



# HOUSE OF LORDS

Revised transcript of evidence taken before

## **The Select Committee on Digital Skills**

Inquiry on

### **DIGITAL SKILLS**

*Evidence Session No. 13*

*Heard in Public*

*Questions 158 - 172*

TUESDAY 21 OCTOBER 2014

11.20 am

Witnesses: Jack Evans, Mark Chambers, Paul Hynes and Miles Berry

#### USE OF THE TRANSCRIPT

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### Members present

Baroness Morgan of Huyton (Chairman)  
 Lord Aberdare  
 Baroness Garden of Frognal  
 Lord Giddens  
 Lord Haskel  
 Lord Holmes of Richmond  
 Lord Janvrin  
 Lord Kirkwood of Kirkhope  
 Lord Lucas  
 Lord Macdonald of Tradeston  
 Baroness O’Cathain

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### Examination of Witnesses

**Jack Evans**, Specialist Support Teacher (Computing and DT Co-ordinator), Kingsmead Primary School, **Mark Chambers**, Chief Executive Officer, Naace, **Paul Hynes**, Vice Principal, George Spencer Academy, and **Miles Berry**, Principal Lecturer, Computing Education, University of Roehampton

**Q158 The Chairman:** I think some of you were here and therefore know the areas we are pushing on. Can I just run through a few things that I need to do before we start? You have a list of interests that have been declared by Committee Members in front of you. They were declared orally by Members at the previous sessions in July and they can be found in the transcripts as well. This is a formal evidence-taking session of the Committee and a full shorthand note will be taken to be put on the public record in printed form and on the parliamentary website. You will be sent a copy of the transcript and you will be able to revise it in terms of any minor errors. The session is on the record. It is being webcast live and will subsequently be accessible via the parliamentary website. You are very welcome to submit supplementary evidence and indeed, as you heard before, we may well ask for some specific stuff where we have questions that we want to delve into rather more. Make sure you speak up clearly. We will also try to do so. The acoustics are not bad but not brilliant. So that is by way of introduction. What would be great is if you introduce yourselves and if you wish to make any opening remarks please do so, otherwise we will go straight into questions. As you heard from the previous session, some of the questions will be applicable to all of you, some not. So we will play it by ear. Thank you very much.

**Miles Berry:** I am Miles Berry. My job is as Principal Lecturer in Computing Education at the University of Roehampton. I have been there for five and a bit years now. Before that I spent my teaching career pretty much in the primary phase, a lot of the time working around the computing curriculum or ICT curriculum as it then was, as well as looking at how ICT can be best used to support the curriculum across school. I am part of the Computing At Schools Board of Management and a member of Naace’s Board of Management, as well as the UK Forum for Computing Education. I was part of the drafting panel that put together the new computing programmes of study and have been quite heavily involved in the implementation phase of the new curriculum, particularly in regard to primary schools.

The way things are in initial teaching training—at least as far as university-based teaching training is concerned—is a lot more positive than you might have been led to believe in the previous session. Certainly my informal professional network suggests that those who are doing roles like my own are pretty much up to speed with the new curriculum and are doing a lot of very good work in preparing the next generation of teachers to teach this confidently, competently and with a degree of expertise.

In terms of broad principles, it important to bear in mind that breadth and balance is there as a statutory entitlement in terms of curriculum provision as well as computing provision. There is much more to the new curriculum than just coding, despite what the media might have led us to believe, that it is the foundation of the applications and the implications of this as a subject discipline.

The focus has shifted though from one that was about skills in using technology to one that is about establishing children's, young people's, understanding and knowledge of the principles that underpin that technology. It is also important to bear in mind that the national curriculum is about entitlement and it is a curriculum for all and we need to do all that we can to make sure that every child has access to a stimulating, enjoyable, academically rigorous computing curriculum.

Much of the detail is left to implementation. As you have seen, it is just three sides of A4. So the important aspects of this—like creativity, like pupil's autonomy when it comes to using digital technology; like opportunities for collaborative working and opportunities for creative expression—is going to be down to the way this is delivered in school rather than what you see in the document that we produced.

**Paul Hynes:** I am Paul Hynes. I am Vice Principal at George Spencer Academy, which is a teaching school, which have been mentioned before. I teach computing. I taught it yesterday, I will be teaching it tomorrow and I will be talking about it at a parents evening this evening. I came into the school off the back of nine years doing national advisory work with Specialist Schools and Academies Trust, so going round talking about use of curriculum, technology, as well as the embryo of what has become a computing curriculum through the maths and computing colleges as was. I am also part of the ICT expert panel.

The two things I want to talk about would be the use of student digital leaders, which I found an absolutely brilliant initiative. So getting the students involved and embracing their energy and enthusiasm and the skills that they have as a way of ironing out this inequality, and also the link to vendor qualifications. So the qualifications that are currently provided by the likes of Microsoft and Adobe and Cisco are very difficult to get into schools because often they are not available to be shown in the school league tables. They do not necessarily attract the funding and yet they are probably the best thing we can do to provide a skillset for a group of students who are going to move on into a career in that area.

**The Chairman:** That is very interesting; we will come back to that.

**Jack Evans:** I am Jack Evans. I am a primary school teacher in Hackney, the computing lead. I have been working in the same school for four years. I have been helping my team in our school specific curriculum in terms of computing for this year across the school, which I did with our partner school as well with Louise Kwa at Gayhurst, again in Hackney. I have also been responsible for implementing Code Club in the primary schools, as well as trying to co-ordinate that with our second school as well. Yes, I suppose that will do.

**Mark Chambers:** Mark Chambers, CEO of Naace. Naace is a membership organisation. It has about 2,500 members. It has been around for 30 years so it sometimes has some millstones around its neck in terms of its reputation for exclusiveness, and what I have been doing in the last 18 months to two years is making sure that it is an inclusive association. We have 51% membership from schools and school teachers now and about 49% of the old LA teams, advisers, independent consultants and the rest. The thing that unites us—because it is quite a diverse and intentionally inclusive community—is that we are passionate about the subject computing. We are equally passionate about technology and its learning, and something I have been calling recently “technology for school improvement” because, if the focus is not on school improvement, we tend not to get through to these guys in schools. That is the most important mantra for them.

We look for and recognise quality provision. As a fellowship, we have created from within the community on a voluntary basis something called “Third Millennium Learning” and the Third Millennium Learning Award, which recognises schools, which take radical approaches to technology and a matching radical approach to pedagogy. We have responsibility for the ICT mark when we created it and gave it to Becta, and Becta returned it to us at the end of their period. There are still 2,500 schools registered to that programme and the other thing we developed, which is tools. So the self-review framework tool that helps them to establish where they are in their use of technology for school improvement.

We also develop other tools, such as a professional development programme. Our most recent initiatives are around a national performance collection and open badges, which recognise pupils’ competence or readiness and preparedness to deliver the computing curriculum. Fundamentally we believe that effective use of technology has the potential to change behaviour, change systems and empower the individual and, as such, all three aspects of the computing curriculum—computer science, ICT, digital skills—must develop as an essential part of the school curriculum, so that our learners who will be leaders understand it and are then able to solve problems, design tools, experience fresh global thinking. The most important thing from our perspective is to apply these things to the real world: authentic learning.

**Q159 The Chairman:** Thank you very much indeed. Let us kick off with the first question, which is about the new curriculum. To what extent do you think teachers are ready to deliver the new curriculum? Can you give us some insights into how widespread it is at the moment and how can that be done in a more comprehensive way than perhaps it is at the moment? Any concrete suggestions would be very welcome.

**Miles Berry:** Our key priority has been developing teachers’ subject knowledge in terms of computer science. The part of the new curriculum—

**The Chairman:** That is specialist teachers, yes?

**Miles Berry:** No, pretty much every teacher in primary school is teaching their class for computing lessons. There are exceptions.

**The Chairman:** That is what we were trying to get from the last panel.

**Miles Berry:** Some schools have gone down alternative provision but my impression is that they are very much the exception rather than the rule. Yes, we are expecting with the new curriculum for teachers to teach something that they themselves have never been taught. This does not mean to say it is beyond them and many teachers have gone out of their way

to acquire this subject knowledge, and a lot of the initiatives that have been in place have been about equipping them with that core subject knowledge to teach new subjects. Examples such as the joint CAS/Naace guidance documents, Code Club Pro, the Barefoot scheme from the British Computer Society and joint CAS/Naace conferences for primary teachers, have all gone a long way to helping with that, although we are not there yet and there is plenty more work to be done in that area.

In terms of making it innovative and engaging, certainly as far as the primary phase is concerned, this draws on good old fashioned best practice in primary education. This is about collaborative working, allowing scope for pupils' own creativity to flourish and allowing scope for independent, autonomous projects—the sort of thing that has been good practice in ICT education for a long time now, which Ofsted remarked on when they last reported on ICT education. That said, it would be interesting to have the aspects survey as to how schools are coping with the demands of the new curriculum. Yes, we do have some feel of what good practice is through the networks, through computing at schools and other places, but having somebody like Ofsted come in and do a proper survey of that and report on that would be tremendously useful.

The technology can help in terms of making computing education both innovative and creative. We see lots of good examples of children getting excited about blogging in primary education, children working collaboratively using online tools, and the role of open or digital badges is a way of accrediting learning within the computing curriculum. All of that is using technology to good effect in teaching a subject, which is in part at least concerned about the use of technology.

Other things that would help: more time. What we have done is have funding from the department to develop resources, to provide courses, to provide content to get teachers up to speed but the best way to learn to code—I know there is more to it than coding—is to spend some time writing some code. Very few primary school teachers have time to engage with the subject content at that level of depth. I am not sure what the solution is to that but it would be nice.

**The Chairman:** I must stop you there otherwise we will run out of time. Mr Evans, tell us what—because you are primary, are you not?—your background is and how you have come to be doing this. That would be useful. What is your impression of other schools?

**Jack Evans:** My background is I came from, to be honest, a rather wishy-washy degree called Communication, but it touched on a lot of aspects of digital technology, which helped me in my role going into the primary school. I would say that largely there are a lot of gaps in teachers' knowledge at primary school. We are very lucky. We are a single form entry. I deliver a lot of our training when it comes to being aware of the new technologies and things like this. When you are going in two, three form entries it is a lot more difficult. We were helped greatly by Code Club Pro delivering a pilot exercise where we had a number of CPD sessions in our staff meetings, extended sessions where we were introduced to new aspects of the curriculum. That was immensely helpful for our staff because they found a lot of the new ideas difficult. To be honest, just looking at a very real example, yesterday I was teaching to my year 6s the coding that I did in my second year at university. I feel very comfortable with it. I can run through it pretty quickly and pick it up again, whereas there are a lot of teachers who would find that impossible without having extra CPD. I would say that is important. It is something we want to look at and it needs to be made more aware of

and there is definitely a lot out there, particularly in Hackney. I feel that Hackney has done very well at making that available to teachers but probably on a wider scale; it does need to happen on a greater scale.

**Q160 The Chairman:** On to secondary, where presumably, in a sense, there are more specialist teachers so it is a different picture than primary.

**Paul Hynes:** Yes, certainly. I look after our teaching school alliance and I would be confident that they are quite good at delivering that. We are blessed at my school. We have three very highly quality specialist computing teachers. That is a rarity. They have been able to deliver quality professional development to those primaries in the alliance, talking about the innovation, talking about teaching computing without having any computers so all the physical things you can do in the playground around some of the theory and the concepts. So I would say they are very confident at that.

We found a slightly bigger challenge helping secondary schools because we have a legacy of staff. For one member of staff from the last year I spoke to, her original training was as a typing teacher. That was her qualification. She has had to re-skill into becoming a business studies teacher. Then she had to become an ICT teacher and at this moment suddenly she has had to become a computer programmer—she thought retirement sounded quite nice at this moment—and her 60 words per minute are now used elsewhere. So that has been a big challenge for those staff that have just happened to have found themselves in a department—

**The Chairman:** But labelled with something different.

**Paul Hynes:** Yes, absolutely. I think it is a place that when you go into those departments and you ask around, including myself—my degree is in chemistry—I found my way into that area, as a lot of the staff have. Until the quality candidates start coming through and populating those departments, we have a legacy of staff that we need to take with us on this journey.

**The Chairman:** That is very interesting, thank you very much.

**Q161 Baroness Garden of Frognal:** You have already mentioned the fact that ICT needs to be taught as a core subject embedded across the curriculum. What does good practice teaching look like in computing and across other subjects, and how do we address the gaps in teachers' skills, and perhaps you have some thoughts about the key learning technologies for this new development in the curriculum?

**Miles Berry:** I am by no means convinced that IT should be taught across the curriculum. IT certainly should be used across the curriculum, and partly that is so as to help children, young people, develop and apply their core skills in digital literacy and information technology. But I think there is much gained through teaching computing as a holistic subject where the connections between computer science, information technology and digital literacy are exploited. We can think of examples if you would like of that.

That said, in terms of use of technology across the curriculum, it is about meeting young people where they are and taking them on to some place where they would not have got otherwise. Green and Hannon writing for DEMOS back in 2007 said young people on the whole are pretty good at being everyday communicators, they are good at staying in touch with their friends, they are good at gathering information, but they saw far less evidence of young people as creative producers or digital pioneers. Providing the opportunity within and

beyond the computing curriculum to move on to those higher uses of technology, those deeper skills, I think would be something I would very much like to see across the curriculum.

**Mark Chambers:** Just referring back to the first question, I am slightly less optimistic than Miles in terms of our ability to demonstrate that we are going to make a difference across the whole education system to the computing curriculum. I think there is evidence that in the primary schools—as in the case of Jack here—even in larger schools, teaching has been left to single individuals, who are those that are being exposed to the national training programmes that have been funded in the various methodologies. We are creating a gatekeeper for knowledge in the primary sector in particular, where things are getting trumped up and not reaching out to the individual classroom teachers, which brings me to your question. I am feeling that, because there has been almost an obsession with coding and with computer science, to the exclusion of the rest of the computing curriculum and to the exclusion of the use of technology for school improvement, right now we have a lot of teachers who are not confident about their use and who are questioning the value of things that they have learned have been useful over the last three or four years. I think we are at a moment where one of the powerful things that we could do is remind everybody that the use of technology in the classroom is important because it can impact on outcomes for young people. Most importantly, it is about providing them and sharing with them relevant experiences, which will reflect their experiences of the real world. I think that is key.

We are at a point where if we continue this almost lemming-like obsession with one aspect of the computing curriculum by national funding, by emphasis, formed by publication, we will lose the opportunity to draw forward the multitude of skills that are needed in the digital economy beyond just programming.

**Paul Hynes:** Two points: on the computing curriculum we have put a heavy emphasis on the digital literacy aspect. We divided our computing curriculum into three equal parts, so we have the computer science aspect. We introduced one called “creative media” that we did not feel was well represented in the curriculum. Then we also have the digital literacy. When we went out to our employers and said, “What do you want out of this strand?” nobody came back and said, “We want programmers”. Now that might be the west side of Nottingham’s group of employers. It is not a hot bed—it is not the UK Silicon Valley or anything—but what they did say was, “We want them to be good users of the Office applications”. So almost a backward step to what had been almost thrown out, so we have made a move to do the Microsoft Office qualifications with the children, so they leave with a certificate that says they can use Outlook, Tasks, Calendar and Contacts and all of those things—Word and Excel spreadsheet work—and that is of more value than any other course we can offer, when you look at it from the employer’s point of view.

To pick up on the issue of the learning technologies, at secondary we are blessed in that the students bring in, in their pocket, a device that has high-definition video, we connect it to an open wireless network in our schools so we have no technical issues, and we open up the world of knowledge to them. That aids the teachers in terms of offering differentiation and extension. We can link them, through a QR code or similar, to absolutely anything. I think that has been a blessing to us. Jack will probably say it is a little more difficult at primary certainly.

**The Chairman:** What about children who do not have that technology?

**Paul Hynes:** I think that is a bit of a myth. Whenever we do our surveys and talk to the children, if we are talking about a digital device in terms of poorer students, our poorer students have the better technology. It is almost as if our richer parents stay rich by not spending it on the latest device. I would say we have very few but again a school has the power through Pupil Premium. We can easily fund a device for them—sub £200—that will make a difference. We are also in the luxurious position that we can push out our wireless network to the local community and so we can say, “Here is a device that will connect when you are at home” so the fact that you are on a black list with BT so cannot get a landline because of county court judgments and previous history you can have internet in your house and there will be no charge for that.

**The Chairman:** Because from your school your area is very tight?

**Paul Hynes:** So their use comes at a time when we are not using our bandwidth because it is holidays and weekends and evenings, and that is not just us educating the child but offering opportunities and bringing a digital citizenship to the community and that group of parents particularly who would find it difficult to get that connectivity.

**Lord Kirkwood of Kirkhope:** Is that used a lot by other schools? I have not heard that.

**Paul Hynes:** It is quite rare. There are examples of it and the technology is there. You can provide a wireless in pretty much whatever radius you like. It is an extension of what you would get in a normal café or something similar.

**Mark Chambers:** I absolutely endorse what Paul is saying. We see it as members report to us what is happening in schools. We see it in schools that are embracing the technology as a key strategic part of their tools. But it is not common. Again, if the Committee wants to think about things that would make a practical difference, in terms of equality of access, requiring that schools create structures that facilitate young people’s access to learning through their personal devices would be very good.

**Paul Hynes:** As well, the other aspect is, when they connect they connect through our network so they are covered by all our web filtering and all of that protection.

**The Chairman:** Yes, it is safe.

**Paul Hynes:** They are immediately immersed in our learning resources that we would provide them.

**The Chairman:** That would only work where you have a very tight catchment area though, would it not?

**Paul Hynes:** It can be half a mile radius of the school. It is possible certainly.

**Miles Berry:** It also provides some interesting creative solution in areas where rural broadband access is very limited; if there is cable to the school but not to the village.

**Jack Evans:** I would say that perhaps there is a bit more of a divide between our children’s access to technology than what you suggest. Perhaps it is smaller on the whole, perhaps it is a bit of a myth, but definitely, on just my personal understanding, in our school we have a significant number of pupils who do not have access to those technologies. We are lucky we have great community links and they are aware of to be able to use them outside, libraries, through our clubs and things like that, but it is difficult for them to do those extra aspects we would like them to do.

Referring to your question about what is good practice, I would say in primary school particularly my personal opinion is a big deal for a primary school is to make children enjoy learning, so to see them using technology and to enjoy it. It is all well and good saying, "Oh we are going to use the cameras today just because you are doing a cross-curricular lesson" but unless they are enjoying it and using the technology and having fun through that, I do not see a great deal of value. We have to ignite their excitement in what they are doing. Although we are a very creative school, I would also say the idea of them cracking codes, changing their behaviour and rewriting things and then solving the problem is huge for them. When they go back and they say, "Nothing has happened", they have gone back and rewritten it and then it has fixed it. That is probably the biggest deal, the biggest change that I have seen since we started doing the new curriculum. It is something that goes across wider education about: do not give up on the first problem; you can try something else. I would say that would be important.

**Q162 Lord Macdonald of Tradeston:** In a Hackney school, Jack, I would anticipate you have quite a few children for whom English is not their first language. Do you find that the access to digital technology helps them with reading and literacy in the way that we heard in the previous session?

**Jack Evans:** It is very interesting because there is a very distinct divide between what types of languages are spoken at home and how that is dealt with. To give an example, for a lot of our Asian communities it is definitely improving their literacy. They access the kind of programmes that we ask them to. Whereas perhaps a lot of Turkish families they will use those technologies but it will be in Turkish at home, and so they much rather decide to use those rather than some of the programmes that we might suggest. There are still a lot of problems when it comes to the parents of our Turkish families, teaching users, compared to perhaps some other ethnic communities. So I would say it is quite varied. I do not know if that is a particularly clear for you.

**Q163 Lord Aberdare:** I want to ask how you tackle the issues of making students aware of the security issues, the privacy issues and some of the risks involved in technology? Does the new curriculum cover that in a helpful way and how do you deal with it?

**Jack Evans:** At the moment it does certainly. There are different points throughout the topic. We break it down into the topics, so throughout a number of the topics there will be a very specific focus on internet safety. When we are doing research for other areas of the curriculum as well, we have this ethos throughout the school and the understanding is anybody can be writing these websites. We know the rigour of research is very important, and that touches on the idea of internet safety. Also Internet Safety Day, every year there is a very huge focus. I know that is not good enough in terms of just one day a year but that is a very big deal and it comes into anti-bullying week as well, which is important with cyber-bullying going on or being aware of it. So there are a few different examples.

**The Chairman:** Mr Hynes, is that your experience too?

**Paul Hynes:** Yes. What I would say is our solution and the solution of many schools is to involve student digital leaders. So take a group of students who have this level of skill, use them as the forefront of the assembly where you are talking to the masses about e-safety, what the issues are, because to be honest the students will listen to each other rather than

to somebody like me standing at the front telling them to be safe, because they have had that.

If they are doing the assemblies, they are running twilight sessions for parents on how to set up their own blocking and things at home—it does not always make these digital leaders popular with their peers when the parent goes home and blocks their internet and things—but those are exactly the people that should be designing the posters when Facebook change their privacy settings or whatever the latest tool is that replaces Snapchat or whatever the new one is, what your privacy settings should be. In my book, that should be a student deciding that and it should be a student producing the posters, communicating that to the students, whether it is through a school Twitter account or similar. But they are the lead; they keep up to date better than the staff.

**The Chairman:** I am going to move us on to make sure we get through, because otherwise we are not going to get through the questions.

**Miles Berry:** Schools have long had a duty to keep children safe. The new curriculum provides them with a responsibility to teach children how to keep themselves safe, and that is a significant difference. Yes, we have from key stage one up that that children should be taught to keep their personal information private. In the modern world of the internet, that has wide implications so at key stage four there are new ways to keep your personal information private—there is a bullet point. That can include virtual private networks and onion routing for browsing. At key stage three we have a reference to security, which allows us to bring in issues of cyber security and encryption and password security there as well. Brief enough?

**The Chairman:** Thank you very much. That is fine, thank you.

**Q164 Lord Giddens:** If there is a high technological change, talking mainly of secondary schools and colleges, how do we prepare today's prospective labour force for the jobs of tomorrow since they are likely to be very different from the jobs of today? How do we do that in terms of preparation? What kind of vocational qualities should be taught and what kind of links with industry should there be?

**Paul Hynes:** The companies that run the vendor qualifications—such as Microsoft Professional and those sorts of courses—have a vested interest in keeping that up to date. So those courses are out there. The difficulty I see is schools are not picking them up. They do not attract those league table points and they do not attract the funding, and so schools have to do quite a complex mapping process. If I go back 10 years—

**The Chairman:** Who monitors those courses? They are not covered by Ofqual?

**Paul Hynes:** No, they just exist. But in terms of a globally recognised accreditation, something where we can push out the best of our candidates from this country and go out and lead the world, in a sense, I do not think there is anything better because they do have that instant validity wherever you go; they have a currency. If I go back 10 years, we used to use the advance GNVQ qualification and mapping those professional qualifications to it. We had to do that because that was the course that was funded. That is the course that would attract some element that would help in the performance tables, and yet we delivered the vendor qualifications through that mechanism. I would like to see more schools doing those sorts of things. That would certainly be one aspect.

**Lord Giddens:** How do you know the qualifications of today are going to be relevant to what is happening tomorrow, for example, given that someone could have an apprenticeship and then that complete trade is just knocked out? That has happened to composers in the printing industry, for example.

**Paul Hynes:** It is generic skills. It is the computational thinking. We have this with our code club—which is not connected to “the” Code Club—where students can come along and programme in whatever language they want. That causes no end of headaches for the volunteer staff leading it. Suddenly they are trying to flick from one mode to another, in a language they are not comfortable with and with a student who has a hare-brained idea of what they want this programme to do. But those transferable skills we are teaching them there should allow them to take up any course. Again when I talk to schools there is such a variety of programming languages being used out there, often led by whatever the member of staff happens to have some knowledge in. So, I would say go for the generic skills.

**Lord Giddens:** Would you care to specify what those skills are or give the Committee a sense of them?

**Paul Hynes:** Yes. It is the bug-fixing; it is the process of coming up with a structure, flow-charting, those sorts of things, looking at where a programme has particularly broken down and going back and looking at where the errors would be and feeding back. I think that is a generic skill every person should have to be a citizen, and you can probably apply it to most jobs through their life. That is not necessarily teaching them to programme in Python or a particular language.

**Miles Berry:** I concur with that. It is the skills of learning to use one particular application or even one particular programming language, which are going to be quite time-limited. Skills and approaches, such as computational thinking, that I would use as an umbrella term for things like logical reasoning and algorithms, decomposition, abstraction and generalisation of patterns. Something that applies to coding programming projects, but also has wide applications across the rest of the computing curriculum and to other fields, like project management. Many roles are going to draw on that sort of body of understanding or those sorts of concepts.

Alongside the computational thinking, though, I would add things like working creatively across a range of digital media. That will include code but need not be limited to code: being able to put together a four minute video essay—something we ask our trainees to do as part of the course at Roehampton—as well as things like being able to work collaboratively. That is something certainly a lot of the industry reports I read seem to be crying out for from schools, but something most of our exam boards seem to discourage in examinations, as well as the deeper criticality of stepping back and asking the “why” questions and “What is this? What are the assumptions embedded in this software or this digital media?”

The qualifications get you so far but for many of the creative industries it is, “Show us your portfolio. Tell us about the projects you have worked on”. Getting a job in the games industry is not about having an A level in computer science or a degree in games programming. It is about having made a game, and the opportunity for that in school, as I am sure your pupils have, is going to matter.

**The Chairman:** Just to be clear, when you describe what you are doing with your students at Roehampton, they are primary, are they?

**Miles Berry:** The people I work with for the most part are training to become primary school teachers as primary generalists.

**The Chairman:** In a sense, you are teaching this set of skills to primary teachers whose lead subject may be all sorts of different things. Is that right?

**Miles Berry:** Yes.

**Mark Chambers:** Just to share with you again some of the issues for people who are on the chalk face, so to speak, in schools there can be an almost—I am sorry, I am using “obsessive” quite a lot today—a strong emphasis on literacy and numeracy, because that is what will make a difference to young people. You can lose sight of the opportunity that technology brings as a multiplier to improve attainment in those subjects. Where we are with vocational skills at the moment is that we need to encourage industry to get involved with schools, at a direct level, to bring real world problems to the attention of teachers and students that they can collaborate together on solving those problems. If we do that in the context of literacy and numeracy, using technology, we will be getting very close to reflecting what they are going to do in the world of work rather than in an isolated sense studying literacy or in an isolated sense developing their IT skills. I think that is a much better reflection.

**Lord Giddens:** Do such collaborations—

**Mark Chambers:** I certainly think they do in good practice. The third millennium schools that I have referred to that Naace has been working with. They do in schools that are emphasising entrepreneurship as a key element of the curriculum, either secondary or primary, and those that are emphasising social entrepreneurship where young people are using technology and using their learning to create solutions to local problems that make a difference in people’s lives.

**Lord Giddens:** It sounds quite important to me. It could be generalised, could it not?

**Mark Chambers:** I think it could with a key message. It does not even take money. It takes messages; it takes important people prioritising this to communities and to the nation.

**The Chairman:** If you can send us anything hard on that it would be helpful. Any examples, and also anything about the impact that the use of technology has in terms of delivery of higher attainment, because people always need the proof before they will move to it.

**Mark Chambers:** One of the things I could recommend, and I know you are all extremely busy, as are MPs, is selecting to visit some of these schools that are demonstrating this practice. We could help and empower you with that, and that gives them an encouragement. Some of these schools here are SD marked schools or third millennium schools. Knowing that and we could empower you by giving you that information and then going to explicitly look at that kind of experience would give a great deal of encouragement at the local level.

**Lord Giddens:** I think the more we can get businesses to understand this the better, because you have to break the old model where schools just prepare people and the state pays and business just takes this for granted. Business has to have a much more proactive role in developing these skills in the future.

**Q165 Lord Janvrin:** I would love to continue that but I want to step back into best practice, sharing best practice among teachers and how in your experience this is most effectively

achieved. We have heard a lot about hubs and local networks, and so on, but what I do not understand is who is leading the charge in setting up local networks so that teachers can share best practice and learn from each other. What is your experience about who is enabling that, whether it is CAS or some other organisation that is pushing this? I would be very interested in your own personal experience of this.

**Paul Hynes:** For me there are two major areas. We are a lead school on the CAS centre of excellence and we are very tightly linked to a very good university, Nottingham Trent University that leads our local region. We are very happy with that network. But we have a more local need and that is where our teaching school alliance comes in, a group of schools that share their expertise on all sorts of areas whether it is behaviour management, use of school data, all those sorts of things. Using that network that is already in place and that mechanism of the meetings and the sharing and the keenness of people who are part of that is how we share those messages. We find that a little bit more inclusive in a way. Computing At Schools is a fantastic thing. It is quite a tricky network for the group of people who will most benefit.

**The Chairman:** Explain that a bit.

**Paul Hynes:** The people who are not interested in programming. This is what I found, if you go back 18 months, I will generalise it. A very nervous primary school teacher who has no vocabulary suddenly goes into this environment. Computing At Schools is not new. For the last eight or ten years or whatever it was populated by high ability, geeky programmers. There is a sort of mismatch there and it is those primary, under-confident people that most benefit from that experience but they do find it a threatening environment. I think we have the Computing At School hub that addresses one need and attracts a certain person who is willing to give up 4.00pm to 7.00pm every six weeks or whatever to come to a meeting and share practice. But for the other group that do not fall into that then the teaching school alliance meets most of their needs.

**Lord Janvrin:** One supplementary if I may; do you get any industry involvement in any of that or is it simply the profession at the various levels?

**Paul Hynes:** I would say very little in terms of industry involvement. We have done work with the employers, normally through the school governors, as to what their needs would be.

**Lord Janvrin:** It is more on the governance.

**Paul Hynes:** Yes. But we are limited again. We would love to send them to some fantastic work experience placements. Previously we have sent students down to London all the way from Nottingham to find a good work experience placement for that because they are not easy to find in our area. We do have companies that do high end virtual reality, but they are so secretive you cannot get a student to wander round there for a week doing some photocopying or experiencing what is going on. That is one particular local issue for us but we would love to give them more opportunities.

**Mark Chambers:** The Chair came up with a good idea when suggesting we need to map some of this provision. In response to your question, there are a whole range of providers from school to school; providers who are supporting each other with development in the computer curriculum to LA teams, which still exist because schools are valuing their contribution. I am thinking of one local authority where they still employ 10 people, not on

any kind of top-slicing but simply because schools are purchasing those services because they value what those people are bringing in terms of an innovative use of technology to the classroom. If Naace can help with that idea I think this is certainly something we would like to do.

**Jack Evans:** I can echo Mr Chambers' suggestion about LA authorities helping out. Particularly the Hackney Learning Trust is great at making those ideas available to teaching computing leads, which is obviously very highly dependent on the enthusiasm and commitment of those individuals throughout the school. But it is very easily available and Jeremy Harris, who I am thinking of specifically, makes me aware of a lot of ideas that are happening throughout the borough and then bringing teachers together.

On a much smaller scale with our partnership school we have a lot of collaboration frequently where we share best practice. She has now left but Louise Kwa—who I wrote our particular school's computing curriculum with—was equally passionate. We managed to combine our skills to write the curriculum for both those schools, but, of course, that is very small scale. It is quite difficult to copy.

**The Chairman:** In terms of Hackney, you say the Hackney Learning Trust provides some level of coordination, is that right?

**Jack Evans:** Yes.

**The Chairman:** When you write your curriculum with one other primary school in Hackney what happens to that? Beyond your schools does anything happen to that?

**Jack Evans:** With ours at the moment, no, but we do have ideas in place that perhaps if it is particularly successful we can roll it out to others. We have also used in the past a Hertfordshire school curriculum that is again sharing knowledge, which we found incredibly helpful. It was based on the previous curriculum but did have an open mind to the new aspects so it was helpful but obviously now has to be changed quite a bit. Yes, there are possibilities, definitely.

**Q166 Lord Holmes of Richmond:** I want to turn to extra-curricular programmes. What role do you think extra-curricular programmes such as Code Club have and what impact do such programmes have on the students' learning?

**Mark Chambers:** Just to start off, we might introduce another name: CoderDoJo is another alternative to Code Club. Naace and CoderDoJo are currently talking to a major bank about getting involved with us directly, in terms of an initiative in the North West providing out of school learning opportunities for those who are interested in coding specifically. I am giving you a little illustration there of an alternative to Code Club. We feel this is important because it gives those who want to specialise the opportunity to deepen their learning. The fact that it happens outside the school day recognises there is a broad range of other things that others will be interested in and I think we would advocate some balance in terms of that provision.

**Miles Berry:** I want to return very briefly to a couple of things in relation to the previous question about ways practice is shared. There is more to CAS than the CAS hubs. The online community is a particularly vibrant place, where people are posting you questions and getting responses and there is a lot of industry representation there. You would have some very senior people working for Google and Microsoft responding very quickly to teachers'

questions and that is fabulous, it really is. We are seeing a sharing of practice. I think at some point we are going to need to step back and question what best practice is in here. There are 1,000 flowers blooming at the moment.

The community is becoming more skilful in evaluating what makes for good practice here but I think at some point there will be a stepping back and saying. "Yes, that does work". This comes back to the question of measuring impact of initiatives such as Code Club. Nobody gets to Carnegie Hall through just going to class recorder lessons. The entitlement for everybody of course matters, but those who are destined for careers in the industry or as academic computer scientists will have to put in the 10,000 hours. Peter Northing talks about taking 10 years to learn to code and it is going to be an experience like that.

Code Club will pivot from an extra-curricular club for those who are interested in learning coding because it is not happening on the curriculum to the extension and the enrichment activities for those who do want to take it further, just as you have a school orchestra or a school choir for those who are particularly interested or gifted in those dimensions. But that alone will not be enough either because you need to put in the hours of practice and start writing some code essentially.

**Q167 The Chairman:** How does that happen because they do not even operate in secondary schools?

**Miles Berry:** No, but last week I think Claire Sutcliffe hinted this was something on their agenda and many secondary schools like Mr Hynes' are offering extra-curricular provision for those who are enthusiastic and have done so for a while now.

In terms of evaluating the impact, we announced yesterday that I and a couple of colleagues at Roehampton are going to be evaluating the impact of Code Club's work and our model should be robust enough to look at other initiatives as well. We are interested in does this promote this sense of wanting to be a digital maker, wanting to work creatively in the digital domain among those children who do turn up to Code Club and take part in that? Does it help develop children's computational thinking, the cluster we were talking about earlier? Does it help them with those softer skills, the creativity, and the collaboration? I hope so, and ultimately does it make a difference to their maths science? It would be nice if we found evidence that it did.

**The Chairman:** People would buy into it quicker, that is for sure.

**Miles Berry:** Yes. This is an open question and I do not want anybody thinking there is a foregone conclusion there.

**Paul Hynes:** Certainly I think we get a different clientele to each one of our extra-curricular activities. Code Club is one group of particularly focused programmers. ICT Club has a different clientele and our Robotics Club is a very different group altogether. Often the younger students who just want that little in to the real world of programming, through using the Lego apparatus and things like that they can do that. We have noticed the progression of those students that attend the Code Club is off the scale. It goes so much quicker, and part of that is them explaining to other students or jointly problem solving an issue with one of their pieces of code. It reinforces their own knowledge but at the same time gives them a level of challenge.

If I am being polite, some of those students are not necessarily the best communicators as well, as a lot of programmers you meet aren't, so that opportunity for them to be into a vibrant community environment where they are sharing code and talking about each other's code helps them in a softer social skill as well as their programming aspect.

**The Chairman:** This is slightly darting to another question, but what is your proportion of girls and boys in your upper school set?

**Paul Hynes:** Again in those sorts of things the gender split is across the different groups. We are quite lucky in that we are starting to put female role models in there through the teaching staff, and I think is a massive step forward for us. We are dying to have our first female computer scientist that can go all the way through to A level but we are lucky in that we get these in at Year 7 and 8 when the girls can see; hold on, here is a female role model here who knows their programming and they can follow that through. As long as we do not alienate them in any way through those extra-curricular and they are adopted into there I cannot see any issues.

**The Chairman:** We will move on or otherwise we will not get through our questions. Lord Aberdare.

**Q168 Lord Aberdare:** I wondered how you see the role of online learning and whether that is going to in any way change the role of the teacher, whether you are already using any of these famous MOOCs that we hear about but what your perception is of the potential of online learning, particularly from the two who have experience.

**Jack Evans:** I can start just by introducing some of the things we do in terms of online learning. Mathletics is a large part of what we include, so it is an online experience where children log in and they can be set certain tasks by the teachers and they can also challenge other children around the world. They can have their particular maths challenges and you can work out which sum is the fastest. From my personal point of view I would say it is more individualised aspects like that. Perhaps you could broaden that to other subjects, of course, but just from our school's point of view at a primary level I would say it would be more individual aspects of learning rather than a broader understanding of it.

**Paul Hynes:** I think for us the focus has been on the blend. We are not ready to get rid of teachers just yet but we cannot obviously ignore the power of the online learning, its 24/7 availability and the diverse nature in terms of differentiation. You can find all sorts of videos on YouTube and Khan Academy and things that will help students. From our staff is introducing concepts like flipped learning that takes that model of what used to be the homework becomes the classroom experience and what used to be the classroom experience becomes the homework status. The students do their learning outside the school through a flipped model and then they come in ready to maybe do the exam technique aspects around that as well.

Again, I think the computer staff are leaders in this. They have to become facilitators. That is what they are really. We still use the phrase "teachers" for them but they are facilitators because they cannot be experts in all those programming languages and solve all people's problems. But they facilitate the support and the challenge and the extension of the students and post them in the directions of where they will their next piece of work or where they will find support if they are struggling. Computing is probably our lead area in

the school for that transition over to a facilitation role as opposed to a genuine stand at the front, on the stage sort of role.

**The Chairman:** Mr Berry, is this something you train your new teachers in?

**Miles Berry:** We spend some time asking them to evaluate online resources, particularly focused on systematic synthetic phonics and we get some very interesting results. One of the interesting observations from trainees has been how different some of these resources would be if the software developers had teachers or educationalists involved in their development. Often what is labelled a phonics resource seems to be a reading resource and is not developing that graph in phonics correspondence.

The online resources we see particularly targeted at primary school are very good at drill and practice for reinforcing factual knowledge, and it is of course part of learning and rightly so. But they seem less effective at a more social model of learning. They seem less good at developing a deeper understanding of things or at exploring the creative application of knowledge. It is very easy to get a computer to mark a page of maths questions. It is much harder for a computer to give meaningful feedback on a piece of poetry or a piece of art, and you see this with things that are focused on the computing curriculum too.

But the flip learning point is a well-made one. Of particular interest is the key stage 4 computer science curriculum. It says on the National Curriculum all pupils should have the opportunity to study computer science or information technology at a higher level and in a school where there is not an expert teacher who can teach to GCSE computer science, MOOC may well have a place there. Something like EdX's CS50, what a brilliant opportunity to study that for a child who is sufficiently motivated and connected to be able to pursue a qualification on a course like that.

**The Chairman:** Lord Lucas, you wanted to come in.

**Lord Lucas:** It is on a different subject if someone wants to continue this.

**The Chairman:** We are tight so you can come in.

**Q169 Lord Lucas:** To come back to what you said about industry qualifications, it has always seemed extraordinary to me that universities that can evaluate qualifications from 190 countries round the world are so restrictive on the UCAS form. Would it make a difference if you were allowed to list things like these qualifications on the UCAS form or would they have to assign points to them for you to be motivated to do them?

**Paul Hynes:** It would be idyllic if there were points attached. Some of them overlap so much that they are not welcomed by universities. We had a student with a Cisco Networking qualification who applied to university. They accepted them and said, "Basically you do not need to turn up for year 1 so come and see us in a year's time because you have covered everything. Go away and do something exciting for a year and then come and join us in year 2 because your Cisco Networking qualification covers our year 1 curriculum". It is not quite engaged, because it is not a recognised route that they are used to, they are used to the traditional A level route, they have to be treated as special cases.

**Miles Berry:** I do not take responsibility for Roehampton's admissions policy.

**The Chairman:** You are part of the national, are you not? You cannot separate.

**Miles Berry:** But the potential trainee for our undergraduate course who says, “I have completed EdX CS50” or another high value online open course as part of their personal statement is somebody I would very much like to talk to at interview about that experience. That evidence of independent study and self-motivation counts for a lot in terms of a recommendation for a course, possibly more than quite a few UCAS points, to be fair.

**Mark Chambers:** We are wrestling with the area that you are talking about as a community at the moment, particularly at aged 16 where we have a computing science GCSE that is part of EBacc and we do not have any point at the moment, formal stage of recognising another qualification that might involve the rest of the computing curriculum, so there is no computing GCSE for 2017 onwards. There is a lot of debate internally in our community at the moment as to the appropriateness of that qualification, of the overlap between the two.

In terms of the vocational qualifications that might be of equal value with the GCSEs, again there is a lot of debate at the moment because between the practical elements of computer science and the practical elements of a computing vocational qualification is incredible overlap because you cannot produce course work of comparable quality unless you have the theoretical underpinnings that would help you to support the delivery of that course work.

But that is overlap, so you might be disqualified from a points’ equivalent system that we have operating in England at the moment.

**The Chairman:** It needs some joining up.

**Mark Chambers:** It is more telling you about the complexity of the issue at the minute than suggesting we have solutions as a community, I am afraid.

**The Chairman:** Thank you. We need to move on very quickly. Lord Haskel.

**Q170 Lord Haskel:** This is a question about inclusion. We have been told that a lack of awareness of the benefits of digital and how to use new technologies will contribute towards a rise in inequality. How can we make sure that all students and all pupils are inspired and equipped to work in and maintain their future in a digital-based environment and what are the skills they will need to do this, to avoid this inequality?

**The Chairman:** We have covered some of this earlier so it is anything in addition you want to bring to the table on this.

**Mark Chambers:** If I could just emphasise that one of the biggest barriers to equality is not necessarily personal ownership but the effectiveness of the infrastructure when they attend school or in their local community. I think this Committee might well have some strong opinions on how to support primary schools particularly with effective infrastructure. I could go on on that, so that is fine.

**The Chairman:** No, we have had that before and that makes sense.

**Miles Berry:** I would add to that the importance of home access and I am not alone in regretting the demise of Vector’s home access scheme of providing children who were coming from particularly challenging backgrounds a computer and access to the internet. The access to the web is such a transformative thing in terms of so much of what we have been talking about here and I would love to see some evidence of schools spending Pupil Premium money on providing those children who do not have that access, by no means

every child on free school meals, of course, with a laptop of their own, with a connection to the internet.

**Q171 The Chairman:** This has been raised with us before and we have asked various other people to send us a very short note on what is the cheapest basic package that somebody needs to be in a sense connected at home. If you could do that, whether it is a tablet or a laptop, what the basic cost of joining it all would be because we want to get that from arrange of people. It would be helpful.

**Miles Berry:** I will do that for you. The other thing worth saying is firstly on the gender issue, I think putting computer science onto the curriculum from primary school will help with that. Emma Mulqueeny speaks about Year 8 being too late and I think she is absolutely right. If they are interested in computer science and programming from primary school there is more chance of coping with possibly adverse per pressure when it comes into secondary school. That said, 14 to 18 becomes an issue. I worry, and it is hard to track down the evidence on this. Maybe your Lordships can help with this. The proportion of schools that are offering computer science as a qualification at GCSE and at A level, my suspicion is that they may be skewed towards more affluent areas an there is not a fair entitlement there. Having there as an entitlement, yes, you should, whichever school you happen to be at, whatever home background you come from, be able to study GCSE computer science and A level computer science as well as qualifications in IT, of course.

**Paul Hynes:** What I would say, Lord Haskel, if I put four students round a table and gave them a task the immediate response would be to all get their devices out and make a decision. They do not do it in the way that you or I or the parents are worried that somebody will say, "Your phone is rubbish. It is really old". They do not do any of that. They look at what is available on the table for their team and what the task is and they choose the most appropriate tool for the job. One child's device might take HD quality so we will use that for producing the resource. Somebody else's might have a bigger screen. That would be easier for browsing the internet to do our research. Sometimes it is just sitting there and seeing whose screen is not broken or cracked or whatever. That is how the students would approach that. In our heads and often in the parents' heads they think there will be some sort of bullying because of not having the latest device but I never see it in practice. That is how they would sit down and they would work on it as a group in that way.

**Jack Evans:** I think quite a big aspect of addressing this inequality is maybe going into the idea of our extra-curricular club. For example, I choose, because our club is oversubscribed, a selection of children, not only the ones who I think are going to do well, which is obviously incredibly important, but also to the ones who I know do not have access to those types of things. To make the availability and the idea that they could pursue this if they wanted, whatever they have at home, regardless of that, so they know they can be part of this world very easily is I think incredibly important.

**Lord Haskel:** You think social skills are as important as the technical skills.

**Jack Evans:** I think the mentality behind it very much so is as much important as technical logical skills, yes.

**Q172 The Chairman:** A final question, and we are asking this of everybody who comes in front of us. Can you give us one key suggestion that you think we should recommend to the

Government to move this whole area on? It is always hard to focus on one but if you can try and focus on one thing that you think is worth us recommending.

**Miles Berry:** I would come back to the point I just made, ensuring that all secondary schools offer GCSEs in computer science and IT for any student who wants to study these along with developing a similar robust academic, rigorous qualification in creativity in digital media. I am not sure how we label that but a qualification like that would be really nice to see.

**The Chairman:** Thank you very much. Mr Hynes?

**Paul Hynes:** I would like to see some qualification that recognised the work of student digital leaders reflected in performance tables that takes it on a step. Things like the nice idea of open badges takes it to one step but I would love to see a more robust certification that would be recognised by employers for that, reflected in league tables as well.

**The Chairman:** Thank you very much. Mr Evans?

**Jack Evans:** I would suggest highlighting the idea of training primary school teachers, looking at just for my background, in computing skills. I did not qualify too long ago, five years ago, and the computing that we did we had to pass a test for it but that was so tiny. You might be able to help me out slightly, Mr Berry, about what you do now but I would say focusing on the fact that it is a huge part of what we teach in primary schools now and making that training very rigorous.

**The Chairman:** Thank you. Mr Chambers?

**Mark Chambers:** Computing science specifically, since the redevelopment and re-launch of the computing curriculum has received significant national investment. If there were to be a similar or even a 50% or any other number you care to choose, prioritisation of the rest of the computing curriculum I believe that not only would we see a return on investment in terms of performance in computing, we would see a return on investment in terms of computing across the rest of the curriculum, sorry, competences across the rest of the curriculum where computing has such a multiplying effect.

If I can add one little bit, you as individuals could take an interest in those schools in your communities that have achieved a quality mark of some kind. We write to you, we write to MPs and if you could respond to those and encourage those schools that would be extremely practically useful.

**The Chairman:** I am not sure you do write to Members of the House of Lords, do you?

**Mark Chambers:** We definitely do to MPs. I need to go back to the office to ask about the Lords.

**The Chairman:** I think you need to go back and make sure that you write to Members of the House of Lords as well, and that is a very fair recommendation. That is our recommendation to you then. Thank you very much indeed. It has been very interesting. Clearly the computing community is not quite as cohesive as we had been led to believe so that has been very interesting. Thank you very much.