OFFICIAL REPORT
AITHISG OIFIGEIL

Education and Skills Committee

Wednesday 2 October 2019

Session 5

The Scottish Parliament
Pàrlamaid na h-Alba

Wednesday 2 October 2019

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EDUCATION AND SKILLS COMMITTEE
26th Meeting 2019, Session 5

CONVENER

*Clare Adamson (Motherwell and Wishaw) (SNP)

DEPUTY CONVENER

*Daniel Johnson (Edinburgh Southern) (Lab)

COMMITTEE MEMBERS

*Dr Alasdair Allan (Na h-Eileanan an Iar) (SNP)
*Jenny Gilruth (Mid Fife and Glenrothes) (SNP)
*Iain Gray (East Lothian) (Lab)
*Ross Greer (West Scotland) (Green)
*Alison Harris (Central Scotland) (Con)
*Rona Mackay (Strathkelvin and Bearsden) (SNP)
*Gail Ross (Caithness, Sutherland and Ross) (SNP)
*Liz Smith (Mid Scotland and Fife) (Con)
*Beatrice Wishart (Shetland Islands) (LD)

*attended

THE FOLLOWING ALSO PARTICIPATED:

Richard Lochhead (Minister for Further Education, Higher Education and Science)
Barbara Morton (Scottish Government)
Ken Muir (General Teaching Council for Scotland)
Niamh O'Connor (Scottish Government)
Stuart Robb (Scottish Government)
Charlaine Simpson (General Teaching Council for Scotland)

CLERK TO THE COMMITTEE

Roz Thomson

LOCATION

The Robert Burns Room (CR1)

Scottish Parliament

Education and Skills Committee

Wednesday 2 October 2019

[The Convener opened the meeting at 10:00]

Science, Technology, Engineering and Mathematics Inquiry

The Convener (Clare Adamson): Good morning, and welcome to the 26th meeting in 2019 of the Education and Skills Committee. I remind everyone to turn mobile phones and other devices to silent for the duration of the meeting.

Our first item of business is the final evidence session in the committee's STEM in early years education inquiry. Before we begin taking evidence, I take this opportunity to thank everyone who participated in our seminar at the Scottish learning festival and shared their valuable views and experiences on STEM in early years education. The write-up of the session is in the background papers for today's meeting.

We have two panels today. Our first panel has representatives from the General Teaching Council for Scotland. I give a warm welcome to Ken Muir, chief executive, and Charlaine Simpson, senior education officer, initial education and accreditation, with the General Teaching Council for Scotland. I ask Mr Muir to make some opening remarks.

Ken Muir (General Teaching Council for Scotland): The General Teaching Council for Scotland touches base with the STEM agenda in a number of areas. The first is our accreditation of the initial teacher education programmes that we are required to do before they go live. We have accredited a number of STEM-related programmes in recent years. We also touch on the STEM agenda through the work that we do on supporting teachers' professional learning and the requirement for teachers to have their professional learning signed off every five years by GTC Scotland.

The committee will be aware that the entry memorandum has recently been updated and revised. A lot of consideration was given to what was included in the entry memorandum. We have a statutory function of setting the standards for teachers, which is under revision at the moment—consultation started this week and will last until 20 December. Within that, we have taken the opportunity to refresh the standards to take account of various policy areas, including STEM.

We also support STEM-related activities through our engagement with STEM-related groups, such as the board for the digital strategy, and participation on the advisory group for the Scottish Schools Education Research Centre. There are a number of areas in which we touch base directly with the STEM agenda.

The Convener: Thank you. I move to questions from the committee, opening with Mr Gray.

Iain Gray (East Lothian) (Lab): I have two different questions, but they are similar. The committee has asked a number of witnesses about the possibility of raising the entry requirement relating to science subjects, particularly for those entering training for primary teaching. In a similar vein, we have asked about the possibility of more time being spent in initial teacher education on building confidence in delivering lessons to do with STEM. Quite a lot of the evidence that we have had is that there is a limit to how much can be done on either of those issues, given the time constraints and the requirement to recruit enough teachers who meet the standards. Will you say something about your thoughts on that balance? Is there any scope for raising those standards in time?

Ken Muir: We considered that issue when we were refreshing the entry memorandum for people entering the teaching profession in Scotland. There was a widespread consultation with the various stakeholders who have an interest in entry into the profession. Given that science is an important area, we gave consideration to the request that came in—interestingly, it was from the Royal Society and was not supported by other stakeholders with whom we engaged—about the possibility of introducing a requirement for science. However, as Mr Gray has pointed out, there is a tension in introducing that higher expectation for science. At a time when we are short of teachers in Scotland, we would be likely to dissuade a number of folk who do not meet the requirement from coming into the teaching profession.

Charlaine Simpson was responsible for the memorandum consultation. On the basis of the evidence that we gathered, the decision was taken to maintain the requirement for a higher in English and a national 5 in mathematics. We set only the minimum standard for entry, and it is for the universities to decide whether they want to enhance that in any way, but we included in the entry memorandum a statement that encourages a modern language, to accord with the Government's one plus two policy on languages and, potentially, a science subject as well. That is as far as we went.

Scotland's expectations are not too dissimilar to those of other teaching councils across the world. None that we have looked at specifically requires

a science although, in Queensland, in Australia, there is a requirement for people to have confidence in science—I think that that is the term—at an appropriate level for entry into primary education. Interestingly, one or two jurisdictions—most notably Ireland—have introduced a requirement for higher maths as well as a higher in English. The feeling was that our approach of requiring higher English and a national 5 in maths and recommending a science and/or a modern language is consistent with the evidence that we got through the consultation on the entry memorandum.

Iain Gray: What about the potential for more time being spent on STEM in initial teacher education to build confidence?

Ken Muir: Again, that is Charlaine Simpson's area, but you have pointed out the tension that we face. A number of representations are made to the General Teaching Council for subjects to be given priority, and strong rationales are given for that. In the past few months alone, we have had representations requesting us to introduce a higher modern language as a requirement for teacher education and, just the other day, the Royal Scottish Geographical Society made a strong case for geography to be a mandatory entry qualification, given the profile of global warming, climate change and so on. There are a lot of areas in which that rationale can be made.

The difficulty, or the tension, is about how much can be embedded within an initial teacher education programme, particularly the one-year postgraduate programme. We have had lots of representation from various parties who would like to see more within that programme. Although we talk about it being a postgraduate year, in fact it is 36 weeks, 18 of which are spent in a university and 18 of which are spent on placement. The Scottish Government is already considering the teacher education programmes and induction into the teaching profession. As you will be aware, the teacher induction scheme currently lasts for a year. Does that adequately prepare students coming in as teachers to deal with the range of requirements that are placed on them? That tension very much exists in trying to create space in an ITE programme.

Charlaine Simpson (General Teaching Council for Scotland): I concur with everything that Ken Muir said. In the memorandum consultation, we spoke to lots of stakeholders. We had a working group and we did 14 sessions with various stakeholders across Scotland. We had a full 12-week consultation period and, through it all, only the Royal Society raised the issue of science. Everybody else was content with the expectation of a qualification in science or modern languages, to ensure that we have generalists in primary education.

We have recently accredited six primary programmes, some of which have a STEM focus and some of which are generalist. I will give a couple of examples. We have reaccredited the University of Strathclyde programme, which has personalisation and choice that allows students to choose a STEM pathway among other pathways. The bachelor of arts course at the University of Stirling also has a STEM focus and students can come out with an enhanced science qualification. At the Dumfries campus of the University of Glasgow, there are pathways in environmental science and mathematics.

There are options should students choose to come out with a specialism in science. Primary teachers teach the breadth of the curriculum, so they have to have knowledge of it all, but there are specialised routes for them to choose.

Liz Smith (Mid Scotland and Fife) (Con): I have a couple of questions but, before I ask them, I seek clarification on something that you said, Mr Muir, in response to Mr Gray. You said that representation was made to you about the possibility of primary teachers being required to have higher maths, but that, after you had discussed the issue and looked at some evidence, you did not feel that that was necessary. Will you expand on what the evidence was?

Ken Muir: I will pass that on to Charlaine Simpson, who did the analysis of evidence.

Charlaine Simpson: In the consultation, we looked at the report "Making Maths Count—Transforming Scotland into a Maths Positive Nation", which talked about a requirement for level 6 mathematics. The consideration was whether having level 6 mathematics makes someone a better numeracy teacher, given that it is numeracy that we are talking about in primary education. We also had representations from other subjects, such as social subjects and expressive arts, that changing the requirement from national 5 to higher mathematics would be a real barrier for people coming into teaching.

Liz Smith: Would that be a barrier to a significant number of people, who would then not come into the profession?

Charlaine Simpson: Yes, according to the data that we gathered.

Liz Smith: The issue about STEM has flagged up issues about the balance in the curriculum. You rightly say that there are tensions. In the uptake of Scottish Qualifications Authority subjects, there are clearly issues with some aspects of STEM, there are issues about modern languages, which you have referred to, and there are issues in some

social sciences, which the geographers have been speaking to you about. Does the GTC have a responsibility to look at the balance of the three faculties—the sciences, social sciences and the arts—in advising the Government about what is required for education purposes and from a social and economic perspective?

Ken Muir: Yes, and our role in accrediting the initial teacher education programmes is paramount in that regard. In relation to early years up to the end of primary 4, through initial teacher education programmes in Scotland, we are trying to create primary teachers who can integrate the learning across a range of subject and curriculum areas. That has become more apparent as teachers in early years and early primary stages are moving towards a more active and play-based approach to learning. The way in which learning takes place for those young people is principally through good teachers making connections across the curriculum areas. I make no apology for the fact that we expect teachers in the early stages of primary to be generalists who are skilled in making the links so that children understand. Children at that age in particular, and arguably later on, do not learn in a subject context. They learn best when links are made across curriculum areas.

That is why, when we accredit programmes, particularly the primary programmes in initial teacher education, we are looking for a balance that reflects the broad general nature of education that is delivered through curriculum for excellence.

Liz Smith: That is helpful. Are you looking for young recruits into the teaching profession who have a balance across the curriculum in their qualifications from their school careers and from college and university, or do you believe that you can get the balance simply through the teacher education programme?

10:15

Ken Muir: As I said, our role is to set a minimum expectation for entry into the teaching profession, and we have done that with the revised memorandum. The universities interview the students to determine their suitability for the teaching profession. In a sense, we set broad parameters within which we expect the universities to operate. Although we have a role, the detail of what students might bring is in the hands of the university. We recognise that there are difficulties in attracting teachers into some subject areas. I imagine that the universities are mindful of that when it comes to interviewing students, some of whom might have a particular bent for science, social subjects or creative and aesthetic subjects.

Liz Smith: Are you aware of any trend—specifically, a downturn—in numbers applying to do teacher training from any specific discipline? Does that come into your thinking?

Ken Muir: The workforce planning group looks at entry into the teaching profession by allocating places to the universities through the Scottish Further and Higher Education Funding Council. Over a number of years, the STEM subjects have rarely, if ever, achieved the full complement but, equally, we do not satisfy the complement of places available for home economics or Gaelic, and sometimes English. That makes the exercise of bringing folk into the teaching profession much more difficult.

GTC Scotland has to look at new routes that do not attract teachers in the traditional sense of coming from school, going to university, doing teacher education and then going back into schools. A lot of the new routes have been designed to attract folk who perhaps wish to change their career or who are getting towards the end of their career and who might want to finish off by offering three or five years in the teaching profession. Most recently, quite a lot of our focus has been on addressing that changing model of the type of individual who wants to come into the teaching profession. Traditionally in my day and, I dare say, in Ms Smith's day, the vast majority of teachers were people who went from school to university and then went to a college of education. That is no longer the model, and we have had to adapt our programmes to take account of that.

Daniel Johnson (Edinburgh Southern) (Lab): I will ask a couple of brief supplementary questions. It strikes me that there is a distinction between what and how teachers teach. In a sense, ITE attempts to deal with both aspects. Is that a useful distinction to make when it comes to science? Are there particular considerations in how science is taught compared with how other subjects are taught that require a separate focus in ITE?

Ken Muir: Charlaine Simpson was a science teacher and has had experience of teaching in secondary and primary, so she is best placed to respond to that.

Charlaine Simpson: You are right that content, teaching and learning are not distinct—they overlap and are interdependent. When we teach science in the early years, it is more about the methodology of science. It is about developing curiosity in children through really good questioning and offering them opportunities to use their senses. It is about observation and thinking about how children see the world and how we can capture their curiosity and imagination and build that into scientific methodology. It is not about whether someone can do a science experiment and what that means; rather, it is about the love of science and conjuring up the imagery to show that

science does not solve problems but that one can ask lots and lots of questions through it.

When I was teaching, we had a cluster approach to science. We supported our primary colleagues in teaching science across the curriculum. Either the teachers either came to the high school and we did work with them or we went to the primary schools and worked with the children and the teachers. That sharing of pedagogy and learning across sectors is helpful, but teaching science is about capturing the awe and wonder of and the curiosity in children.

Daniel Johnson: That absolutely chimes with my understanding and with what Ken Muir said about there being a broad, integrated approach to teaching. If we look at the experiences and outcomes in curriculum for excellence, I am struck by the approach to science being about exploring the physical world. Given that, is the integrated approach of physical exploration, and then maybe a bit of reflective thought on that, being taken forward in ITE programmes? Are you confident that that is being carried out?

Ken Muir: The programmes that we have accredited, particularly those for early primary, are very much aligned with that inquiry-based approach to learning and teaching. As I have suggested, at that stage, children do not learn in discrete subject contexts; their learning is a combination of the coverage of different contexts, driven by skilled teachers who are able to integrate that type of learning.

On your question about what is taught, it is not about teaching science specifically but about a wider connected learning. The principle of covering science at that stage is, as Charlaine Simpson said, very much about trying to develop a love of learning and an inquiry-based approach to learning.

On the programmes that we have accredited, we are quite confident that universities, through the accreditation panel activities that we engage them in, are trying to develop that approach in the ITE programmes.

Rona Mackay (Strathkelvin and Bearsden) (SNP): I will follow up on the subject of integrated learning. Last week, some committee members attended the Scottish learning festival. We discovered that a lot of the problems stem from teachers—usually primary teachers—not having confidence in teaching a subject. A lecturer—I think that she is from the University of Strathclyde—said that she is very keen to reach out and form an association, so that that could help out and collaborate with other teachers. Would you support that?

Ken Muir: Absolutely. As I said in my introductory statement, one of the roles of the General Teaching Council is to support the professional learning of teachers. Teachers are required to have their professional learning signed off by GTC Scotland every five years. We expect them to log their professional learning and the learning that has the greatest impact either on them or on their students.

It is not just science that some teachers lack confidence in. That is the case in other subjects, such as modern languages. As Charlaine Simpson has suggested, one approach that many primary schools take is to bring in someone from secondary with expertise in those areas, to support primary teachers. We know from past experience of the one-plus-two languages model that teachers in primary who develop a skill in a curriculum area or, indeed, a subject area become very valuable assets. What does that mean for promotion? When they build expertise, they can move on to another school because of that expertise.

When GTC Scotland is accrediting the initial teacher education programmes, we are trying to make sure that all teachers have generalist expertise, albeit in some cases relatively small-scale expertise. Through professional learning, we are encouraging the award of professional recognition to teachers who engage in meaningful inquiry and research into their own subject area or particular area of interest. In the past few years, we have accredited and given professional recognition to 159 primary teachers in STEM alone. We are trying to encourage, promote and incentivise professional learning not just in the STEM subjects, but across the board. That encourages primary teachers to gain expertise. That practice can be supported; they can support other teachers in their school, too.

Rona Mackay: Do further education establishments have a role in that?

Ken Muir: One of the areas that we explored some time ago was the programmes that the Open University made available free on its website for primary teachers who wanted to gain expertise in a particular curriculum area. I think that it is more down to headteachers in primary schools to ensure that there is an adequate coverage of expertise and to encourage teachers, as part of their professional learning, to engage and be more focused in some areas, so that the school can benefit from having expertise across the board. In some areas where there is still a lack of confidence—an example of that is the sciences—there are other routes from which to access the expertise. Charlaine Simpson is a good example of that.

Jenny Gilruth (Mid Fife and Glenrothes) (SNP): I return to Iain Gray's line of questioning about subject specialisms. Ken Muir spoke about

the requirement for those entering teaching training to have national 5 maths and higher English, which has always been the case, and you alluded to modern languages in that regard. Will you remind me what you said about the GTC's approach?

Ken Muir: We encourage the universities to consider modern languages and sciences as part of the entry requirements, but that is not something that we specify.

Jenny Gilruth: I am a former modern studies teacher, so you will know where my professional interest lies. I think that Education Scotland published its impact report in 2012, when Ken Muir and I worked there. You will remember that that report said that 20 per cent of secondary schools in Scotland did not deliver modern studies. It also highlighted the lack of confidence in primary teachers to deliver that part of CFE in the broad general education in social studies at primary level. Rona Mackay alluded to that when she mentioned last week's Scottish learning festival. Have you had any representations from the Modern Studies Association about how that could be delivered in primary education?

Ken Muir: I know that the Modern Studies Association, the Scottish Association of Teachers of History and the Scottish Association of Geography Teachers have all been working with primary schools in order to provide resources and support in their particular curriculum areas.

Primary teachers sometimes find it quite difficult to deal with modern studies and politics, which can be quite sensitive subjects. Where do you draw the line with your own political allegiances and bias coming into what you deliver? I think that that is a good example of what I suggested earlier in the context of science. As you are well aware, not all schools have modern studies—there are historical reasons for that—but from my experience as a former education adviser in Jenny Gilruth's local authority, I very often found that, where any concern has been expressed in delivering some of the Es and Os that are more modern studies and politically related, the primary schools will not be slow in accessing expertise from the secondary schools.

As I have said, there are lots of potential claims for priority in the curriculum, and folk can make as good a case for modern studies being a mandatory subject as they can for science. As a former geographer, I would go along with the Royal Scottish Geographical Society's expectations that everybody undertakes geography. [*Laughter*.] We are finding—this was my experience as a former inspector, too—that primary schools that are lacking expertise more generally are quick to seek support, either through professional organisations such as the Modern Studies Association or the Scottish Association of Geography Teachers, or through access to a learning community, which is much more the norm, with secondary schools working with a cluster of primary schools and sharing resources.

Potentially, the creation of the regional improvement collaboratives answers some of that. Young though the RICs may be, I am certainly aware of a greater willingness to use the resources that are available in a wider collaboration to benefit the teachers and, ultimately, the children in primary schools.

Jenny Gilruth: I think that Charlaine Simpson alluded to there being accredited programmes for science. Are there any programmes on political literacy, for example, for primary teachers, or on modern studies more generally?

Charlaine Simpson: It just so happens that the programmes that I highlighted have STEM roots, but we look to have a balance across the curriculum, so we are always looking for opportunities for humanities study as well as science study.

We need lots of primary teachers who are differently skilled or specialised in areas to support each other, so we look for that. There are no programmes specifically for social sciences. Some target STEM, but that is because of the funding. However, we absolutely look for a broad range of skills across all curriculum areas through ITE accreditation.

10:30

Jenny Gilruth: I want to move on to the professional update process, which Ken Muir spoke about at the start of the session. That process came in in 2014. The idea is that teachers have to get their continuing professional development signed off by the GTCS every five years. How is that quality assured by the GTCS every five years?

Ken Muir: Before we undertook the professional update process five years ago, we validated all the professional review and development schemes that local authorities had. In fairness, they were of mixed quality. We tried to set a minimum standard through that validation, and authorities have responded to that. In order to keep up that approach and give a degree of quality assurance, we are about to embark on a programme of reaccreditation of those professional review and development schemes.

As a starter before the professional update process came in, we did a widespread validation exercise across all the local authorities and all the organisations that had registrants in them. In the independent sector, for example, we validated the

individual private school's professional review and development programmes, or the Scottish Council of Independent Schools developed a single approach that covered most of them. Our approach has been to ensure that there is a minimum threshold of expectation on the quality of the PRD schemes.

How the schemes are implemented is, of course, another matter. Every year since we introduced the requirement for professional updates to be signed off—usually somewhere between 12,000 and 15,000 teachers a year have their professional learning signed off through the professional update process—we have done an evaluation of their impact. We recently published a four-year report, and we are working on the fifth year, which is the last year of the first full round. By the end of the last academic session, all teachers in Scotland will have had their professional updates signed off by the GTCS.

There is a heartening thing from that. A question that we ask in the analysis is about the extent to which the teacher's professional learning and professional update have had a direct impact on them as a teacher, their colleagues, the school and the students. I am talking about a random sample; teachers volunteer to respond to that question. We get a response rate of around 10 per cent from the 12,000 to 15,000 teachers; we do not coerce folk into responding. That is quite a positive response rate, given that answering the question is entirely voluntary. I have certainly been very heartened, and I know that the GTCS council has been very heartened, by the fact that the respondents have either agreed strongly or agreed with the statement that the teacher's professional learning and professional update have had a direct impact on them, their students, the school and their colleagues. The figures are well over 80 per cent. In the case of individual teachers and students, the figure has been over 95 per cent.

That gives a fairly clear indication of two things: that teachers are taking their professional learning seriously and that that professional learning is having a discernible impact out there on the system.

Jenny Gilruth: On the practicalities of what happens, it is up to the individual principal teacher or faculty head in a secondary school, for example, to sit down with a member of staff and go through their PRD, and your organisation comes in every five years. What do you do? Do you look at and check what has been done? What do you look for as evidence?

Ken Muir: We do not have the resources for that. In effect, our system piggybacks on the local authorities' and organisations' professional review and development schemes. It would be for a principal teacher, for example, to sign off the professional learning of a teacher as a member of their department. As a leader of learning, a faculty head, principal teacher, depute head or head would have the expectation that they would sign off the professional learning or ensure that the professional learning that was taking place was meaningful to the teaching context. We simply accept that the sign-off that has been done by the reviewer of the teacher is good and acceptable.

Our quality assurance of that is done through our analysis of the annual report and what we gather from respondents to that and through the validation of the professional review and development schemes. We are about to engage in a second round of that after five years to ensure that the local authorities and others who are responsible for professional review and development are keeping the standard up in respect of the expectation that we all have of professional learning.

Alison Harris (Central Scotland) (Con): I know about interdisciplinary learning. In the committee in June, I asked a panel about science, technology, engineering, arts and mathematics—STEAM—and whether the arts should be included in STEM. The panel consisted of a mixture of practitioners and academics, and I found their responses quite positive. Have you done any research into the merits of including the arts more formally with STEM learning?

Charlaine Simpson: No, we have not. Obviously, STEAM has been around for as long as STEM, and different people think that the arts should or should not be included with STEM. That could be argued either way. Obviously, there are lots of connections between the arts and the sciences, so people absolutely have a point, but we have not done any research on that to this date.

Alison Harris: Will you perhaps look at that in the future?

Ken Muir: Yes. We are always open to such suggestions. That opens up the possibility—this is not to denigrate the arts in any way whatsoever—of a much longer acronym that includes all the curriculum areas in Scottish education. We had representations from arts-based bodies at the time of the inquiry into the entry memorandum that made very strong cases for including the arts—particularly drama—within the mandatory requirements for teachers coming into primary education. We are working very closely with instrumental music instructors, who have made a very strong case for music being part of the curriculum and therefore those who are coming into the teaching profession having expertise to be able to respond to that. We are certainly open to that, and we are quite happy to take that issue forward through our education committee.

Dr Alasdair Allan (Na h-Eileanan an Iar) (SNP): I was interested in hearing about career-long professional learning and your views about how that is developing, specifically with regard to STEM around the country and the GTCS's role in trying to evaluate that. Do you think that CLPL in STEM is improving around the country? I appreciate that you are not inspectors in that respect and I know that you have mentioned voluntary surveys that you have done, but will you say a little more about how that might be measured?

Ken Muir: The way in which we have tried to frame the professional standards in Scotland is unique. The standards for registration set a benchmark for teacher and student competence. Following on from that, the standard for career-long professional learning and the standards for leadership and management are designed to provide teachers with opportunities to use them as a toolkit with which to plan their professional learning. It is interesting that, in the feedback that we received from our analysis of the four years of professional learning, the highest proportion of teachers responded to having used the standard for career-long professional learning to inform where they might take their career and where they might take their professional learning.

We do not record the areas in which teachers undertake their professional learning—that is the responsibility of teachers aligned with whoever their reviewer in the school is. As I said earlier, we know from the responses that we have had to requests for teachers to be considered for professional recognition awards that we are seeing an increase in the number of teachers who are seeking professional recognition with the General Teaching Council for Scotland.

We have a research hub on our website and, over the past few years, Charlaine Simpson has been responsible for trying to encourage teachers to engage in meaningful but small-scale research—stuff that they might do themselves or in collaboration with groups. We put that on to the research hub on our website, which allows teachers to access it. In areas of technology, mathematics and numeracy, for example, we are seeing an increasing number of teachers providing that kind of support to colleagues in STEM. Overall, although we do not measure it in a hard, quantitative way, the qualitative evidence suggests that the incidence of professional learning in STEM is increasing.

Dr Allan: The professional update process is used to monitor some of those things. How do you ensure that there is on-going contact and on-going opportunity for any individual teacher throughout their career? Do you see regional varieties in how those opportunities are taken up, for instance? Is there any basis on which you can measure that?

Ken Muir: Not specifically. At the end of the day, the professional learning of teachers is, in effect, a contract between the teacher and their reviewer. We would expect teachers to have a different kind of profile of professional learning that depends on the skills that they have or perhaps do not have, the context, the school and the area in which they teach. I cannot say that we have specific evidence on that, but I go back to what I said earlier. We are seeing through the qualitative feedback that we get and the ways in which we measure in a very loose way the response to the professional update process that STEM subjects are increasing in profile in that area. What has added to that and has perhaps been a catalyst for it has been the fact that we expect headteachers to drive forward the STEM strategy through the professional standards along with other major policy priority areas.

Dr Allan: On one of the recent occasions that we met teachers, they told us that they have a feeling that they do not know where to begin when it comes to the engineering element within the STEM spectrum of subject areas. Is that something that you try to address directly?

Ken Muir: I will pass that to Charlaine Simpson, but I can say that it is an area where we have had quite an active involvement, particularly with the Primary Engineer organisation.

Charlaine Simpson: We have been working with Primary Engineer to promote its programme, which starts again in January. We have put an article in our magazine and written about it in our newsletter so that registrants know that that is available. We try to use as many of our social media channels as possible to promote opportunities for professional learning, not just in engineering but elsewhere in STEM and other areas, too. I am from a STEM background so, on Twitter, I read @GeekGirls and all the STEM accounts, and I retweet them because they are things that are close to my heart.

We are trying really hard to support people in this area. For example, we supported the University of the West of Scotland's STEM academy. Again, we are using that as almost a springboard to support teachers' ability say to pupils that there are opportunities out there and that they should go and have a look. We are pointing to things rather than being providers of professional learning.

Ken Muir: I think that that is an important point. The *Teaching Scotland* magazine, which is sent free five times a year to all registrants—and to all members of this committee, I believe—has a section on resources, which covers physical

resources and staff development and professional learning opportunities. One of the pieces of work that we are doing on behalf of the Scottish Government is creating a national e-portfolio, which is a portal through which teachers can record their professional learning. The added-value part of that is that it enables them to access professional learning opportunities. Things such as the work that Primary Engineer does would feature within that particular portal.

10:45

The Convener: By invitation, I have been able to attend a couple of the STEM academy events at UWS. I know that that is run in partnership with other universities, including the University of St Andrews, the University of Edinburgh and the University of Glasgow, and with the Royal College of Chemistry. It is an absolutely fabulous two days of intensive training. When I was there, it was open to people studying for their postgraduate diploma in education, people who were probationers, and sixth-year pupils who were thinking of going into teaching or had a mission to go into primary teaching.

Attendance at the academy was voluntary. Does the effort that people make in that regard feed into their professional standing in terms of accreditation? Is it recognised?

Charlaine Simpson: If they choose it to be, it could be part of professional recognition on an individual basis, but that is only open to teachers who have been teaching for a couple of years. However, if they are student teachers or if they are prospective teachers, it is about enthusiasm for science and trying to develop that curiosity and that methodology that we mentioned earlier.

The Convener: As a layman, I was absolutely inspired by what I saw going on in those events.

Ross Greer (West Scotland) (Green): Throughout this inquiry, the committee has taken a substantial amount of evidence around gender inequalities in STEM, which will be of no surprise to you and is unfortunately nothing new. I am interested in your perspective on what the role of the GTCS is in tackling gender inequalities with regard to empowering teachers to tackle them where they see them in the classroom and with regard to supporting teachers to work through any unconscious biases that they might have.

Ken Muir: We have updated the professional code and the professional standards, so there are now specific references to the issue in the exemplification of the values, particularly under social justice, and, in the new refreshed professional standards, there is an expectation that teachers will challenge the assumptions and be aware of conscious and unconscious bias. Within the professional code, there are also specific references to teachers needing to be aware of and actively engage in discussion and dialogue around what would constitute conscious and unconscious bias. We have tried hard to update the professional standards and the professional code. They are out for consultation at the moment, and you will be able to see the specific references to what teachers are expected to do as professionals in the context of bias, both conscious and unconscious.

Ross Greer: How does that materialise within ITE at the moment? If I were on an ITE course, what would the GTCS's expectation be of that course in relation to tackling gender inequalities? The issue is important in areas other than STEM, of course, but STEM is where it most obviously manifests itself.

Charlaine Simpson: As part of the accreditation, we look strongly at the value system and how values are discussed and supported throughout the ITE programme. We do not want it to be a one-off lecture. Values have to be embedded within the programme—we are very strong on that point. We want to understand how universities are discussing values and how the students are developing dispositions and values and challenging assumptions and beliefs and unconscious bias. That is part of the ITE accreditation.

We have also worked with the Institute of Physics, and we were part of its working group on addressing gender balance in science. Our PRD documentation and our new guidance will also have sections that will ask teachers to challenge their biases.

Ken Muir: The professional review and development guidance document that the GTC has drafted will be issued at the end of October. The advice to reviewers and reviewees in the summary at the end says that they should be prepared to challenge their unconscious bias and that of others. We have tried to give it as high a profile as we can within the PRD guidance, which is applicable to all teachers, but equally to the code and the standards.

Ross Greer: That is useful to know. How will you measure the success of that?

Ken Muir: In initial teacher education, we accredit the programmes as presented to us. We do not have a formal role. That formal role sits with Education Scotland and HMIE, which, at the request of the committee and the ministers, undertake reviews of aspects of teacher education. GTC Scotland plays no role in that, although I know from discussions with Gayle Gorman, the chief executive, that she, like me, has recognised an inconsistency in having an

organisation that accredits the programmes but then has no role in monitoring the implementation of them. Gayle Gorman has given an undertaking that GTC Scotland will be represented in any initial teacher education review that the committee or ministers call for in future.

Specifically to respond to your question, we take feedback from students themselves, because we are constantly engaged with students during their undergraduate or postgraduate year, and also from probationers. We do a lot of work not only with probationers who are going through the teacher induction scheme but those who are going through the flexible route as well. We have regular updates from the probation managers in each of the local authorities. I think that we have a pretty firm handle through those means of the response of students and probationers to the programmes.

Gail Ross (Caithness, Sutherland and Ross) (SNP): I have a quick supplementary to the line of questioning from Ross Greer. At a workshop in the Scottish learning festival last week, one of the teachers, who was speaking as a parent, said that her two girls had felt that STEM had been forced on them so much that they were completely against going into any careers that involved STEM. Hopefully, that is an isolated incident, but how do we ensure that we are encouraging people and ensuring that they know that STEM is open to everyone and not going so far that we push them in the opposite direction?

Ken Muir: It is disappointing that that has happened. It has probably involved an overzealous headteacher or staff looking at the STEM strategy. It is disappointing if that is the case.

We try to ensure, through the measures that are available to the General Teaching Council in accrediting the programmes and engaging with the students themselves and through the work that we do on an on-going basis with in-service teachers, that we remind people about the importance of that balance across the curriculum and the role that teachers have to play in delivering well for their subject area—in secondary education—as well as taking responsibility with regard to interdisciplinary learning. I think that there has been a greater focus on that in the recent refresh of the curriculum for excellence narrative, which reminds teachers that students learn best when high-quality teachers make the connections between areas of the curriculum and subject areas. If we can generate that, particularly in early primary—which is the remit of the committee's inquiry—as well as more generally, I think that we will have succeeded in producing well-rounded individuals who can take a decision about where they then want to take their career, whether it is as a scientist or as a physical education teacher or whatever.

The Convener: Thank you very much. That completes the questions from the panel. Thank you both for your attendance this morning. It has been very helpful. I am going to suspend briefly for a couple of minutes to allow the panel to change over.

10:53

Meeting suspended.

10:58

On resuming—

The Convener: For our second panel of the day, I welcome Richard Lochhead MSP, the Minister for Further Education, Higher Education and Science; and from the Scottish Government, Barbara Morton, team leader for STEM, languages and social subjects in the curriculum; Niamh O'Connor, head of the early learning and childcare quality unit; and Stuart Robb, head of the education workforce unit. I invite the minister to make an opening statement.

The Minister for Further Education, Higher Education and Science (Richard Lochhead): Thank you, convener. It is a pleasure to be before the committee this morning, and in particular to be before members who are new to the committee since the last time I was here. I offer a special welcome to Beatrice Wishart, who is newly elected to Parliament; this is the first time that our paths have crossed, so it is a particular pleasure to be here.

I will take a few minutes to set the scene regarding the important issue that the committee has chosen to investigate. I very much welcome the opportunity to appear before the committee to discuss the Government's approach to STEM learning in the early years of education, particularly during this maths week Scotland.

Looking at the big picture, science and innovation are embedded in Scotland's heritage and culture. They play an ever-increasing role in Scotland's future in the very complex world that we live in. Science, technology, engineering and mathematics open up new ways of manufacturing, create new knowledge and innovation and open doors to understanding the world around us. That creates huge opportunities for economic growth in Scotland and for the social benefit of our people. To achieve that benefit, we need to grow Scotland's STEM expertise. That needs to happen for everyone, so that there is equality of access and opportunity in STEM.

11:00

Since I became the Minister for Further Education, Higher Education and Science, including STEM, I have been impressed and inspired to see at first hand across the country the multitude of STEM opportunities and initiatives that are under way. We all need to promote and celebrate Scotland's significant success, achievement and talent in STEM and the committee is focusing, rightly, on the early years of education, which are the foundation of that success.

There is much to be celebrated, but, as the committee is finding out, there are also many challenges. Those challenges include ensuring that we have the right number of teachers and early learning professionals with the expertise to deliver great STEM learning; tackling the gender imbalance and other inequities that exist in STEM, which, of course, are unfair and undermine our ability to deliver inclusive economic growth; sustaining and growing the inspiration and enthusiasm for STEM; and ensuring that education and training are equipping people with the skills that employers seek.

The STEM strategy that we have put in place aims to tackle all those challenges in a systematic and co-ordinated way. In the course of its inquiry, the committee will have heard about some of the action that we have taken to ensure that all our children have a really good STEM experience in the crucial early years. Members will have heard about the raising aspirations in science education programme, which has worked across 532 school clusters since August 2017. An evaluation showed that 87 per cent of the pupils involved had enjoyed more challenge in STEM learning and 77 per cent had increased their STEM aspirations.

The committee will also have heard about the Scottish Science Education Research Centre—we will call it SSERC for the rest of the meeting—which we have funded for more than 10 years. To date, SSERC's primary science cluster programmes have engaged with 99 school clusters across all 32 local authorities.

We are doing a lot more. We have 2,700 active STEM ambassadors in Scotland. Recently, Education Scotland awarded nearly £1.4 million of STEM professional learning grants for teachers, technicians and early and community learning practitioners. A total of 140 new bids will be supported, which will benefit an estimated 722 establishments across the country and nearly 14,000 practitioners this year alone.

I do not want to say much more. I could continue to talk about some of the other actions, but I am sure that they will be mentioned during questions and answers. For many of the strategy's actions, particularly those that are targeted at the early years, it will take time and patience to see the long-term impacts. I feel confident that we have the right building blocks in place, but we will of course continue our efforts to raise aspiration in STEM and ensure that our young learners are encouraged and aspire to develop an interest in and awareness of STEM, not just for their future careers but to ensure that our society is equipped to fully understand and adapt to our ever-changing world.

The Convener: Thank you very much, minister. We move to questions, starting with Mr Gray.

Iain Gray: One of the subjects that has been talked about quite a lot in our evidence sessions is continuous professional development for teachers. That seems to be an area in which time pressure and so on mean that there is a restriction. It is difficult to get hard information about how much STEM CPD for primary teachers has taken place. Has the Government considered creating a proper performance indicator to monitor how much CPD has been undertaken by way of primary teachers taking up opportunities such as those that you mentioned with SSERC?

Richard Lochhead: In the wider debate that the committee has been having about all practitioners at all levels having the confidence to teach, and take an interest in, STEM, ensuring that opportunities are available for professional career development is very important. As I mentioned in my opening remarks, we have just announced £1.4 million for STEM grants from Education Scotland; those are far-reaching grants across many establishments across Scotland in early years, primary schools and secondary schools.

There is an appetite out there for career development. It would be helpful to have a better picture, because as well as what the Government is doing there are local initiatives in each local authority area and initiatives that take place through the college hubs. The science centres reach out to pupils and to staff. There is a bit of work to be done; that is a fair point. We need a better picture.

Iain Gray: Do you intend to do that?

Richard Lochhead: Yes. The performance indicators that are outlined in the strategy are relevant to that question. What I am saying is that, in terms of my year in this post, perhaps we need to keep working to ensure that we get the complete picture.

Iain Gray: After another year in post, when you are in front of the committee again, will you be able to tell us how much CPD has been undertaken in STEM areas by primary teachers because you will have created that performance indicator and be monitoring it?

Richard Lochhead: I hope that that will be the case, yes.

Liz Smith: On the previous panel, Mr Muir flagged up some tensions, as he described them; in particular, he gave the example of interest groups that want to see the raising of standards among people entering the profession. There was some reluctance to go down that road because of the shortage of teachers. What discussions is the Scottish Government having with local authorities about the gap in STEM teacher availability in different parts of the country?

Richard Lochhead: There are constant discussions with both local authorities and the universities. I know that you heard from the previous panel about some universities taking extra steps to try to enhance qualifications with science for teacher training.

Such discussions take place with local authorities; Stuart Robb will come in on that in a second, because that is his area of expertise. We have to be very conscious about putting extra barriers in front of aspiring teachers. Clearly, the committee is looking at STEM, and, in the future, we might look at another subject. The more qualifications that we ask aspiring teachers to have, the more obstacles we will put in front of applicants. We must be careful about that, but I welcome the fact that some universities are taking steps to enhance qualifications.

Stuart Robb (Scottish Government): We recognise that the recruitment of teachers and student teachers is challenging in certain subjects. The teaching workforce planning process, which includes local authorities, recognises that in the targets that it sets for student intake. We know that universities sometimes find it difficult to meet those targets, so we are doing a range of things to try to support that. That includes putting in place alternative routes into teaching—we have a number of those, the majority of which are focused on STEM subjects. Getting those courses in place has involved a lot of work with the universities and the General Teaching Council for Scotland. We have around 770 additional students in the system as a result of those new routes.

We have put in place a STEM bursary scheme to encourage more students to come into STEM subjects. That scheme offers a £20,000 bursary for career changers, and the teaching makes people recruitment campaign also has a particular focus on STEM subjects. All of that aims to enhance the numbers that we have coming into the system.

Liz Smith: That is helpful. I am asking the question because when this committee was discussing subject choice and we had Education Scotland before us, it was apparent that it was not terribly clear about where the gaps in teacher numbers were. We had a lot of issues with that. Mr Robb has just indicated that an extra 170 teachers have come in through those new routes. What discussions are taking place with universities and local authorities about where those 170 teachers will be deployed in order to fill some of the gaps where STEM subject choice has dropped or there has been a downturn in SQA uptake of certain STEM subjects?

Richard Lochhead: You are talking about secondary school education rather than early years. The universities are autonomous, to a degree, in that they design their own courses, but in the wider STEM conversations that we have with the universities, they take these matters into account. We do not direct them to change their courses to add on the option of an extra science qualification.

Liz Smith: It is not so much that as the fact that at there are students who are obviously potential teachers, for not just secondary but primary education. What I am interested in is what ideas you, local authorities and universities have for getting them into the classroom, where they are badly needed. That is what I am driving at.

Richard Lochhead: I ask Stuart Robb to come in on the direct conversation with universities. Clearly, local authorities have a big role to play in this area.

Stuart Robb: In the teacher workforce planning process, the teacher workforce planning advisory group sets a national target and then we work with the universities and the Scottish Further and Higher Education Funding Council to allocate the places where they are most needed. That is driven largely by capacity in universities, but we are working on having a more geographical element in the planning process so that we can make sure that the student teachers and teachers are going where we need them.

Liz Smith: I get that, and that is very helpful, but there is another route to go down, which is to ensure that those newly trained people are getting into the right classroom. That is what I am interested in. After all, it is important that those newly trained people actually deliver the education that is required across classrooms in Scotland, whether primary or secondary. I am focused on getting them into the classroom. That would do a lot to not just get pupils fired up in primary school but improve uptake of STEM subjects when those pupils go on to make their SQA choices. It is all very well saying we have those teachers ready to go, but the next stage is getting them into the classroom. I am interested in what plans the Government has to do that.

Stuart Robb: That is part of an on-going discussion with local authorities through their teacher workforce planning process. It is for local authorities to employ the teachers. We cannot dictate where they go.

Liz Smith: Absolutely. Are you aware of how many of the 170 have offers of places?

Stuart Robb: It is actually 770, not 170.

Liz Smith: Sorry, I misheard you.

Stuart Robb: Yes, we are aware of that. They are all going through our alternative routes, and we work quite closely with the universities and the local authorities on those routes.

Liz Smith: So, there should be good statistics on the increased numbers of people who are qualifying and what schools they are going to.

Stuart Robb: Yes.

Liz Smith: We would be interested in seeing them, if that was possible.

The Convener: I am sure that we can request that information.

Daniel Johnson: We just heard from the GTCS about the various calls regarding entry requirements. I understand the point that you make about not wanting to put up barriers, but the requirement that is being asked for—a Scottish credit and qualifications framework level 5 qualification in a science—does not seem particularly onerous. Indeed, if we aspire to a broad education, should we be aiming for all school leavers to have an SCQF level 5 qualification in a STEM subject?

Richard Lochhead: That takes us into a much wider debate.

Daniel Johnson: It would solve the problem, would it not?

Richard Lochhead: I am sure that it would address part of the problem, but we do not dictate the curriculum to schools. As you are aware, schools adhere to a broad curriculum in the education system. It is certainly beyond my pay grade to specify certain qualifications that all pupils in Scotland should have when they leave school.

The other debate that the committee is having—you have heard from witnesses that this is the most important debate—is about teachers and practitioners in primary school and early years having the confidence to teach STEM. Many of the experts whom I have spoken to and heard from see that as key, rather than other solutions that committee members are referring to. A lot of the emphasis of Government policy and the STEM strategy has been on ensuring that all primary school teachers and early years practitioners have enough confidence to teach STEM, so that it is not down to certain teachers with certain qualifications to do that. I know that there is a debate about secondary school, which is obviously a later stage, but in the key period of influence in inspiring an interest in STEM, which is the early years, there is a need for generalists.

Daniel Johnson: To ensure that our primary school teachers have confidence in teaching science, it would help if as many people as possible took science as far as possible in secondary education. That would help people to have a general understanding and familiarity with science, which would help the situation, would it not?

11:15

Richard Lochhead: I do not have a closed mind about that. I just make the point that the emphasis, which I support, is on the fact that early years intervention is shown to have much more of a longer-term impact on take-up of STEM careers in later life. Therefore, we have to focus on how in the early years and primary school we spark the curiosity for science, mathematics, engineering and so on.

Alison Harris: I would like to ask you something that my colleague Oliver Mundell mentioned in a previous committee meeting. SSERC offers to early learning and childcare practitioners training in delivery of STEM learning in childcare settings. Obviously, that is very valuable, but it is only available to local authority providers. I know that your Government has reiterated time and again that expansion to 1,140 hours of funded childcare cannot be done without the private, voluntary and independent sectors being included. In that light, why are those providers being excluded from accessing that learning, and have there been discussions to bring them in, given that they provide the same Government-funded entitlement under the national standard for early learning and childcare?

Richard Lochhead: There is clearly an issue, in that local authority nurseries have, in relation to early years provision, more access to support in some areas. I am keen to look at that and am doing so at the moment.

However, there is a lot happening for private providers, as well as for local authority providers. As part of the expansion, there is an induction programme that takes into account STEM learning, which is open to private providers and local authority providers.

Education Scotland has also set up online portals for STEM activities and advice, which are available to private providers as well as to local

authority providers. I cannot speak for every private provider, but some that I have spoken to in recent years are taking part in STEM activities as much as local authority providers are. I am not saying that there is not an issue, but there is ample opportunity for private sector providers to access STEM advice and resources through Education Scotland and other sources.

Alison Harris: Obviously, the Government funds SSERC. I think that there is a major issue if the private providers cannot access the training that local authorities can access. Is that something that you could move on more quickly? The 1,140 hours ELC provision is to be rolled out next year.

Richard Lochhead: SSERC is funded by local authorities; therefore, it is there primarily for local authorities. Niamh O'Connor deals with the issue day to day, and deals with private providers, so I will bring her in.

Niamh O'Connor (Scottish Government): Thank you. Alison Harris is absolutely correct that in the expansion of funded ELC, the involvement of private, voluntary and independent providers is crucial and will be fundamental to its success. We are very mindful that continuous professional learning should be available to all sectors in early learning and childcare provision.

The Education Scotland STEM grants are accessible by private, voluntary and independent providers of funded ELC. The guidance that Education Scotland issues to people who consider bids for that grant makes that very clear. SSERC, for example, which has been one of the grant recipients in round 1 of that programme and in the latest round, has collaborated with the Scottish Childminding Association, which is, as a group of self-employed individuals, part of the private, voluntary and independent sector. SSERC is increasingly working with PVI providers in ELC, but there is a way to go on that.

That is in addition to the main provision for continuous professional learning in ELC, which includes, as the minister said, "Early Learning and Childcare National Induction Resource", which was published this year. It includes a directory of the CPL opportunities that are available to all staff, no matter the sector that they work in—local authority, private, voluntary or independent. That document is available on the Care Inspectorate's website. It has a section on STEM resources that practitioners can use.

Finally, there is a national programme of online CPL in development that will be available to providers of funded ELC no matter the sector that they are in. That CPL will include a specific module on STEM. That programme is being worked up at the moment, so the committee's consideration of STEM and early years education is very timely for it: the committee's findings can be fed into development of that module.

Richard Lochhead: It is also worth mentioning that the Scottish Childminding Association has just been awarded a grant through the Education Scotland STEM grants that were decided in the past fortnight. That is to allow it to take forward online training courses for its members.

Dr Allan: The committee asked the General Teaching Council for Scotland, which was on the previous panel, whether there is a measure of how much career-long professional learning is available for teachers in STEM. Perhaps it is more a question for the Government than one for the GTC. I am curious to know what there is out there and whether the Government sees variations around the country in terms of how much that learning is being accessed.

Richard Lochhead: We have mentioned before some of the instruments that are in place to fund such CPL. We pay close attention to equality to ensure that all parts of the country benefit—that deprived areas and other areas are not excluded for any reason. There should, through the many streams of CPD activity, be opportunities for all practitioners to benefit.

Clearly, for some funding rounds we need proactive applications: plenty came in. Our STEM grant awards, which are delivered through Education Scotland, have been well oversubscribed, so that is clearly an issue for us to continue to reflect on.

In the most recent rounds, there have been many awards for rural areas. An example that I have is of schools in north-west Sutherland, which is clearly one of Scotland's most rural and remote clusters of schools, being offered funding to allow teachers to visit each other's classrooms and learn about the most effective ways to improve numeracy and mathematics teaching. That is just one of many types of award that are given regularly to different parts of Scotland.

As I said in response to Iain Gray, there are so many different routes for CPD, so we must keep working on getting a complete picture for the country. There being so many ways in which practitioners can access CPD is a sign of success. We must just make sure that we are on top of it and that we understand how the whole of the country is benefiting. We monitor that and we have our own schemes. There is still a case for having a more complete picture.

Dr Allan: Are we seeing a measurable impact in terms of young people's confidence in relation to science subjects, or is it too early to look for measurable impacts of the work that is being done on CPD for primary and secondary teachers during the broad general education phase?

Richard Lochhead: We have the results of various surveys that show that practitioners in the early years, primary and secondary are much more confident about STEM, and so are the children. The STEM survey that is carried out by—if I remember correctly—Education Scotland gives us data that we can pass to the committee, if you do not have it already.

Dr Allan: In earlier education—pre-school and the early years—are there different pictures for private and state provision in respect of developing the confidence of, and information for, practitioners?

Richard Lochhead: Niamh O'Connor has data on that.

Niamh O'Connor: The national standard, which will come into force from August 2020, will be key in guaranteeing the levels of qualifications, skills and continuous professional learning of the workforces in the various sectors. That will include minimum amounts of broad continuous professional learning—not just in STEM, but in the round—and measures of action on quality of learning and the experience of younger children in early learning settings. That national standard will apply to anyone who wants to deliver funded ELC—local authority, private, voluntary and independent sector providers.

Rona Mackay: In July this year, you wrote to the committee about the funding initiative to improve the gender balance and equalities in STEM learning. The "Tapping all our Talents 2018" report noted that gender stereotypes and biases abound in all parts of society. Does primary teacher training pay sufficient attention to challenging unconscious bias, given that teachers are key influencers in the early years? What more could be done to make progress?

Richard Lochhead: I will, in a second, ask colleagues to come in on teacher training. More widely, there is a lot happening. The report that you mentioned is important. I know that it says that there has been a lot of action following commitments from the Government, local government and all the various partners. There are still, of course, significant challenges, particularly in later years education.

Our gender balance and equality officers are now being put in place in early years and primary education across the country. They are tasked with working to make progress with all practitioners and providers in their regions. Various reports and resources have been made available to the practitioners. For example, "Gender equal play in early learning and childcare" is a new resource that the Care Inspectorate, working with Zero Tolerance, has put together for the early years. Gender equality has been put much higher up the agenda in early years and primary education: the officers have a key role to play in that.

In terms of direct teacher training, Stuart Robb can come in and say how that work is being taken forward.

Stuart Robb: The committee will have heard from the GTCS that initial teacher education is an issue for the universities in respect of determining the content of their courses. Courses are set up to enable teachers to meet the standard for registration that is set by GTCS, which will include substantial information on gender balance and equality issues. We are working with the universities through the Scottish Council of Deans of Education and the General Teaching Council on how we can make gender issues more prominent within initial teacher education. Ultimately, it is a decision for the universities to make in respect of the content of courses.

Rona Mackay: Given that there is not a relevant key performance indicator in relation to gender balance within STEM, how can that be measured? How will effectiveness or progress be measured? Is it too early for that? Is it planned?

Richard Lochhead: The strategy is, of course, in only its first year of five. I hope that subsequent years will show evidence of progress. As I have said, many the issues are about relatively long-term impacts.

I visit nurseries, primary schools, secondary schools and colleges: everywhere I go there are references to gender balance issues. They take into account much of the guidance and policies that are made available to them. I visited the nursery in Seafield primary school in Elgin just last week. The practitioners took me through all the steps that they take to ensure gender balance and that there is no gender stereotyping. One of the wee girls was playing with her hard hat on and her uniform, so I hope that the work is making an impact.

Rona Mackay: That is really encouraging. Should that be included in school inspections? Should inspections focus on it more than they do? I do not know whether they do it at all, right now.

Richard Lochhead: Again, Education Scotland makes its own decisions about how it goes about inspections. STEM generally is part of the inspection process. Although I am confident that such issues will be incorporated to a degree, there is no prescription in terms of how the inspection process goes about that.

11:30

Ross Greer: I will stick with Rona Mackay's last question. In the absence of a KPI on gender

inequality in STEM, particularly in early years and primary education, I am not quite clear how are you measuring success. What measures of success is the Government looking for?

Richard Lochhead: Barbara Morton will talk about KPIs and how they will be taken forward.

Barbara Morton (Scottish Government): As you are aware, there is a KPI on gender balance in STEM, in terms of what we can measure from the SQA data.

The improving gender balance and equalities programme will also be evaluated and that will give us an indication of its effectiveness. It is possible that that evaluation data will not necessarily be robust enough to base a very strong KPI on, but you can be assured that the effectiveness of that programme will be monitored and evaluated as it grows and develops. As the minister says, we will also look at finding other sources of evidence of how awareness is growing, so that we can talk about it in the annual reports on the strategy.

Obviously, the improving gender balance and equalities officers will have their own work programme. A steering group has been set up to help guide the work programme, so the officers will have their own internal programme targets on, for example, the numbers of schools, practitioners and wider STEM partners that they engage with. It is important that the officers work to raise awareness of gender and unconscious bias not just with schools, but also all the STEM partners, in other words, the museums, the science centres, the festivals and Skills Development Scotland. The officers also work alongside the gender action plans that colleges and universities have. It is important to see them as part of that wider context.

Ross Greer: That is useful. Thank you. I have one brief supplementary. Are there plans to assess the impact and success of STEM projects that have been funded using the pupil equity fund? We probably all have very good or perhaps not as effective anecdotal examples of where PEF funding has been used, particularly in primary school settings, for STEM work. I would be interested in any specific evaluation, arising from your work, of projects that have used PEF.

Richard Lochhead: My understanding is that PEF has its own evaluation that will look at the merits of how PEF is used across Scotland, whether for STEM or for other areas. I hope that we will be made aware of how many initiatives out there are funded by PEF, but there is a separate exercise evaluating PEF.

Ross Greer: Thanks. I will follow that up with you once we have bottomed out how PEF is being evaluated.

Richard Lochhead: Yes.

Gail Ross: Science centres have been charged with delivering the STEM strategy's approach to tackling geographical inequities in access to STEM education. Given that the centres are in Aberdeen, Dundee, Glasgow and Edinburgh, which are all very long bus journeys away from, and possibly require an overnight stay for schools in my constituency, how is that addressing inequities?

Richard Lochhead: You have quite rightly highlighted the importance of the science centres, which are funded to a significant extent by the Scottish Government. The issue that you raise is usually also the first question that I ask them every time that I meet them and every time that we are providing resource to them. I want to know what they are doing to support our island communities and rural Scotland.

The centres fund a number of initiatives all around Scotland, such as generation science and various outreach programmes. They bring back to us the evaluation and the statistics relating to their activities around Scotland and they are reaching all corners of the country. I visited a generation science performance in my constituency—actually, to correct the record, I visited Buckie, which is not in my constituency but is in the Moray Council area. I think that it was organised by Edinburgh Science; if not, it was Glasgow Science Centre. I have discussed the issue directly with all the science centres.

We can send the committee evidence of the number of outreach visits undertaken by each science centre and also the number of practitioners and pupils that they have had contact with around the country.

Gail Ross: That would be very helpful. Thank you.

Richard Lochhead: In terms of the extra costs, there are funds available through certain funding streams to pay for bus journeys and transport costs for pupils. I will happily send that information to you as well.

Gail Ross: Do schools have to apply for that funding on a case-by-case basis? How is it distributed?

Richard Lochhead: Those are good questions. Again, because of the success of bringing forward so many initiatives in the last few years, I am keen to make sure that it is easy for all schools and establishments to access what is out there. The RAiSE officers work in each local authority and part of their job is to co-ordinate and make sure that pre-school, primary and secondary schools know what is available and co-ordinate it all, as well as the college hubs that they work through.

We also have the STEM officers team who work for Education Scotland. There is usually one officer per region, although, to recognise the extra challenges facing rural areas, there is more than one STEM officer in, I think, the Highlands and perhaps one other region of Scotland. There are eight officers across six regions to give extra support to rural areas.

Beatrice Wishart (Shetland Islands) (LD): I will follow up Gail Ross's question and ask about access for island communities, from which pupils cannot just get a bus to Aberdeen or Dundee. How does that play with island proofing and ensuring that access is available for island as well as rural communities?

Richard Lochhead: Again, as for the previous question, that is very much a priority for me, albeit that I represent a rural constituency, not an island constituency. We discuss with all the science centres, which do a lot of the outreach work, the attention that they pay to island communities. When we send the committee the information about visits and so on, members will see that.

Shetland Islands Council does apply for some of the grants that are available to local authorities and practitioners. We do our best to make sure that the whole country benefits from our grants and awards. I will happily send members details of how their areas have benefited.

Iain Gray: You mentioned the funding of STEM co-ordinators in some parts of Scotland. I think that I am right in saying—colleagues will correct me if I am wrong—that we took evidence from the STEM co-ordinator in Highlands and Islands Council. She pointed out that the funding for her post was coming to an end and that she knew of no prospect that it would continue. I wonder what you intend to do to try to make sure that that continues.

Richard Lochhead: I will investigate that. I think that that was the RAiSE officer. There are two types of officers. The RAiSE officers are funded jointly by the Scottish Government and the Wood Foundation and they work embedded in local authorities. The STEM officers work for Education Scotland and they are allocated per region.

Iain Gray: I think that it was the RAiSE officer, yes.

Richard Lochhead: That is a good resource that we have there. I will happily check the situation in the Highlands to understand what is happening there. My understanding is that the posts are continuing, but I will have to understand the context of her comment to the committee.

The Convener: Minister, this is our last opportunity to take evidence in this inquiry, which we decided to undertake in the context of the fourth industrial revolution and, as you said, the skills that we need for the future. With so much development work going on, how will we measure success? Are you confident that everything that is happening will lead to a workforce that is fit for those new challenges?

Richard Lochhead: How will we measure success? Ultimately, one of the purposes of Education Scotland is to ensure that we have appropriate skills for the workforce and for the economy of the future. We know that the fourth industrial revolution and the fast-changing economy, not just in Scotland but globally, is more dependent on STEM skills than ever before and that the number of jobs in Scotland relating to STEM skills is on the increase. Our measure for success in the longer term will clearly be the extent to which those skills are available for the economy.

In the short to medium term, we clearly have to monitor and evaluate many of the issues that we have discussed. We must ensure that we are attracting more teachers into STEM subjects, that STEM is being taught at all levels of education to an appropriate standard, and that the teachers and the practitioners have the confidence to do that. We will continue that effort.

The Convener: Thank you very much, minister, and thank you to the panel for their attendance. I will briefly suspend the meeting to let the panel leave.

11:41

Meeting suspended.

11:42

On resuming—

European Union (Withdrawal) Act 2018

EU Research and Development Programmes (Revocation) (EU Exit) Regulations 2019

The Convener: Under agenda item 2, we will consider a proposal by the Scottish Government to consent to the UK Government legislating using powers under the European Union (Withdrawal) Act 2018 in relation to a United Kingdom statutory instrument proposal. The relevant statutory instrument is the EU Research and Development Programmes (Revocation) (EU Exit) Regulations 2019. Do members have any comments on the notification?

Members have no comments. That concludes our public session for this week. Next week, we will take evidence on the Disclosure (Scotland) Bill.

11:42

Meeting continued in private until 12:05.

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