

Y Pwyllgor Menter a Busnes

Lleoliad: **Ystafell Bwyllgora 3 – y Senedd**

Dyddiad: **Dydd Mercher, 30 Ebrill 2014**

Amser: **09.15 – 12.10**

Gellir gwyllo'r cyfarfod ar Senedd TV yn:

Cynulliad
Cenedlaethol
Cymru

National
Assembly for
Wales



Cofnodion Cryno:

Aelodau'r Cynulliad:

William Graham AC (Cadeirydd)
Mick Antoniw AC
Keith Davies AC
Dafydd Elis-Thomas AC
Rhun ap Iorwerth AC
Julie James AC
Eluned Parrott AC
Joyce Watson AC

Tystion:

Staff y Pwyllgor:

Siân Phipps (Clerc)
Claire Morris (Ail Clerc)
Olga Lewis (Dirprwy Clerc)
Michael Dauncey (Ymchwilydd)
Sian Hughes (Ymchwilydd)

TRAWSGRIFIAD

Gweld [trawsgrifiad o'r cyfarfod](#).

1 Cyflwyniadau, ymddiheuriadau a dirprwyon

1.1 Cafwyd ymddiheuriadau gan David Rees AC a Byron Davies AC. Nid oedd unrhyw ddirprwyon.

2 Ymchwiliad i Dwristiaeth – trafod yr opsiynau ar gyfer ymweliad

2.1. Trafododd y Pwyllgor yr eitem hon yn breifat a chytunwyd i gynnal ymweliadau i dri lleoliad ledled Cymru ar 26 Mehefin 2014.

3 Ymchwiliad Dilynol i STEM – papur briffio ar gyfer y gwe–sgyrsiau

3.1 Trafododd y Pwyllgor yr eitem hon mewn sesiwn breifat.

4 Ymchwiliad Dilynol i STEM – gwe–sgwrs â myfyrwyr Addysg Uwch/Addysg Bellach

4.1 Fel rhan o'r Ymchwiliad Dilynol i STEM gwnaeth Aelodau'r Pwyllgor: Mick Antoni AC, Dafydd Elis-Thomas AC, William Graham AC ac Eluned Parrott AC gymryd rhan yn y gwe–sgwrs â myfyrwyr Addysg Uwch/Addysg Bellach. Er y cynhaliwyd y gwe–sgwrs yn breifat, bydd y trawsgrifiad ar gael i'r cyhoedd maes o law.

5 Ymchwiliad Dilynol i STEM – gwe–sgwrs ar y rhywiau a STEM

5.1 Fel rhan o'r Ymchwiliad Dilynol i STEM gwnaeth Aelodau'r Pwyllgor: Keith Davies AC, Rhun ap Iorwerth AC, Julie James AC a Joyce Watson AC gymryd rhan yn y gwe–sgwrs ar y rhywiau a STEM. Er y cynhaliwyd y gwe–sgwrs yn breifat, bydd y trawsgrifiad ar gael i'r cyhoedd maes o law.

6 Papurau i'w nodi

6.1 Nododd y Pwyllgor y dogfennau ategol canlynol:

EBC(4)-11-14 (p.1) – Perfformiad Banc Buddsoddi Ewrop yng Nghymru

EBC(4)-11-14 (p.2) – Gwybodaeth am gyfranogiad Cymru yn y rhaglen MEDIA 2007

EBC(4)-11-14 (p.3) – Nodyn ar waith Tasglu'r Gweinidog ar gyfer Trafnidiaeth Gogledd Cymru

EBC(4)-11-14 (p.4) – Gwybodaeth ychwanegol am hyrwyddo masnach a mewnfuddsoddiad

EBC(4)-11-14 (p.5) – Adroddiad cryno ar y prif bwyntiau sy'n ymwneud â cham cyntaf yr Arolwg Hydredol o Ardaloedd Menter

6.2 O ran Papur 3 o'r papurau i'w nodi, cytunodd y Pwyllgor i dderbyn rhagor o dystiolaeth lafar gan Weinidog yr Economi, Gwyddoniaeth a Thrafnidiaeth ynghylch trydaneiddio'r rheilffyrdd.

Y Pwyllgor Menter a Busnes
The Enterprise and Business Committee
[Trawsgrifiad o we-sgwrs]
[Transcript of web-chat]

Dydd Iau, 30 Ebrill 2014
Thursday, 30 April 2014

Aelodau'r pwyllgor yn bresennol
Committee members in attendance

Mick Antoniaw	Llafur Labour
Yr Arglwydd/Lord Elis-Thomas	Plaid Cymru The Party of Wales
William Graham	Ceidwadwyr Cymreig (Cadeirydd y Pwyllgor) Welsh Conservatives (Committee Chair)
Eluned Parrott	Democratiaid Rhyddfrydol Cymru Welsh Liberal Democrats

**Ymchwiliad Dilynol i Sgiliau Gwyddoniaeth, Technoleg, Peirianeg a
 Mathemateg (STEM)**
**Follow-up Inquiry into Science, Technology, Engineering and Mathematics
 (STEM) Skills**

**Trawsgrifiad o We-sgwrs gyda Myfyrwyr Sefydliadau Addysg Uwch a Phellach
 a Phrentisiaid**
**Transcript of Web-chat with Further and Higher Education Institution students
 and apprentices**

Y Pwyllgor Menter a Busnes: Bore da, bawb. Dim ond neges sydyn i ddweud y bydd y sgwrs yn cychwyn am 10.15. Mae croeso i chi ymateb i'r cwestiynau yn Gymraeg neu Saesneg. Bydd William Graham AC (Cadeirydd y Pwyllgor) Mick Antoniaw AC, Dafydd Elis-Thomas AC a Eluned Parrott AC yn cymryd rhan yn y we-sgwrs. Bydd y gwe-sgwrs yn dechrau yn awr.

The Enterprise and Business Committee: Good morning, everyone. Just a quick message to confirm that the discussion will start at 10.15. You are welcome to respond to questions in Welsh or English. William Graham AM (Chair of the Committee), Mick Antoniaw AM, Eluned Parrott AM and Dafydd Elis-Thomas AM will be taking part in the web-chat. The web chat will start now.

Beth wnaeth eich ysgogi i wneud eich cwrs?

What inspired you to choose your course?

Benjamin Williams: I chose it because engineering is becoming more important these days and there is a shortage of jobs in engineering.

Aled Illtud: Yn bennaf, y syniad bod y llais Cymraeg o safbwynt pynciau STEM ddim yn cael ei glywed yn ddigon aml ar y cyfan. Hefyd y syniad o allu cael y cyfle o wella'r

Aled Illtud: Mainly, the idea that Welsh voices are not heard often enough on STEM subjects, generally. Also, the idea of improving the subject that I am studying for

pwnc rydw i'n ei astudio i bobl eraill.

others.

Y Pwyllgor Menter a Busnes: Aled, a ydych chi wedi penderfynu eich bod am ddysgu'r pwnc yn barod? A yw'r ffaith eich bod wedi dewis astudio drwy gyfrwng y Gymraeg wedi rhwystro eich opsiynau mewn unrhyw ffordd?

The Enterprise and Business Committee: Have you decided that you want to teach the subject already? Has your decision to choose to study through the medium of Welsh limited your options in any way?

Aled Illtud: Mae dewis fy mhwnic yn y Gymraeg wedi bod yn mantais i mi yn bennaf oherwydd mae gan fy nhwtor personol fwy o amser i siarad gyda ni, y myfyrwyr Cymraeg, yn benodol. Rwy'n ystyried y syniad o ddysgu ar hyn o bryd, ydw.

Aled Illtud: Choosing to study my subject in Welsh has been an advantage for me mainly because my personal tutor has more time to talk to students studying in Welsh specifically. Yes, I am currently considering the idea of teaching.

Ryan Myles-Roberts: I was originally going to choose physics, but I preferred the less applied and more pure aspect of maths with the rigour that comes with it. I also liked the idea that maths does not really limit my options for future careers as a result of the wide range of skills.

The Enterprise and Business Committee: Ben, do you mean that there is a shortage of jobs in engineering or a shortage of apprentices choosing to do engineering?

Benjamin Williams: I meant a shortage in apprentices choosing engineering because I was reading about the shortfall of engineers in Britain as the industry is growing again, I think.

Chris Lorch: For me, during year 9 of secondary school we did a bit more in-depth studying of space science and it really just blew my mind. I have always had an interest in all sciences but space science was what really appealed to me.

While we did not hear too much about STEM in year 10 and 11 at my secondary school, those doing A-levels in a STEM subject did have continuous encouragement to follow such a career path, but I felt it was more directed at people who already knew what they wanted rather than at year 11 students who did not have as much of an idea about their future careers.

The Enterprise and Business Committee: Out of 10, how would you rate the importance of job prospects to your decision to study this subject and out of 10 how would you rate the importance of your love of the subject?

Ryan Myles-Roberts: 7 and 10 respectively.

Aled Illtud: 8 a 10.

Aled Illtud: 8 and 10.

Benjamin Williams: 10 - important for prospects and about a 9 or 10 - for how much you need to love the subject.

Chris Lorch: I chose to do the subject out of passion rather than career opportunities, I would rate at 5 and 10. There are very little options regarding space science in my area, and most other physics subjects. I knew it would be hard to find work experience and other forms of work. I feel like this would have put a lot of students off the idea of STEM jobs due to there

not being a wide variety in my area.

The Enterprise and Business Committee: Ben, we understand that you are currently applying for an apprenticeship scheme. Could you tell us about that?

Benjamin Williams: I have to send in a lot of CVs into companies but the main problem is that companies begin interested and then closer to the point where they want to take people on they either change what type of apprentice they need or may not have funding to take them on. However, other companies will not take anyone on until the end of the year when the courses are finished.

The Enterprise and Business Committee: Ben, did you have difficulties in securing that apprenticeship?

Benjamin Williams: I do not have one at the moment I am doing the extended diploma.

The Enterprise and Business Committee: Ben, who have you turned to for advice on the application process and are you finding it difficult?

Benjamin Williams: Friends who are engineers influenced me and the lecturers are very good. The head of engineering in the college and all the lecturers are very helpful with their input and letting me know when apprenticeships arise. It is not very difficult but just frustrating at times.

Catherine Jones: Hello. Sorry I am late logging in, but I have been having problems with my internet.

The Enterprise and Business Committee: Aled, have you had to compromise on the choice of research subject that you will undertake and have you been limited in terms of your choice of tutor?

Aled Illtud: O beth rwy'n cofio, ges i fy rhoi gyda fy nhiwtor i, ond mae yna ddewis o ddau arall. Rydw i'n neud traean o fy nghwrs yn Gymraeg. Yn lwcus iawn, ffiseg oedd beth yr oeddwn i moen ei wneud felly doedd dim rhaid i mi gyfaddawdu i wneud rhywbeth yn Gymraeg.

Aled Illtud: From what I remember, I was allocated a tutor but there was a choice of two more. I undertake a third of my course in Welsh. Fortunately physics is what I wanted to do so I did not have to compromise at all to study in Welsh.

Y Pwyllgor Menter a Busnes: Aled, beth fyddai'n dylanwadu ar eich penderfyniad i ddysgu neu beidio?

The Enterprise and Business Committee: Aled, what would influence your decision to teach or not?

Aled Illtud: Mae fy nhad i yn dysgu Ffiseg yn ysgol gyfun trwy gyfrwng y Gymraeg, ar hyn o bryd mae ysgolion yn cael trafferth ffeindio athrawon Ffiseg. Mae yna cymaint o alw am athro Ffiseg sydd yn apelgar, yn ogystal â'r ffaith fy mod i yn hoff o'r pwnc, sydd yn eithaf pwysig!

Aled Illtud: My father teaches physics in a secondary school through the medium of Welsh. Schools are finding it difficult to find physics teachers, there is so much demand for physics teachers, as well as the fact that I like the subject which is pretty important!

Y Pwyllgor Menter a Busnes: Pwy oedd y bobl fwyaf dylanwadol i chi?

The Enterprise and Business Committee: Who were the people who influenced you the most?

Ryan Myles-Roberts: In what respect? To do Maths specifically or my interest in STEM?

The Enterprise and Business Committee: Both.

Aled Illtud: Gwnaeth fy nhad, a fy athrawes Ffiseg; Miss Brooks ysbrydoli fi yn bennaf i neud Ffiseg, yn ogystal â'r hwyl byddwn i'n cael yn trafod y gwyddorau gyda ffrindiau sydd efo'r un diddordeb a fi.

Aled Illtud: My father and my physics teacher, Miss Brooks, inspired me to study physics as well as my enjoyment of discussing science with friends with similar interests.

Chris Lorch: My secondary school physics teacher was the reason I continued in physics rather than chemistry. He made the subject fun and appealing, as well as showing the class applications of the subject, which is hard to appreciate until you reach a higher level.

The Enterprise and Business Committee: Catherine, we know that you are hoping to do a PGCE at Bangor University. What has influenced your decision in that regard?

Catherine Jones: Hi. Being able to study it in north Wales and to be able to stay in my home area to so the school placements was a big deciding factor as I am a mature student, so money is problem. Although I did ring my local LEA, Wrexham, last week to see on what funding was available for the PGCE, I was spoken to very rudely and told to ring back next year, even though I tried to explain I needed to know about finances before I apply for PGCE courses in September.

The Enterprise and Business Committee: Catherine, you should speak to the postgrad recruitment office for advice at your university. If you would like to email Lord Dafydd Elis-Thomas who is the Chancellor at dafydd.elis-thomas@wales.gov.uk

Catherine Jones: Yes, I have tried; however it is hard to pin anyone down on specifics LOL. I am going to apply for secondary science PGCE anyway. I am interested in making children engage with science, and making sure all children have the same chances to do their best in school. My parents foster children and I have seen too well how vital it is to make children realise that university is for everyone, and not just for what they see as geeks or rich people.

Ryan Myles-Roberts: For me to do maths specifically, it was my A-level maths teachers. They made the subject fun and appealing and I was just completely sold on the idea. My decision making process was 'I want to go to uni, what do I enjoy?' So I did.

Chris Lorch: I think one of the main things in our school which put people off STEM subjects was the lack of opportunity in local areas. Most students on my course including myself, know that if we want to acquire a job in the space industry it will likely mean leaving wales and moving abroad.

The Enterprise and Business Committee: Chris, have you considered looking into opportunities at GE Aviation in Nantgarw? Cardiff University has a research team that builds space telescopes. It is lovely to hear how much you love your subjects.

Chris Lorch: I had heard Cardiff and Aberystwyth have well developed space departments, however I only found that out through my own research and not through my secondary school. I am lucky enough to attend Aberystwyth University, however I find many of my friends in the university had a lot of information given to them from their secondary school during years 10 to 13.

Ryan Myles-Roberts: As regards my interest in STEM, I do not know how I was inspired; I have just always loved it ever since I started school and I have pursued it all the way through. My teachers all the way from Key Stage 1 through to the end of the sixth form helped though. Good teachers love their subject and they can inspire people.

Y Pwyllgor Menter a Busnes: Beth yw'r heriau yr ydych neu bobl eraill wedi'u goresgyn?

The Enterprise and Business Committee: What are the main obstacles that you or others have faced in pursuing your interest in the subject?

Aled Illtud: Mae'n bwnc anodd, felly mae digon o heriau yn eich wynebu chi. Bob hyn a hyn gewch chi un cwestiwn dydych chi fethu neud o gwbl, does dim ots faint o weithiau chi'n trial, mae angen safbwynt person arall mewn arbrofion neu gwestiynau ffiseg ambell waith.

Aled Illtud: It is a difficult subject so you face many challenges. Every now and again you'll get a question that you cannot answer at all, no matter how many times you try, you need another person's point of view in experiments or physics questions sometimes.

Ryan Myles-Roberts: Lack of self-confidence: a lot of people perceive STEM subjects as hard and ones where you either have 'the brain' to do it or you do not. Since starting my degree, every time I tell someone I study maths they always give me a look that's like 'Oh God, rather you than me,' and say something like 'I could never do maths'.

Catherine Jones: North Wales does not have many bioscience opportunities (unless you were interested in food tech or water companies). If I want to enrol on the NHS graduate scheme for my area, I have to go to England.

Benjamin Williams: Being given extra work on top of the engineering topics such as Welsh Baccalaureate which gives you less time to do the important topics which are relevant in engineering.

Chris Lorch: My biggest obstacle was finding work experience relating to my future career choice and further looking into jobs in the space sector in Wales; however, I found many more jobs more along the lines of my career choice existing outside the country. I agree with Ryan, there are a lot of stereotypes when studying a STEM subject, as well as students early on in their education being discouraged by these comments.

Ryan Myles-Robert: The big stereotype is that STEM subjects are perceived as boring.

The Enterprise and Business Committee: Do you feel that you are leading the way in your fields or stereotyped as 'geeky'?

Catherine Jones: Yes, young children, especially those from poorer backgrounds, assume science is not for them and is something that is boring and geeky and hard to study. They

don't seem to connect with science.

Aled Illtud: Nid wyf yn hoff o'r ffaith bod pobl yn ystyried ffiseg a mathemateg fel pynciau i fechgyn; mae hyn yn broblem fawr yn enwedig mewn perthynas â ffiseg.

Aled Illtud: I do not like the fact that people consider physics and maths to be subjects for boys; this is a big problem, especially with physics.

Ryan Myles-Roberts: I second that.

Chris Lorch: In relation to Ryan's comment on STEM subjects being boring, I feel more information should be given on where the techniques taught can be applied, and definitely as a younger student I was never confident to reveal what I wanted to do when I was older as it would result in judgement from classmates.

The Enterprise and Business Committee: Did you do any work experience before your course and were you supported in that or did you find your own way?

Benjamin Williams: Not so much in engineering and I had done work experience, but not in engineering.

Ryan Myles-Roberts: I did not do any work experience except the two weeks in year 10 and 12 but that was a waste of time for everyone involved. I had a job through years 12 and 13 in my local library but that is not related to Maths. I was not offered any support in school for finding work experience, though a friend got some paid work experience at a local engineering firm and he now studies engineering at Cardiff

Catherine Jones: I am quite proactive so I found work experience myself in my local Hospital, but it is discouraging, that if I liked what I saw in the local NHS labs, I could not train there.

The Enterprise and Business Committee: Catherine, have you approached Betsi Cadwaladr UHB about graduate schemes? Would you be happy for Lord Dafydd Elis-Thomas to discuss your issue with the chair of the local health board?

Catherine Jones: Yes please, the NHS options are limited for my area. Locally my trust covers only medical physics I think, so this limits my choices and means that if I wanted to return to Wales for post grad study, I cannot apply for the NHS scheme.

The Enterprise and Business Committee: How would you rate the careers and subject advice that you received?

Catherine Jones: I study in an English university, and they do seem to cater for English students and careers in England.

Benjamin Williams: I had good advice but discovered engineering was more exciting and seemed a better career path for me.

Chris Lorch: In secondary school, when I went to the careers adviser with specific questions I walked out with more of a goal than when I went in with. However when addressing the whole year group, I felt there was a lack of clarity in many aspects of the talk. It applied to the

average student but not specific inquires.

Aled Illtud: Ges i lawer o gymorth o'r swyddfa gyrfa yn Aber yn ddiweddar drwy'r Gymraeg, rydw i wedi cael profiad gwaith yn ysgol gyfun oherwydd hyn. Ges i brofiad gwaith fel technegydd yn orsaf radio tra roeddwn i'n ysgol - llawer o hwyl.

Aled Illtud: I had a lot of assistance from the careers office in Aber recently in Welsh, I had work experience in secondary school as a result, I had work experience as a technician in a radio station while in school - it was lots of fun.

Ryan Myles-Roberts: The careers advice I had throughout school was quite bad. It was all done through Careers Wales. Subject advice was given from individual teachers and they were great.

Aled Illtud: Yn gyffredinol mae cyngor gyrfa yn undeb Prifysgol Aberystwyth yn esbonyddol o well na'r cyngor oedd ar gael i mi efo Careers Wales yn yr ysgol.

Aled Illtud: Generally, careers advice at Aberystwyth University Students' Union is much better than the advice that I received from Careers Wales in school.

Ryan Myles-Roberts: The careers advice in Aber was how to write a CV and apply for jobs, but nothing really specific. It was in 1st year, and that's it saying that, I get a lot of good feedback about the careers office in Aber.

Chris Lorch: During chemistry classes in sixth form, we gained a lot of insight by talking to our teacher about his experiences. I had to organise my own work experience for my Welsh Baccalaureate award. The teachers were not determined enough to help me find work experience where I wanted to go. I had said about my interest in space science, but they were adamant to send me to a local oil refinery as it seemed to me as an 'easy option to get it over with' after that I organised my own work experience with lecturers at Aberystwyth.

Aled Illtud: Fel nodyn ychwanegol, mae'r cwrs Gregynnog mae Prifysgol Aber yn trefnu ar gyfer myfyrwyr Cymraeg yn feysydd mathemateg a ffiseg yn arbennig am ddatblygu eich CV!

Aled Illtud: On an additional note, the Gregynnog course that Aber university organises for Welsh students in the fields of maths and physics is excellent for developing your CV!

The Enterprise and Business Committee: Is there anything that you think schools, colleges or the Government could be doing to provide greater support? What needs to change, in your view?

Chris Lorch: In my view the biggest change should be to encourage STEM subjects from a lower year, such as year 9, 10 and 11 during their career choices. More applications for the lesson content should be taught to give clarity on its usefulness in the real world. More effort should be put into helping students who have specific goals in mind rather than giving them the 'overall average' options. By overall average, I mean that students with a specific goal, using my own experience, space science, will be offered work experience in an oil refinery rather than an observatory due to extra effort being required.

Aled Illtud: Mae angen mwy o bethau yn ysgol gynradd yn fy marn i: yr ychydig arbrofion gwyddonol oedd ar gael i mi fel

Aled Illtud: More things are needed in primary school in my opinion: the few scientific experiments that were available to

plentyn oedd rhai o fy hoff atgofion o ysgol gynradd. Hefyd, rwy'n meddwl bod angen, fel wedodd rhywun yn gynharach, dangos ochr ymarferol pynciau STEM i bobl ysgol gyfun.

me as a child were among my most fond memories of primary school. I also think that there is a need, as somebody said earlier, to show the practical side of STEM subjects for secondary school pupils.

Ryan Myles-Roberts: They need to inspire children and young people into STEM through an innovative, practical and thought provoking curriculum starting as soon as, or even before, they get to school. Continue to move away from the 100% textbook idea and take it into the realms of practical things. The best thing for me was doing physics and chemistry safely. Teachers who have come just out of their PGCE are great but they cannot understand fully what it is like to apply these things.

Benjamin Williams: Schools could do with teachers having more experiences in actual fields such as in industry etc. which would give children a bit more knowledge of the fields they want to go into.

Aled Illtud: I second that! Brilliant point.

Catherine Jones: Yes, I agree.

Aled Illtud: Perhaps even get guest speakers every now and then to inspire pupils.

Ryan Myles-Roberts: Guest speakers are great: all the way from primary through to degree level.

Chris Lorch: I agree with Aled and Ryan: guest speakers from STEM subjects would definitely encourage students and help rid schools of stereotyping STEM subjects as boring and geeky.

Benjamin Williams: Yes, I agree with Ryan: it is a good idea for this chat.

The Enterprise and Business Committee: Did any of you have any guest speakers?

Ryan Myles-Roberts: Not that I can remember.

Benjamin Williams: Yes, but only from the forces with engineering experiences which is good but you want to see some other parts of the industry.

Catherine Jones: Yes, but I think having teachers who are inspiring and passionate about their subject area and who, most of all, really care for their students and their futures is most important. Children need to hear very early on, that what they are able to do is only limited academically and limited by gender, social status or money.

Aled Illtud: Yn yr ysgol gyfun, cawsom ni lawer o siaradwyr gwadd ar gyfer y chweched dosbarth, mae'r system yma dal i fynd fel. Mae hyn ar y cyfan er mwyn ticio bocsys y Fagloriaeth Gymraeg, ond dwi'n cofio ambell sgwrs gyda gwyddonwyr a

Aled Illtud: In secondary school, we had many guest speakers for the sixth form and that system is still in place. This is mainly to tick boxes for the Welsh Baccalaureate but I remember some conversations with scientists and colleges as a result which was helpful in

cholegau o'r herwydd, nath rhoi lot o gymorth i mi wrth ystyried ffiseg fel pwnc prifysgol.

considering physics as a university subject.

Chris Lorch: We had a day where some people from QinetiQ gave a talk, which I feel did help students.

Y Pwyllgor Menter a Busnes: A oes unrhyw beth yr hoffech ei ychwanegu cyn inni orffen?

The Enterprise and Business Committee: Would you like to add anything further before we conclude?

Ryan Myles-Roberts: Thank you for the opportunity to take part.

Y Pwyllgor Menter a Busnes: Diolch ichi am roi o'ch hamser a hoffem eich dymuno'n dda at y dyfodol.

The Enterprise and Business Committee: Thank you for your time and we wish you well for the future.

Chris Lorch: Thank you for this opportunity; I hope it helps.

Aled Illtud: Diolch am y cyfle yma. A diolch i Celyn am roi lan efo fy Nghymraeg i!

Aled Illtud: Thank you for this opportunity. And thank you to Celyn for putting up with my Welsh!

Y Pwyllgor Menter a Busnes: Byddwn yn siŵr o'ch diweddarau ar yr ymchwiliad wrth iddo ddatblygu. Mae'r gwe-sgwrs ar ben. Diolch yn fawr iawn i chi i gyd.

The Enterprise and Business Committee: We'll be sure to keep you all updated on the inquiry as it progresses. The webchat is now over. Thank you very much to you all.

**Y Pwyllgor Menter a Busnes
The Enterprise and Business Committee
[Trawsgrifiad o we-sgwrs]
[Transcript of web-chat]**

**Dydd Iau, 30 Ebrill 2014
Thursday, 30 April 2014**

**Aelodau'r pwyllgor yn bresennol
Committee members in attendance**

Rhun ap Iorwerth	Plaid Cymru The Party of Wales
Keith Davies	Llafur Labour
Julie James	Llafur Labour
Joyce Watson	Llafur Labour

**Ymchwiliad Dilynol i Sgiliau Gwyddoniaeth, Technoleg, Peirianeg a
Mathemateg (STEM)
Follow-up Inquiry into Science, Technology, Engineering and Mathematics
(STEM) Skills**

**Trawsgrifiad o We-sgwrs gyda Myfyrwyr Sefydliadau Addysg Uwch a Phellach
a Phrentisiaid Benywaidd
Transcript of Web-chat with Further and Higher Education Institution Female
Students and Apprentices**

Y Pwyllgor Menter a Busnes: Bore da, bawb. Mae'r gwe-sgwrs ar fin dechrau.

The Enterprise and Business Committee: Good morning, everyone. The web-chat is due to begin.

A gawsoch eich annog i astudio pynciau STEM gan fodolau rôl ac a oeddent yn fenywod neu'n ddyinion?

Were you encouraged to study STEM subjects by role models and were they men or women?

Jenna Keenan: I was encouraged by my parents.

Elen Everett: As was I.

Anna Christian: I was encouraged by parents and school.

Zoe Morgan: Personally, I was always encouraged to study a STEM subject but so were other members of my school, both male and female. I do not think there was any more encouragement given by my school to girls than boys. My mum always told me to do what made me happy and was delighted when that was medicine.

Rebecca Hanley: I was encouraged by my parents as well and also my GCSE teachers

persuaded me that I should take it onto A-level, mainly because they thought I was good at it. I would not say there was any particular emphasis on male/female though.

Anna Christian: My school encouraged males and females to study STEM subjects; I enjoyed science and studied biology, chemistry and physics for A-level. I was one of two females in my physics class the rest were all males. My biology and chemistry classes were more equally split between males and females.

Elen Everett: I would agree that we were encouraged to do what we liked and what we were good at at school, regardless of gender.

Jenna Keenan: My school left everyone to decide for themselves what they wanted to do and only suggested science if you showed a particular flair for it.

Robyn Moloney: It was only after I had done my GCSEs that I decided to go into engineering and study a course.

The Enterprise and Business Committee: Were either of your parents involved in STEM subjects?

Jenna Keenan: Neither of my parents were involved in STEM subjects

Zoe Morgan: Neither of my parents are involved in STEM subjects: my mum is a social worker and my dad works in IT.

Robyn Moloney: Neither of my parents were. I was encouraged by them to take a STEM subject.

Rebecca Hanley: My dad did a maths degree and my mum did psychology, if that counts.

Elen Everett: No, neither of mine were involved in STEM subjects, although they were farmers so I suppose it could be considered to be a STEM vocation.

Anna Christian: My parents both worked for the health service; however, they always encouraged me to do whatever I wanted.

Jenna Keenan: My father is a plumber and my mum a glass and china specialist so could not be further from STEM.

The Enterprise and Business Committee: Were some of you put off by the fact that you could have been part of a small minority of girls in the classroom?

Rebecca Hanley: Not really. I was always told to do what made me happy and what I was good at so it never bothered me. In fact, my further maths class had slightly more girls than boys.

Robyn Moloney: I am the only female in a class full of guys on my engineering course and yes on my first day it was very scary walking in but it made me prove myself even more.

Jenna Keenan: Not at all. In my school, biology, chemistry and maths were heavily dominated by the females.

The Enterprise and Business Committee: Jenna - what about physics?

Jenna Keenan: Barely any girls studied physics.

The Enterprise and Business Committee: Jenna - why do you think that was the case?

Jenna Keenan: Most of us just found it really boring and the sciences for most were used as filler subjects because we had to choose four subjects.

The Enterprise and Business Committee: Jenna, do you mean that girls found physics boring or that the boys did too?

Jenna Keenan: Most people in my school that studied science and maths were also doing history and English and went to university to study those instead of maths and science. Lots of us found it boring but it seemed more interesting to the boys because they were more interested in the engineering careers than the girls.

The Enterprise and Business Committee: Jenna, why do you think that girls would not be interested in engineering careers?

Jenna Keenan: I, for one, had no idea what engineering entailed. We often had people coming to the school to talk about teaching as a career or the armed forces but were never told about the possibilities of engineering. Stereotypically engineering is associated with being a male career so I think it is just lack of awareness that makes females less likely to do it.

Robyn Moloney: I agree with that.

Anna Christian: I agree with Jenna: I really enjoyed physics; however, I was never encouraged to go down the engineering route.

The Enterprise and Business Committee: Do you think other girls were put off by being part of a small minority of girls in the classroom?

Zoe Morgan: I was quite lucky with my A-level subjects that the balance of males and females in my biology and chemistry classes were equal. However, I do not think I would have been put off by there being more boys. They were subjects I enjoyed and my teachers gave support to all the pupils.

Elen Everett: No, I would not be put off if I was in a minority. I do not know of anyone who openly chose their subjects based on this either.

Anna Christian: Being in a physics class that was very much male dominated was a little scary to start off with as the boys were very competitive; however, it did not become a negative issue for me personally.

Robyn Moloney: But being the only female in the class it has its advantages and you have more opportunities given to you.

Robyn Moloney: In my secondary school you were only encouraged if you were an A grade student they did not really have the effort or time to encourage if you're not good at those types of subjects.

The Enterprise and Business Committee: Robyn, were you aware that you would be the only female in the class? Would you be happy to continue to be the only female for the rest of your career?

Robyn Moloney: I was very aware that it is a male environment but it is the kind of thing you have to jump into, you either push yourself or give up. And I would be very happy to continue my career being the only female.

Anna Christian: I did not know that I would be one of two girls in the class; however, I do not think it would have made any difference to my choice of studying physics. When I had to re-sit my final year, I was the only female and there were only about seven of us in the class that year.

The Enterprise and Business Committee: Robyn, do you think it would put other girls off?

Robyn Moloney: It possibly could, yes, but you have to be able to think like a guy. It is very different and you have to be able to take the jokes and get on with it.

The Enterprise and Business Committee: Robyn - what do you mean by 'jokes'?

Robyn Moloney: Like the taking the mick out of me for being too short and the kind of behaviour guys have with each other.

The Enterprise and Business Committee: Do you think that girls should be more actively encouraged to pursue STEM careers?

Zoe Morgan: I think that girls should always be encouraged to study STEM subjects if they have ability but also the guys too. I have seen a very different picture for engineering today but for medicine, 52% of my year group at Cardiff are actually female.

Jenna Keenan: Definitely, if the talent is there and it is something they feel would be interesting.

Rebecca Hanley: Yes, definitely.

Jenna Keenan: There is so much variety in the STEM careers that is not communicated by schools.

Elen Everett: I think that applies to both men and women though, if they need to improve communication it should be applied equally to both genders.

Y Pwyllgor Menter a Busnes: Pwy ddylai fod yn gyfrifol am wneud y gwaith annog? Ai ysgolion, prifysgolion neu cholegau?

The Enterprise and Business Committee: Who should be doing that encouraging? Should it be schools, universities or colleges?

Jenna Keenan: I think both should encourage but schools are more important

Rebecca Hanley: All three, hopefully. We were just told that STEM subjects were pretty much either medicine or finance. I was never really told what other careers maths or physics could bring.

Zoe Morgan: I think it has got to start early—the earlier the better before young girls have

had a chance of believing that a career is only for boys.

Anna Christian: I think it should start in school; university is a bit late in my opinion.

Jenna Keenan: I agree with Zoe: the earlier the better. Even in primary and junior school doing interactive science exercises would help to get that interest started.

Anna Christian: The earlier the better—before GCSE and certainly before choosing A-level subjects.

Robyn Moloney: I agree it would help the earlier the better.

The Enterprise and Business Committee: Should it be the job of careers advisers or the subject teachers to promote STEM careers?

Jenna Keenan: Schools need to raise awareness before choosing GCSE subjects so that if a pupil wants to study a STEM subject they will have the right qualifications.

Zoe Morgan: All of them. I saw a careers adviser once when I was in year 9 and then never again. I know in other schools it is run differently but you have much more day to day contact with teachers and they play a vital role in educating girls about STEM subjects.

Jenna Keenan: My careers adviser was less than useless. I indicated that I wanted to do a STEM subject and he gave me no relevant information and instead tried to persuade me to pursue German.

Anna Christian: My careers advice was not great to be honest; I basically had to tell them what I wanted to do and they did not give me many ideas. I wanted to study medicine, but they never helped me think of what else I could study in university if I was unsuccessful.

Elen Everett: I agree—I did not have great careers advice; I have had more advice during my Masters year than at any other time during school or university.

The Enterprise and Business Committee: Do any of you know any female engineers or physicists?

Elen Everett: Yes, I have a friend who is a chemical engineer.

Rebecca Hanley: I do not know any female engineers or physicists.

Jenna Keenan: Yes, I have a female friend who is a civil engineer.

Zoe Morgan: I personally do not know any female engineers but I know a female physicist.

Robyn Moloney: I know a few.

Y Pwyllgor Menter a Busnes: A wnaeth pob un ohonoch astudio cemeg, bywydeg a ffiseg i'ch TGAU? **The Enterprise and Business Committee:** Did all of you study chemistry, biology and physics for GCSE?

Elen Everett: Yes, I did.

Rebecca Hanley: Yes.

Jenna Keenan: It was compulsory in my school to study all of them.

Anna Christian: Yes I did science double award for GCSE.

Zoe Morgan: Yes—it was compulsory to study core science: biology, chemistry and physics.

Robyn Moloney: I studied all.

Zoe Morgan: The top three sets then had to do compulsory additional science, the lower sets got to choose whether to continue studying the three.

The Enterprise and Business Committee: Do you think that more female role models would encourage more women to pursue STEM careers?

Robyn Moloney: Yes, it would. I find that when I help out with college talks to primary schools I get questioned loads.

Anna Christian: Yes, I think it would be useful to have more speakers representing STEM subjects come to school and talk about the different career opportunities.

Rebecca Hanley: Yes, definitely.

Jenna Keenan: I do not necessarily think girls need more female role models, just more information about the career possibilities.

Robyn Moloney: It is because it is strange seeing a female talking about it.

Zoe Morgan: I think so—I had a talk from a very confident and intelligent female doctor who helped me see that being a doctor was a very viable carer for women.

Elen Everett: I think there just needs to be more information about STEM careers in general.

<p>Y Pwyllgor Menter a Busnes: A oeddech erioed mewn cysylltiad a diwydiant yn eich ardal chi? A wnaeth cwmni neu diwydiant ddylanwadu arnoch chi?</p>	<p>The Enterprise and Business Committee: Were you ever in contact with industry in your area? Did any company or industry influence you?</p>
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Anna Christian: I found that when looking for work experience placements, there were not many options for placements in STEM related workplaces.

Jenna Keenan: It was extremely difficult to get work experience for dentistry.

Robyn Moloney: I went to an open evening in Pembroke Dock in my own time when I was in school and listened to what companies were around and get the basic information.

Elen Everett: I agree with Anna, it was difficult to get STEM-related placements.

Zoe Morgan: Our school had a few guest speakers from different engineering companies and big businesses but they were never female, always male.

Rebecca Hanley: I found very few STEM work experience placements for maths that wasn't a bank.

Robyn Moloney: I also had a chat in school from QuentiQ.

Robyn Moloney: And on my course we had to do a few weeks of work experience in engineering companies.

Rebecca Hanley: Our school had no guest speakers for STEM at all.

Elen Everett: The closest I got was working in an accountant's office but even then it was just administration tasks.

Jenna Keenan: It was really easy to get placements for teaching or shop assistants but not for medicine and dentistry.

Zoe Morgan: I was lucky to manage to get a work experience placement at a local hospital too but that was not organised by my school, I had to organise it.

Anna Christian: I was lucky enough to get quite a lot of work experience for medicine, although I had to organise it myself too.

Jenna Keenan: I met the dean of my dental school by chance in the post office on GCSE results day and that is how I got work experience. Every practice I approached was not interested.

Robyn Moloney: I had more of an eye opener as to what actually goes on and learnt a whole lot more.

Anna Christian: There was a good placement however in my local hospital that was set up for sixth form students, and you had to go through an interview process.

Robyn Moloney: I also did veterinary work experience in school.

Jenna Keenan: I think it just needs to be highlighted as an option earlier in school and explore the different possibilities by getting speakers into schools.

Jenna Keenan: Every piece of relevant work experience I managed to get was organised by me and done in my own time. I found that if someone knew a dentist it was much easier to get experience.

Anna Christian: I was unsuccessful in getting a place to study medicine straight from school and ended up doing biochemistry in Liverpool, There were not many work experience opportunities in research labs available.

The Enterprise and Business Committee: Did the boys have better work experience placements in your view?

Robyn Moloney: No.

Jenna Keenan: It was just as difficult for boys as it was for girls.

Rebecca Hanley: Not really.

Robyn Moloney: They knew more about the companies they went to as some of their family or friends work there.

Elen Everett: I agree it was the same for boys.

The Enterprise and Business Committee: How do you think that we could get more girls to

study STEM subjects?

Robyn Moloney: By asking female speakers in, by sending them on an experience day to colleges to work with the machines etc. to give them as much information when in school.

The Enterprise and Business Committee: Robyn, sorry if you have already said, but what do your parents do?

Robyn Moloney: My dad is a builder and my mum is a care worker in the community.

The Enterprise and Business Committee: Thanks, Robyn.

Rebecca Hanley: I think more people need to be told the wide range of careers a degree in STEM can bring you. Maybe they will find something that they are enthusiastic about.

Zoe Morgan: For myself, I was worried that I would not be able to have a family but I have met so many doctors who manage to juggle a family. I think to really get more girls involved in STEM subjects they have to be asked why they are reluctant to go into the field and address those concerns.

Jenna Keenan: I did not think at all about not being able to have a family because it is all about time management.

Elen Everett: I think biological sciences are already popular with women. I have never been in a male dominated environment since university and all my course mates are women for my Masters course.

Anna Christian: Speakers into school and more information for students who study science in school about different STEM career options. I personally feel that if you are good at science schools try to encourage you to do medicine or dentistry rather than giving you information about other science based careers.

Elen Everett: I agree with Anna, I want a research career but I did not really know this existed until late on at university.

Jenna Keenan: Yes, my school told me that because I did not get into dentistry first time I should give up hope but I did a biomedical science degree and am now doing dentistry.

Jenna Keenan: I think all males and females should also be made aware that if they do not get the grades for the course their heart is set upon, there are other routes into them.

Elen Everett: I think there are more males but we have women in quite high-up positions, a couple of whom have given talks about careers in my field.

Robyn Moloney: I think the students need to follow their hearts and dreams as mine were crushed in secondary school and did this course to prove them wrong and myself.

The Enterprise and Business Committee: Robyn, how many girls would you say were discouraged from pursuing a STEM career?

Robyn Moloney: I have no idea I would say a good few. I was always good at the creative subjects drama music dance that kind of thing. I got told by a teacher in school that I will never have a scientific or maths career and to just stick to what I'm good at which was crushing as I set my heart on being a vet.

The Enterprise and Business Committee: Anna, would you have done research work in a lab if you could or did you always want to be a doctor?

Anna Christian: I did want to be a doctor; however after being unsuccessful twice I would have liked to have been able to have work experience in a research lab. I think it would also have given me a better understanding of what doing a biochemistry degree could potentially lead to.

Anna Christian: I was lucky after doing my biochemistry degree that I got a place on the GEM course in Swansea to study medicine.

Jenna Keenan: I think people could do with more information about what a particular STEM career could lead to as well. I have four friends that study science in university and are now either teaching support or working in shops.

The Enterprise and Business Committee: What is the ratio of female/male lecturers on your course, would you say?

Jenna Keenan: Mine is about 60:40 in favour of males.

Zoe Morgan: I would say about twice as many male lecturers to female.

Rebecca Hanley: One female out of nine for my course. Although we do not see much of the lecturers for higher years, so I do not really know for sure.

Robyn Moloney: We have three female lecturers: the rest are all male.

Anna Christian: I would say in Swansea there are a fairly equal number of male and female tutors. Our Dean of Medicine is female.

Y Pwyllgor Menter a Busnes: A ydych chi wedi gwneud unrhyw beth i annog menywod i wneud pynciau neu yrfa ym maes STEM?
The Enterprise and Business Committee: Have you done anything to encourage women to do STEM subjects or pursue STEM careers?

Jenna Keenan: I take part in open days at Cardiff University both in the dissection lab and talking to prospective students with their parents about what my degree course entails and what I did on my previous degree.

Zoe Morgan: I have gone back to my school and spoken to GCSE and AS-level students about medicine and answered lots of questions that people have. I did not actively encourage just the girls but I did give them the statistics about the number of women studying medicine.

Elen Everett: Only on a personal level.

Robyn Moloney: I have just competed in an engineering competition and had loads of young girls and young woman of different ages asking me questions I allowed them to use the modified machine themselves. I have also done talks in primary schools and would love to go back to my old school and talk to the pupils there.

Rebecca Hanley: Not really. Nothing has ever really been available to try and persuade more women to do STEM.

The Enterprise and Business Committee: Rebecca, what do you think should be available?

Rebecca Hanley: I would love the opportunity to go into local schools or sixth forms to try and talk to younger students about pursuing a future in STEM.

Jenna Keenan: At Cardiff University they run days where school kids can come in and have a go at some things in the labs to try and get them interested in science.

Anna Christian: I think it is great for school children to be able to visit universities and to be encouraged from a young age.

The Enterprise and Business Committee: Do you all think that you'll be doing a STEM job in 5 years' time?

Elen Everett: I would like to think so.

Jenna Keenan: If dentistry counts then yes.

Robyn Moloney: I hope so.

Zoe Morgan: I hope so.

Rebecca Hanley: I will either be doing a STEM job or a higher degree.

Anna Christian: I will hopefully be a doctor by then and would love to one day be able to also teach in the university as well.

Y Pwyllgor Menter a Busnes: A gawsoch unrhyw wybodaeth am beirianeg fel pwnc TGAU yn ysgol?

The Enterprise and Business Committee: Did you receive any information about engineering as a GCSE in school?

Robyn Moloney: No.

Jenna Keenan: It was not a subject that was available in my school.

Rebecca Hanley: No.

Elen Everett: I do not think it was an option for us.

Anna Christian: We did not have engineering as an option for GCSE in our school.

Zoe Morgan: We had talks from all subjects but I do not specifically remember the engineering talk.

The Enterprise and Business Committee: Would any of you consider teaching a STEM subject?

Elen Everett: No.

Jenna Keenan: I would only want to do teaching at a university level.

Robyn Moloney: I would if I had the qualifications.

Rebecca Hanley: Maybe. I would only teach at A-level.

Elen Everett: I worked in a school as a technician and was pushed quite hard to become a teacher rather than pursue research.

Zoe Morgan: I always said if I did not get in to medicine I would like to become a biology teacher so maybe later in life I could do some lecturing in medicine.

Anna Christian: I may do some A-level tuition for chemistry and biology; however, in the future I would like to lecture in the medical school.

Y Pwyllgor Menter a Busnes: A oes unrhyw beth yr hoffech ei ychwanegu cyn inni orffen? **The Enterprise and Business Committee:** Is there anything that you would like to add before we conclude?

Jenna Keenan: Start awareness early; teachers are best placed to encourage STEM careers and encourage visits to university open days and visiting forums that have students on them. There are people from Cardiff University who are paid to write blogs about what doing a STEM subject is like so students could read those.

Elen Everett: I just think more information should be available at a younger age about STEM careers for both genders.

Zoe Morgan: STEM subjects need to be more openly discussed earlier on. STEM subjects shouldn't be so scary for women. I think we need more women talking about their careers in STEM subjects and get more open discussion in schools between boys and girls about STEM subjects.

Jenna Kennan: Interactive programmes are one of the best ways to get interest from school students and just try to develop their understanding of what is available to study and where it can lead once their study finishes.

Rebecca Hanley: More information is good. I only found about a possible career at university and now it's something I really want to do later on in life.

Elen Everett: I also think the gender inequality in STEM is much wider than just an education issue, we are bombarded with gender inequality in the media and socially.

Anna Christian: More information from a younger age, especially during GCSE and A-level, more work experience opportunities in STEM areas for pupils to get a realistic expectation of STEM careers.

Robyn Moloney: I agree with that.

Jenna Keenan: Also more support from schools if you do not get into medicine or dentistry first time—to see that there is hope you do it via another route.

The Enterprise and Business Committee: Thank you very much and if you would like to add anything else to the inquiry, please get in touch with Celyn. Diolch yn fawr i chi i gyd.

Anna Christian: Thank you very much. Diolch yn fawr iawn.

Elen Everett: Diolch.

Robyn Moloney: Ok no problem; thank you for this opportunity.

Zoe Morgan: Thank you for the opportunity to discuss these issues. Thanks everyone.

Rebecca Hanley: Thank you.

Jenna Keenan: I hope this helps.