not even meet the lowest requirement of industry? Yes, we need to look at the curriculum and it needs to move more quickly. We are in a quickly changing world. We are in a competitive environment. We cannot spend five years producing a new GCSE if something is wrong with the current one. In my experience, industry is not involved enough in the discussions about what the new curriculum, new syllabus and new specification should look like.

[197] **Brian Gibbons:** This is the last question from me, Chair, thank you. The one thing that I slightly took issue with in your paper—I do not want to put words in your mouth—was that you seem to be quite dismissive of the appointment of the chief scientific adviser and perhaps even the development of the National Science Academy; however, in your paper, you suggest one high-level STEM strategy group, which to me would seem to fit very tidily either with the National Science Academy or even with the advisory group that the chief scientific adviser has established. He said that he had a very good meeting a couple of days ago. So, I am just wondering whether you could spell out why you think that the chief scientific adviser, academy or scientific advisory group would not be able to deliver your high-level STEM strategy.

[198] **Mr Cater:** I did not mean to be, and I do not think that I was, dismissive of the appointment or the group. The point that I was trying to make, amplifying some of the things that I have said before, was about having a chief scientific adviser to represent STEM in Wales, which obviously also includes engineering, technology and mathematics. I remember that, when Rhodri was doing this, some of us lobbied him and asked whether he could change the title because it does not seem to represent the other areas of STEM. It is not that I am dismissive of that appointment or that group; I just think that it is unfortunate that it is called the science academy. I have been to lots of meetings and I have met John several times, and you have to listen very carefully and look very carefully for the engineering and technology in any meeting or discussion or when they are presenting this. I did look at the advisory group with some dismay because, again, where are the engineering and technology representatives? I am not being dismissive of it; I think that it is a good idea if it is a group that can grasp the plethora of activities and innovation going on around STEM. It is ironic in a sense. The engineering education scheme has been around for 20 years, and we have done STEM for 20 years, and we have used STEM ambassadors for 20 years, but it is suddenly a very fashionable thing to be doing.

[199] **Gareth Jones:** Thank you; I am sure that that is a key point.

[200] **Darren Millar:** I wanted to pick up on some of the issues that Brian has already alluded to. You talk about engineering and technology being almost junior partners in terms of being components of STEM and the fact that schools seem to have less regard for STEM in the curriculum. You have obviously made a number of recommendations, but do you feel so strongly about this that you would say that there should be a change in the representation on the National Science Academy and the council and that the remit of the chief scientific adviser should not only include STEM in the brief, but focus on the development of the engineering and technology parts of that? How can we measure the success of his appointment in terms of the development of engineering and technology in Wales? What would you recommend that we do?

11.30 a.m.

[201] **Mr Cater:** I would have liked to have seen a different title, but that is water under the bridge. However, I would recommend that you make sure that, when you have documents, papers and press releases, that they are not headed 'science, science', with 'engineering' in

small print, which is also to represent technology. Being in a competitive world, the future for the UK, and certainly for Wales, will lie more and more in a resurgence of our manufacturing and engineering technology skills. I do not think that it helps that. It is great to see science up front as it is important—most engineers have good scientific skills—but one recommendation would be to make sure, when there are press releases or pronouncements from the science academy, that somehow it rebalances the imbalance between the subject that are represented by the four letters in STEM. Two of those subjects—technology and engineering—do not seem to feature. I have brought press releases with me, such as the one on science week. Looking at the list, I do not know some of the people, so I have asked a few others, but there does not seem to be a professor of engineering from Wales in that group. We have some very eminent professors of engineers. In fact, we have a female professor of engineering in Cardiff, who we think would be useful on that group. Where are the industrialists in that group, particularly the engineering and manufacturing industrialists?

[202] **Darren Millar:** You gave some figures earlier on the number of pupils actually studying engineering. There are very low numbers across Wales. In fact, they are pretty startling. Is that because they are not offered the opportunity to take up engineering, or is it because there is a problem on the demand side from pupils? What is your assessment of that?

[203] **Mr Cater:** I did mention in the document that I find that number quite startling. There are only eight registered teachers of engineering in Wales. We need to look at that. There are certainly some good engineers out there who may be made redundant or will have time. There is even the notion of a peripatetic engineering teacher because not only are they engineers, but they have mathematics and science skills. I think that that is what STEM is about in schools: bringing those together; not treating them separately, but actually co-ordinating those and giving them some sense.

[204] On the uptake in schools, although one should not generalise, in most schools, if you talk to a headteacher about engineering, they would immediately think of the disaffected and less able. If you look at most groups of engineering pupils in further education or wherever you go, you will find that. Fine, we need to offer those pupils skills and development, but the future of the country is largely dependent on our brighter pupils going into our manufacturing and technology research companies. I do not think that there is enough investment in those. We put in a lot of money into supporting NEETs, but where is the money for the bright pupils, particularly in the STEM agenda?

[205] **Darren Millar:** That is a very important point about those more exceptional performers. Finally, Chair, I wish to touch on how attractive engineering might be as a career path for pupils. We have had evidence presented to us that suggests that the quality and the opportunity to present that career path may not be really that effective at present in our schools. Given the interest of young people, in particular, in things like the sustainability agenda, and the fact that it is a massive growth industry in Wales—we have to equip people and make sure that we are churning out people of sufficient quality to be able to work in those industries in the future—do you think that that could be the hook to draw people into engineering and technology in the future?

[206] **Mr Cater:** Yes; you are right. Last year, we had around 500 primary school pupils involved in the F1 challenge. We did a little survey by issuing a questionnaire. Although the pupils had been involved and many had enjoyed it, when we asked them what their perception of engineering was—I know that this sounds trite—it was about dirty, oily rags, someone mending the car or someone who comes to mend the washing machine. I do not think that many Careers Wales advisers do engineering much good. On a visit to the Ford plant in Bridgend, we heard one adviser from Careers Wales, I think, saying to the pupils as they were getting on the bus after they had been around the plant, ‘If you do not do well in school, that is where you will end up’. The fact is that the people in that plant probably earn twice as

much as any of us because of the shifts that they work and the time that they put in.

[207] **Andrew Davies:** [*Inaudible.*]

[208] **Mr Cater:** Exactly. There is some pretty high-tech stuff happening there, but we need to do something with regard to the perception of what modern engineering is about. There are still some dirty activities, but a lot of our manufacturing is very clean. People do not go around with hammers and spanners anymore; they are more likely to be changing a programmable logic controller or a control board in a machine. They are highly skilled and highly trained people, working mostly in a clean environment.

[209] **Gareth Jones:** Thank you for that. There is a follow-up point from Andrew, before I turn to Chris for the final question. I am mindful of the time now.

[210] **Andrew Davies:** Thank you, Mr Cater, for your evidence. I just did a quick headcount of the chief scientific adviser's advisory council, and, of a membership of 18, there are only two employer representatives—one from Tata and the other from EADS Innovation Works. I cannot see anyone there who is obviously an engineer either. So, it is an interesting point that you made.

[211] On employer engagement, those statistics made your point. There are six sectors to be focused on in the economic renewal programme, one of which is energy and environment. From talking to major energy and utility companies, I know that there is potentially £35 billion-worth of investment in Wales and the borders. That investment is going to need people with engineering skills—from the high-level to the technical skills. I know, from talking to utility companies, that the age profile of their workforces is heavily skewed to the over-50s. So, there is a huge opportunity there, but there is also a huge threat in terms of addressing that skill and demand. In your experience, with regard to the engagement with industry and education, how are we going to address that, because Government as a whole is very bad at workforce planning?

[212] **Mr Cater:** That is a good point. In fact, I heard the national chief executive officer of E.ON speak a couple of weeks ago, and he was outlining exactly what you are saying, that they will have to build 20 or 25 new power stations over the next 10 years. He knows that they do not have enough engineers or people with the skills to do that currently. He also mentioned the upgrading of homes, new homes and the efficiency agenda with regard to homes and monitoring. He said that we have nowhere near the number of technicians that will be needed for that. So, that point is well made. However, that goes back to some of the points that I have made, such as that we have to raise the status and the profile of engineering and technology and the STEM agenda, so that we have more pupils taking those subjects and using their mathematics and their science. I think that, at the moment, we are just pushing science, science, science—even mathematics seems to be sidelined a great deal. What are we going to use that science for? The science curriculum should possibly be moving more towards those agendas and the science around those important agendas for the future, because there will be a lot of job opportunities.

[213] **Andrew Davies:** Do you think that there should be a greatly increased engagement with industry by Government?

[214] **Mr Cater:** Yes, definitely. There are two relevant departments in the Welsh Assembly Government and they tend to work in silos. Speaking from personal experience, we deal with education and industry and if we go to one department, it will tell us that we should be talking to the other, and if we go to the other one, we will be told to go to the first. So, the coming together of the two distinct departments in the Welsh Assembly Government is important and I hope that it will bring industry closer to education and the Government closer

to industry and education.

[215] **Brian Gibbons:** We have had evidence, however, that there are not enough big companies in Wales to be able to undertake this buddying with business, and that companies in the small and medium-sized enterprise sector are just too busy getting their products out of the door to spend time going around schools and so on. Although you might say that it would be an investment in the future for them, people are voting with their feet on that. How do you sort that problem out?

[216] **Mr Cater:** That is difficult. I was startled when my colleagues in the fora in Waterton told me that 95 per cent or more of the businesses in Wales are SMEs or micro enterprises. So, yes, we have a shortage of big companies with the resources to help, but there may be a way in which the Welsh Assembly Government or others could help the smaller industries to help us, for example, to get apprentices in. I know that it has the shared apprenticeship scheme, and that is working very well, as smaller companies can share the burden. However, in Wales, because they are so important to our economy, and because we would want them to help us to look into the future and develop talent, we need to find ways to help them to help us.

11.40 a.m.

[217] **Gareth Jones:** Chris has the final question.

[218] **Christine Chapman:** Could I make a point on the previous comment that you made, Bob, about careers advisers? I know that there is a lot of work to be done there, but the story that you just told has been used many times over many years, so I think that we have to look at that with care.

[219] **Mr Cater:** Yes. I do not think that it is so much that story as the messages that people are getting—

[220] **Christine Chapman:** If I could just make the point, it is quite unlikely that careers advisers would go with pupils on a visit to a company; it is usually careers teachers.

[221] **Mr Cater:** Yes.

[222] **Christine Chapman:** I just wanted to make that point, because we need to look at this. My main question was to ask for your assessment of how the work experience programme, which we have had for many years, is working in encouraging young people to go in for STEM subjects—bearing in mind that, as far as employers are concerned, it is a voluntary programme, and we cannot make employers take pupils on work experience. I would also like your assessment of the availability of good-quality placements, and placements that could possibly change those poor perceptions and stereotypes that young people have of STEM careers.

[223] **Mr Cater:** Are you talking about compulsory work experience?

[224] **Christine Chapman:** Yes. Quite often, it is a real change for some pupils.

[225] **Mr Cater:** Realistically, it is difficult to make it work. If you are talking about every pupil in every school in Wales getting a good-quality experience in a company, you are asking a lot of industry, especially bearing in mind the last point, that over 90 per cent of our industries are micro-industries. Personally, I would rather see us getting good work placements for as many people as we can put in them, because I know from my own experience with my daughter that some work experience placements, perhaps many, are

trivial and do not give the right impression of industry, as the students are treated just as dogsbodies for making tea, sweeping up and so on. It is difficult for some companies to find meaningful work experience for them for a week. I do not know if that needs looking at—do we want to say that we have placed however many thousands of pupils in work experience, or do we want to say that we have placed 60 per cent of them in good-quality work experience?

[226] **Christine Chapman:** I am glad that you mentioned the issue of young women going into STEM areas. If you look at the statistics, although it is getting better, there is still a lot of work to be done. I remember quite a few years ago seeing a young girl placed with a garage, and it was the saddest sight that you can imagine, because she was standing there in an oversized overall looking completely isolated. She might have gone into that placement full of good intentions, but I imagine that she would have come out of there having completely gone off it. Is more support needed? It is not just a question of getting them into those placements, but the support that young people have when they are there.

[227] **Mr Cater:** You are right. You might have a company, probably a small company, that feels that it would like to contribute, but when the pupil turns up, they do not have the resources to spend the time on them, to get right-fitting clothes for them and so on. So yes, that support for smaller companies would be useful—we need to help them to help the students. My daughter's school is asking parents to find placements. I was lucky because I could find a good one for my daughter, but I am sure that some people will be looking for just somewhere that they can send them for a week.

[228] **Christine Chapman:** That is precisely the point I made to the Minister. There is this issue about social mobility, and it is something that we need to look at, Chair, in this report. It should not just be down to having good networks, because all you are doing is perpetuating the inequalities.

[229] **Mr Cater:** Again, it is this balance between ticking boxes to say that they all have a place and ensuring the quality of that place. Is it better to put a smaller percentage in a good-quality placement or to have a higher percentage in a placement that will turn them off, give them the wrong impression, and prove not to be a worthwhile use of time anyway?

[230] **Gareth Jones:** Thank you, Bob, for those responses. May I ask you about one particular point? In talking about STEM, we are basically—I am sounding like a former headmaster now—talking about four specific subjects, although I understand that they interlink a lot. Are you advocating entrusting the four columns—the sciences and mathematics—with being the early building blocks on which engineering can be superimposed further down the curricular development? There is a basic need to identify that. What are your views on that?

[231] **Mr Cater:** Technology and engineering could be combined in the school curriculum. They could have the same slot at the school level, branching out as pupils get older and move into higher education. Immediately, that would get the four down to three. It needs to be a combination. You need a good-quality technology slot in the curriculum. I made the point that design and technology in the national curriculum is too much of a compromise at the moment, because it brought together what were historically girls' and boys' activities. They were lumped into half the time, or less in many cases, and they were a mishmash of activities. Generally speaking, anything that would look like real technology or engineering does not exist in schools. So, I want to see a good-quality technology slot in schools but, as I said earlier, I want to see maths and science working with technology. Perhaps it could get some of their time, because if teaching maths as maths is not working, let us use a little of that time to ensure that children are applying maths and science to practical, problem-solving activities in the school curriculum.

[232] **Gareth Jones:** We were encouraged to hear that the WJEC is apparently working on an intermediate applied mathematics course.

[233] However, we must conclude this session now. Thank you on behalf of the committee. We have talked about doing this over two or three years, and I am pleased that you have finally had the opportunity to come to this forum. As Brian said, you have provided us with the recommendations; all we have to do is write the report. [*Laughter.*] We value your contribution, Bob. We know that you are a stalwart as far as STEM subjects are concerned. We very much hope that our recommendations and report will change things for the better. We appreciate all the time and effort that you have put in to the advancement of STEM in Wales.

[234] **Mr Cater:** Good luck.

11.48 a.m.

Cynnig Trefniadol Procedural Motion

[235] **Gareth Jones:** Cynigiau fod

Gareth Jones: I move that

y pwyllgor yn penderfynu gwahardd y cyhoedd o weddill y cyfarfod yn unol â Rheol Sefydlog Rhif 10.37(vi).

the committee resolves to exclude the public from the remainder of the meeting in accordance with Standing Order No. 10.37(vi).

[236] Gwelaf fod y pwyllgor yn gytûn.

I see that the committee is in agreement.

*Derbyniwyd y cynnig.
Motion agreed.*

*Daeth rhan gyhoeddus y cyfarfod i ben am 11.48 a.m.
The public part of the meeting ended at 11.48 a.m.*