# School C teacher 3 – 17 Jan 2017

Interviewer: Okay. [inaudible 00:00:04] leave it there so I can see [inaudible 00:00:06] a good way for me to [inaudible 00:00:09].

Teacher 3: Okay.

Interviewer: Okay? Yeah. We talked about this a little bit a second ago, but just to give me some context. How long have you been a teacher and how long have you been teaching here?

Teacher 3: I've been a teacher since 2001, and I've taught here that entire time. I retrained, this is my third career. I retrained in 2000ish. Yeah, 2000 to 2001. This was the first and only job that I applied for. It's such a lovely school, it is actually impossible to leave once you've got here.

Interviewer: Once you're in, they don't let you out.

Teacher 3: Yeah. Well, you don't want to leave. It's a big commute for me, I live 33 miles away. I didn't think I was going to be here forever and ever, but actually, I am.

Interviewer: Which direction?

Teacher 3: Towards Barrow, so I live not as far as Barrow, but in that direction.

Interviewer: Okay. That direction.

Teacher 3: Yeah.

Interviewer: Before I forget, what was your name again?

Teacher 3: Teacher 3.

Interviewer: Great. I realised I don't have the consent form from you yet, which is normally where I get the names.

Teacher 3: Okay.

Interviewer: Okay.

Teacher 3: Yeah. I originally, do you want to know where I started?

Interviewer: Sure, if you want.

Teacher 3: I started as an engineer in a shipyard for 12 years. Then I ...

Interviewer: Over in Barrow.

Teacher 3: Yeah. Then I worked in a software company for five years writing training manuals and training users and trainers for the software. Then I applied to be a teacher. Because of my degree, being in engineering, I actually couldn't be a teacher for anything except IT, because you have to have a degree in your subject. For IT, you had to have experience. My entire working life was an engineer and as a software company person was with IT.

Interviewer: You, when you were at the software company, you weren't writing software, but you doing manuals.

Teacher 3: Yeah. I was writing training courses, writing manuals, and then actually training the people who go and do the training of the users. I was training the trainers.

Interviewer: What sort of software was it?

Teacher 3: It was requirements management engineering software. It was not the kind of thing that your average person was used. It was used in big companies like shipyards and such places.

Interviewer: Right. Okay. I know the type of thing ...

Teacher 3: It was data flow diagrams and ... I can't remember all the different diagrams that it was, but it was requirements management.

Interviewer: It would calculate things like your resources and things like that.

Teacher 3: Yeah, it wasn't project management software. It was keeping tracking of what a client was asking you to do, and the processes that you were setting up in order to meet the client's need with whatever software you were writing. It was requirements management for software authoring.

Interviewer: For making big stuff.

Teacher 3: For making big stuff, complex stuff, yeah.

Interviewer: Big complex stuff.

Teacher 3: Ships, boats, planes, that kind of thing. Racing cars.

Interviewer: Like the stuff they build in Barrow.

Teacher 3: Yeah. And such places.

Interviewer: Okay. You've already covered the other question, which was what did you do before teaching.

Teacher 3: Okay.

Interviewer: In general, this isn't an inquiry question, what's it like teaching here, how's it changed over time, if at all?

Teacher 3: The school itself is a lovely place to teach, because the pupil's are well disciplined, well behaved. We have a wide range of people, so I don't think it's that we're particularly privileged. There are a lot of underprivileged pupils and pupil premium kids and so on, but there is an ethos in the school which does manage to persuade new pupils when they're coming in in year seven or whatever year they're trying to send, to be decent human beings, and somehow that keeps going.

 Therefore, it's a nice place to teach. From a general point of view, it's a lovely place to teach. From a teaching my subject point of view, that has obviously changed enormously over the years. From the start, I taught computing at A level but the IT side of computing at A level, so those were the days when the A level IT qualification included, for example, doing a big database project. My part of the A level computing was the database project and the other part, which was the programming part, was done by R-.

 I've always been IT focused rather than computing focus. Then of course-

Interviewer: But also always been thinking of those two in contrast, which is different from some teachers, I think, they haven't always been aware of that other side.

Teacher 3: Yeah. When we first switched from IT to computing at key stage thee, I described it to a non specialist as like expecting a Spanish teacher to suddenly start teaching Latin. There are similarities, but it is a different subject, a completely different subject.

 It's familiar, there's are bits in computing that obviously are familiar to an IT teacher, but essentially, it's a totally different subject. While I completely agree with the government's, maybe this is a late question but I'll say it now.

Interviewer: Don't worry about it. It's a conversation.

Teacher 3: I completely agree with the government's view that people should be taught computing. However, they have been to IT, and on the mistaken belief that pupils learn IT through osmosis by using IT in other subjects. That depends on the other subject teachers having expertise in IT, which they may think they have but they don't. You get teachers teaching kids to use ridiculous bits of software like PowerPoints to make posters or publisher software to make letters, and that kind of thing.

 Teachers of other subjects might know other software in a very superficial manner, but they only scratch the surface, so they don't understand things like master slides, they don't understand things like style sheets, they don't understand how to use paragraph styles in word processing, they don't understand the depths of spreadsheets that you can do. What I think is happening is that the burgeon of teaching IT has transferred to non specialists who can't do it, but think they possibly can, because they're just not aware of the shallowness of their understanding.

Interviewer: I think that's the best case scenario. I think that you have a mixture. You have the best cases where you have non specialists who don't understand it but do the best they can. I think the worst case that you often get is non specialists who know they don't know it and don't even think that they're good at it, and don't even attempt to go there, because they don't even know where to start.

 I think you see both. Unfortunately, the focus of what I've been doing with this research is focusing on computing and ICT teachers, but there definitely is something far broader about teaching non specialists teachers knowledge of computing and ICT.

Teacher 3: Yeah. At the moment, well, in the past, we saw it as our role in the IT department, this was before the computing curriculum came in, we saw it as our role to, in years seven, eight and nine, to equip pupils with IT skills, so equip them with the basic skills that they needed not just for school, but for life. We thought of that as things like intelligent searching, checking for bias and so on in web searching. We saw it as basic word processing, basic spreadsheet work, basic PowerPoints, publishing documents, that sort of thing.

 We saw that as a service that we offered, so that they could then use all of those basic skills in every other subject and in their later lives. We wanted to cover a core things in year seven, eight, nine to equip them, because that's the only years that they will all study IT. That's gone now, so nobody is equipping pupils with those skills.

Interviewer: Do you think that at a school like this one, where my sense is from my knowledge of R-and A- specifically, knowing them a bit, there's always been a knowledge of computer science and computing broadly. In some ways-

Teacher 3: Absolutely. Right from the start, we've always done things like scratch.

Interviewer: Yeah. Whereas in other schools, the ICT meant there was no emphasis on computing here. There's always been that broad approach.

Teacher 3: Yeah, there has. It didn't come as a horrific shock, because when we swapped from one to the other, because we were already doing scratch programming and robomind and so on.

Interviewer: Yeah. In some ways, it seems like in the old system, there was actually more scope for being broad, whereas actually if you have a school that's capable of being broad now, there's less scope for that because there's less time for some of the ICT stuff, the ICT stuff is getting-

Teacher 3: Yep. It's been squeezed out. We do still try to fit little bits in. That's growing again, because we realised that if we didn't, for example, teach a bit of IT, then in year nine when kids are choosing options, they have no idea what IT is, so people stop choosing it as a subject despite the fact that we still think it is a creative subject with value. We're gone back to including some IT further down the school. It's not a finish work. We haven't got it perfect yet. The emphasis is still on computing, which is also something that I think is right, I think we should be doing it.

Interviewer: What do you mean by creative subject? I think I know what you mean, but ...

Teacher 3: We choose to focus on using IT for creative things like making animations or editing sound or editing graphics.

Interviewer: Okay. Do you feel like there's less ability to do that in the computing, more specifically computing stuff?

Teacher 3: Not entirely. For example, we are doing a unit in year eight about graphics, which in our heads I suppose is largely a computing unit. We started by teaching about RGB values and about why originally there were gifs and how jpegs had to evolve in order to make better quality images and why jpegs can support more colours than gifs. All of that is computing, but then we lead it into IT. At the moment we're just about to use spreadsheets to edit CSP image files, so that you can see how philtres and so on are applied to images and how it's not magic, it is maths.

 They need to know a little bit about spreadsheets in order to be able to do that magic maths, to an image file. For them, it's astonishing, that by changing a column of numbers, you suddenly make an image have no blue in it. They think that's, they do think it's magic. That's quite creative, but teaching the spreadsheet part of it feels like IT, and teaching the RGB values feels a bit more like computing.

Interviewer: It feels like ... Does it feel like there's more scope for creativity in some of the ICT stuff than there is ... Because the computing stuff is a little bit more ...

Teacher 3: There's creativity in both, absolutely there is in both. In year nine, we teach a game making course, which we do in order to have a more enjoyable outcome from doing programming. We teach game analysis and game design and testing, black box testing and white box testing of a game. They get a game out of it, and there is creativity in that, and they design or can design their own sprites and sounds and backgrounds and so on.

 There's definitely creativity in both, but when we're trying to sell the subject at year nine, and you have to draw a distinction between the two, the kind of people who are going to do well in computing and GCSE are the ones who are nerdier. The ones who are going to do better in IT are the ones who perhaps are more creative, I think.

 It's a hard distinction to make, and there are definitely some people who do brilliantly at both. We do encourage people to choose both, IT and computing.

Interviewer: I also think it's really important, it's really interesting, you guys have had an opportunity to tease out some of the more subtle differences between the two, and I think that there's some broad differences between the two subjects. It's really interesting to get more down to the more feel, I want to say, intuitive differences about who is good at these different [crosstalk 00:14:12] and why it's so important to have a curriculum that is broad, rather than is more narrow.

 The other thing that I'm encountering is that if we're thinking about the usage of computing or ICT, there's a whole range of future usage things like graphic design and games design and animation, which aren't covered in computing but were covered or can be covered in ICT.

Teacher 3: Yeah. We do do, in our IT qualification, where we particularly choose at GCSE level, to teach animation and app development. I suppose because we're trying to encourage that view of what might be possible in the future. I feel that absolutely every child who's growing up now and is in secondary school now, absolutely every child, whatever they choose to do will end up using IT. I can't think of a single job you would do where you won't, in some way, need to be able to understand ...

Interviewer: There'll also be [inaudible 00:15:23] jobs, I would think.

Teacher 3: Sorry?

Interviewer: Not just in jobs, in life in general.

Teacher 3: That's true, in life in general. Yeah.

Interviewer: Writing a formal letter to someone or writing an informal letter to someone using IT skills.

Teacher 3: Yeah. I've just been doing letter writing with year 10s, that's part of the qualification is to do a mail merge letter. What I find astonishing is actually they've never written a letter, a business letter at all, and didn't know how to lay out a letter. I would've thought that would've been something that the English department would've done, and maybe they have, but it's just fallen straight out of their minds again.

Interviewer: Something like mail merging, if people continue to do Christmas cards ... Why write out every single Christmas card?

Teacher 3: Quite.

Interviewer: Rather, mail merge them.

Teacher 3: Mail merge your address label or whatever, yeah. When we were discussing mail merge, I tell them, how do you think you get labels on your books? We're mail merging thing. How do you think we label our [inaudible 00:16:19]? It's a mail merge. We're using mail merge all the time for practical things.

Interviewer: That again is an example of, I think, a skill that a lot of other non ICT people probably wouldn't have.

Teacher 3: No, they don't.

Interviewer: People within the English department, for example, probably won't know how to do mail merge necessarily yet, as a general ICT skill.

Teacher 3: Yeah. It's something that ...

Interviewer: Kind of invaluable.

Teacher 3: ... Suddenly opens up a whole load of things that you can do so much more easily. I don't think it's something actually that you can teach at year seven, eight, nine, because they don't really have the need to do something that mail merge solves the problem. By the time you get to 10s and 11s, they do begin to see. Things like in word processing, being able to do automatic tables of contents and automatic indices, list of figures and so on. I teach them these things at the beginning of year 10 in order to make the course work, writing, easier.

 It must make things easier for other subjects.

Interviewer: Yeah. I would think so.

Teacher 3: And any other length bit of work that they have to write if they can make-

Interviewer: As soon as you're writing anything that's over let's say five pages, being able to do your page numbers and your table of contents automatically and knowing that it'll know how to update it. I wish I knew that when I was [inaudible 00:17:38]

Teacher 3: Yeah. I feel that children should be equipped with that, but they're not, because only a proportion of them choose IT at GCSE, and of course the ones who don't do that don't get equipped with those skills.

Interviewer: Not as a criticism, because it's invaluable, we've gone off topic, which is-

Teacher 3: We have?

Interviewer: -brilliant because you've answers loads of stuff and told me more than I ... The thing about questions is you can only ask as much as you can imagine, which so usually with the most interesting answers are to the questions you don't ask.

Teacher 3: Back to the questions.

Interviewer: What do you think about the phrase computational thinking? I'm sure you've come across it. I'm sure you use it all the time.

Teacher 3: We do use it all the time. We have massive banners in our rooms saying computational thinking.

Interviewer: What does it mean to you?

Teacher 3: What's it mean to us?

Interviewer: What does it mean to you specifically? What do you think its role is in computing?

Teacher 3: Okay.

Interviewer: You don't have to do the rote answer that R-taught you.

Teacher 3: Computational thinking is, in my way of thinking, it's a logical way of thinking, an algorithmic way of thinking, a way of looking at a problem and breaking it down into sub problems that you can solve yourself. We talk about decomposition and abstraction and all these things, and pattern recognition. That is computational thinking, and there are skills which they get from other things.

 For example, I have a completely separate to what I teach, I have a club in which we do ... It's a games club, and so it's chess and war hammer and other such things, and Sudoku. There are, if you know them, simple rules to play those games, then it opens up this wealth of games that you can play or puzzles that you can solve. Computational thinking is being able to see those rules, being able to pick out the essence of what the problem is.

Interviewer: I like that answer. Being able to see the underlying rules of something.

Teacher 3: Yeah. And see what the exceptions are. This rule will work for me 90% of the time, but in these circumstances, at the edges of this situation I'm looking at, I'll need a different rule maybe to get started or a different rule to get finished or a different rule to deal with this edge situation.

Interviewer: And bringing in things like chess and whatever.

Teacher 3: Yeah.

Interviewer: There are underlying rules in games.

Teacher 3: Games, yeah. And puzzles. We do Bebras every year, which is an international computing competition.

Interviewer: We came across that yesterday.

Teacher 3: Okay. We love Bebras because we think that it really tests computational thinking, because the puzzles just look like logic puzzles to the kids. They don't at all get that the puzzles are related to computing, but they are. There are underlying computing principles that are being asked about, but they're just puzzles. We do it every year from year seven right all the way up to year 13. We do see an incredibly strong correlation between the kids who do well in that and the kids who are proper nerds, they're going to do well in computer science.

Interviewer: Yeah. What do you think computational thinking is good for? What do you think it's not as good for, if anything on either side?

Teacher 3: Within learning computing or within life?

Interviewer: Broadly. However you want to interpret that. Interpret it.

Teacher 3: Computational thinking. I think a lot of what I do, apart from being a teacher of a subject, I also organise the exams in school, which is just one massive great puzzle. It's one massive great project management puzzle, and I've also done the timetable in the past, which is another puzzle. I think the reason that I'm good at sorting out the exams is because I'm a computational thinker. While I wouldn't actually classify myself as a computing teacher primarily, I would classify myself as an IT teacher primarily.

 I think that I am a computational thinker, and therefore I can do these big project management complex puzzles.

Interviewer: Yeah. That makes sense. I think that's a really interesting distinction. I feel the same about myself. I'm not a coder, I'm programmer, I know a couple of languages a little bit. I think that I'm far better at the computational thinking, that's where my interest in the subject comes from, it comes from that side of things.

Teacher 3: Lost again. We're lost again.

Interviewer: Lost again, which is fine. I was just looking at the next question, which is, what do you think the main purpose of the change from ICT to computing is, but I think we've covered that a little bit.

Teacher 3: Yeah. I think it's because the government did recognise that, it was Google, wasn't it, that said ... What's his name, Larry something.

Interviewer: Larry Schmidt.

Teacher 3: Yeah, was it him? Yeah, who said that he was flabbergasted that nobody was being taught computer science.

Interviewer: It's really interesting though, I went back to that speech last year that he gave, and there's the bit everyone remembers where he says he's amazed. Actually, earlier, I think it's earlier in the speech, basically he says that the history of the English curriculum is about having a broad education, and that what you need is people with a broad education, and it's really interesting to look back on how we misremember-

Teacher 3: How it's been interpreted, yeah.

Interviewer: It's been misremembered in some ways.

Teacher 3: Yeah. I feel it was a huge mistake to persuade the government that IT was dead, which I think essentially is what they were persuaded, and that computer science was what we should be teaching. I think that in QES, even before that, we always did teach both, and maybe we needed to increase the emphasis a little bit towards the computing. I think it's a disaster to stop teaching IT. I think the disaster hasn't materialised yet because it hasn't ripped through. We are sending kids out of school, or will be sending kids out of school in the next two or three years, who have never been taught IT.

Interviewer: Yeah. In some ways, and one of the other teachers I've spoken to said this, that in trying to do so much for really the computer science industry, we're doing a disservice to every other industry where people need ...

Teacher 3: Yeah, absolutely.

Interviewer: ... Rather than computational thinking [crosstalk 00:24:15]

Teacher 3: Not just industry. As you side, life. We're sending out kids who don't think when they're doing a Google search, they don't think about what they're finding and whether or not it's reliable or biassed, and they wouldn't even think about making a spreadsheet to solve a problem because they've never seen a spreadsheet.

 While we are trying to build that back in, what we're expected to teach from a computing point of view is quite large, and it's simply not possible to teach what's expected for the computing curriculum and the all writing curriculum as well.

Interviewer: Do you feel like the computing curriculum is relevant to the pupils, and do you think they'll use the concepts in the future, or no?

Teacher 3: No. I think they'll use the computational thinking that we are teaching them through computer science, and I think some parts of what we're teaching them for computing open their eyes to how things work. Of the 210 pupils who leave in one particular year group, how many of them will actually even write a game ever again, or an app ever again? Maybe an app more likely. Whereas they will all, nobody else is turned-

Interviewer: Sorry, don't worry.

A-: Are you happy to talk to year 10 students?

Interviewer: Sure. I talked to some year seven students yesterday, so.

A-: Yeah? Good, because I will have some vex people in next [crosstalk 00:25:49]

Interviewer: Yeah, year 10s will be actually easier in some ways.

Teacher 3: Would you like us to-

A-: Good, [crosstalk 00:25:53]. Sorry?

Teacher 3: Do you want us ... Or is this at lunchtime?

A-: Lunch time. I have vex and they'll all be there, so I just ...

Teacher 3: All right.

Interviewer: Yeah, sure.

A-: Yeah?

Teacher 3: They would be good people.

Interviewer: Yeah. Yes, I had this group of year sevens yesterday, I was up in [inaudible 00:26:05], and when he said, "I already told them that they were coming and they were really excited to talk to you," and I'm like, "Well, okay." They're not really the age group I'm aimed at, but I'll do my best.

Teacher 3: What age group are you interested in?

Interviewer: Mainly year nine, because I think it's really interesting because it's the end of key stage three, so they've had at least two years of computing, possibly three for some of them now. They can reflect on that, and they're also at that cusp where it's no longer [inaudible 00:26:37] compulsory, so they have to decide whether they want to ...

Teacher 3: Make a decision, yeah.

Interviewer: Decide, yeah, if they're keeping computing or ICT. It's a really good poin to reflect on the curriculum to that point, and whether they think they've been taught the right stuff, but also reflect on how they're thinking about how they're going to use it in the future, too. It's a really good point.

Teacher 3: Yeah. Getting back to what you were just asking, though. I think the computational thinking is definitely of use in all sorts of industries, in all sorts of tasks, in all sorts of aspects of your life, being able to look at ... Take the Christmas card example. Here's a monotonous task with a huge amount of repetition that you'll repeat again and again year after year and edit slightly each time. Clearly you should be using a mail merge to solve this problem. If you're not using a mail merge to solve this problem, what on earth are you thinking?

 There are definite skills which ... You wouldn't get the mail merge from computing, but computational thinking is definitely a skill that everyone will use.

Interviewer: You would potentially arrive at something like mail merge using computational thinking.

Teacher 3: Yeah, you would. You'd see that there must be a way to automate this in some degree or make it simpler. It's not saying that I think that we should only teach things to pupils who, which is then going to then be useful to them in later life. I don't think that's the case because I think they have to be exposed to that breadth in order to be able to make choices.

 I, for example, dropped languages as soon as I possibly could, but I don't think I shouldn't've been taught languages. I needed to be taught these things in order to know what I enjoyed and what I didn't enjoy. I'm not saying that it's a useless thing to teach, I think it is an important thing to teach, but I think it's a mistake to be teaching computer science to the exclusion of IT, because I think IT unlike computer science will be used by everybody.

Interviewer: This next question is ... I said I did some edits, this is one of my new questions.

Teacher 3: Okay.

Interviewer: Which is why I'm not quite happy with its phasing yet. That's why I'm warning you. Do you think that the computing curriculum requires pupils to be different in any way, change how they relate to the world or change how they relate to each other?

Teacher 3: No.

Interviewer: Okay.

Teacher 3: I don't think so. You mean compared with how they are in other subjects, or ...

Interviewer: I just am wondering whether it's changing ... In order to understand computing, they have to change how they think, or whether ...

Teacher 3: I'm not sure about that, or if by understanding computing, they then can see parallels in their own lives. The gif jpeg discussion for example, they do find it interesting that there is a reason why silly animations on websites are gifs and not jpegs, and why when they're taking pictures with their cameras, with their phones, why they take up so much space, and that sort of thing.

Interviewer: Yeah. And why the jpeg's not something else.

Teacher 3: Yeah. Then how compression works. We were doing compression algorithms, and experimenting with ways of compressing files, we were doing text files, but we discussed image files as well. They do find that interesting that with a cleverer algorithm, you can compress more.

 Does that change the way they are or the way they think? I don't know. Yeah, I suppose it does change the way they look at the things that they're doing in their lives. The files they're uploading and why it takes time to download a video.

Interviewer: It gives them a deeper understanding of the world.

Teacher 3: It's the depth of understanding, yeah, which is why I think it's a valuable subject.

Interviewer: It doesn't necessarily change whether they see ... This is more about how you deliver it probably, they don't see computing as a skill you use in this area, but not this area, or they don't think, okay, computing is something I do to make a game but not at home.

Teacher 3: I don't know. There's this standard thing where parents say, their child is excellent at IT because they're playing games. Of course, as a teacher, you don't really care how much they play games at home because it has no impact at all on how good they are at IT. However, once you've taught them how a game is made, I feel sure that that must change their perception of when they're playing a game. You discuss a level in a game is room, and you design a room with certain characteristics and behaviour of the objects that you're in the room. Then you move from that room to another room and that's another level. You can introduce new behaviour.

 That must change their ...

Interviewer: Their understanding.

Teacher 3: Their understanding of when they're playing a game. Yeah.

Interviewer: What do you think's the most important thing that you currently teach through the computing lessons?

Teacher 3: The computing. I only teach at key stage three. Binary, probably. It's so fundamental. Binary and the hardware. One of my favourite lessons is the very, very first lesson just about that we do with year seven, where we show them what's inside a CPU or what's inside a case, and we show them a chip and a motherboard and the insides of a mouse, and that sort of thing. We talk about when you press a key on a keyboard, how it's electricity flowing along a wire, and how does that electricity, how can images and video and text and sound, how can all those things be represented in binary.

 I think that's suddenly a fundamental thing. I've forgotten the question now. What was the question?

Interviewer: It was what's the most important thing that you feel ...

Teacher 3: Yeah. I think binary, actually.

Interviewer: Yeah.

Teacher 3: And how you represent all these different kinds of data.

Interviewer: It occurred to me this weekend actually because I was taking something apart to fix it, and that one of the differences between computers broadly is that there's something you can't take apart to understand better. I thought about this because the previous week, we'd taken an old laptop apart with our code club up in Carlisle, and then I was taking something else that was more mechanical apart, and I thought, I can take this mechanical thing apart, see that the gears have worn out, and see that that's why it's not working anymore, and see that if I do this, the gears will work a bit better but it's not going to last long.

 With the computer, it didn't work anymore because it had had something spilled on it, but I couldn't see that when I took it apart, and I couldn't see what the chip did or anything. If you're lucky, the boards have been labelled. You don't get a deeper understanding with computing. I think things like binary and hardware lessons do that in a way you can't self teach yourself how those things work, you have to be taught.

Teacher 3: As a department, we went on some training at Lancaster, and the biggest oo moment that we had was when someone had an oscilloscope on a wire, and showed that when you press the key, you got a, there was an actual visible binary signal. That was the biggest ... We all knew that it happened obviously, but I ... My engineering degree is mechanical engineering degree, and as part of that, we had to do electronics. I hated electronics, which essentially is computing. I hated it, because I couldn't see what was going on.

 That's precisely what you were saying, with ... Yeah.

Interviewer: Yeah. I think that's something that we're not addressing in kids. I think different kids learn in different ways, but some kids like to be able to see that and making it visible is important. Some kids, they don't, but they are struggling in computing sometimes, I think.

Teacher 3: Yeah. I think that's where the spreadsheet work, for example, and images, does make visible what is going on underneath, because all of a sudden, you can see all these values and they're just numbers, but suddenly you understand that these numbers are making colours, and combining these numbers in different way makes colours in different ways. That does make visible something that essentially was hidden.

Interviewer: Yeah. The other thing I think is interesting is, is that really binary is something that is a computational, somebody who ... You identify yourself as a computational thinker, and I think that's that fundamental thing of understanding how computers process, is understanding how binary works and how that translates into electrical signals as well.

 Which part of the computing curriculum takes up the most time to teach?

Teacher 3: Oh my goodness. I'm not sure that I can answer that. I don't think I can answer that, because I don't really think of the computing curriculum very much. I think because I'm not head of department, I am delighted to allow A- to battle with the computing curriculum and say, "We'll cover this bit in this unit." I am delighted that she makes those decisions. Then she tells me, "We're going to do a unit on game development with year nine, so I can't tell you." There may be bits that we simply don't do, I don't know.

Interviewer: What do you think of the things you teach? What is it that takes up the most time or is the most difficult-

Teacher 3: To convey.

Interviewer: -to learn or to convey or ...

Teacher 3: There are some pupils who find, we're doing game design in year nine, and so they have to do objects and sprites and events and actions. They just don't get events and actions. I find it really hard to convey to them, even though they play games, and they know that they're moving a mouse and they know they're clicking a button, to see that that is an event and as a result of that event, when your mouse hovers over something, you can make something else happen. To be able to decompose that, that experience into, it's just a list of events and actions.

 I think that some really struggle to see that underlying truth of what is happening.

Interviewer: What environment do you use to do the games?

Teacher 3: That's GameMaker.

Interviewer: I don't think I've come across that.

Teacher 3: It's free. That's why I use it.

Interviewer: That's a good thing, a reason to use it. We'll look it up and find out more about it.

Teacher 3: Yeah. You can just download it.

Interviewer: Make some games.

Teacher 3: Yeah.

Interviewer: If you could only teach one aspect of, and again this might be similar in that you don't think of a broad curriculum, but if there was one thing that you'd like to teach as a discrete topic, what would that one thing or if it was-

Teacher 3: From the computing curriculum?

Interviewer: Yeah, from the computing curriculum.

Teacher 3: I would be that binary hardware thing again, because I think it's the most eye opening thing that opens up how ... They use computers all the time, but essentially it does come down to text, images, sound and video. Everything. All of that has to be processed in binary. I think being able to see that perhaps makes them less in all of what's happening inside a computer.

Interviewer: Texting just sound, you can put video in brackets, because it's really just images and sound.

Teacher 3: Yeah.

Interviewer: This question is one of those, where is I've assumed discussion, which is true in this case. Other than the things you mentioned, is there anything that you'd change about the computing curriculum?

Teacher 3: The actual computing curriculum itself.

Interviewer: We've covered a lot of stuff already. Don't feel you have to go ...

Teacher 3: Other than integrating it back with IT, so that we're not throwing the baby out with the bathwater ...

Interviewer: It's interesting, because one of the things that you find as you start to dig through documents around computing, is that two or three years before the computing curriculum or the change, there was a number of reports saying that ICT wasn't being delivered very well. It seems like one of the purposes of going to computing was it was a way of sidestepping that is Teacher 3, was, this isn't being delivered very well, so we'll just do something completely different, rather than, we'll improve. This fundamental skill is being covered.

Teacher 3: We still think it's important to teach children to read and write. That still is viewed clearly as a vital thing. Children use computers in primary schools, but they're not using them intelligently. They're using them as a very expensive typewriter that can draw.

 Secondary school was an opportunity to learn all the wonders, and I do think spreadsheets rule the world, databases rule the world. Amazon is a database, isn't it? Facebook is a database. Yet we don't teach databases. I think actually databases is one of these things we could teach in the computing curriculum, but we don't, because we don't have enough time.

Interviewer: What is eating the time, though?

Teacher 3: What is taking the time?

Interviewer: Yeah. Either, what is taking up too much time or what would you chuck out?

Teacher 3: I don't actually think I would chuck out any of the things that we currently teach, but we only teach them for an hour a week, which is nothing.

Interviewer: Yeah. That's interesting, because that comes up a lot, actually. I think you're right. It is bizarre if we think of ICT as in a similar place to reading and writing, or physics is another place that I sometimes compare computing to physics in that, you have to understand ...

Teacher 3: It's a very similar way of thinking.

Interviewer: You learn physics not because people are going to be physicists, but because we all live in a physical world and it's good to know why when you drop something, it falls. It's good to know when you're playing a game, how things work. We spend enough time in a digital environment.

 Taking that ICT and computing is fundamentally important, one hour a week is pretty shameful in some ways.

Teacher 3: It is, yeah.

Interviewer: As an amount of time to spend on it.

Teacher 3: Yeah. I think we are ... We're letting children down by not teaching them the IT as well. It's not possible.

Interviewer: Yeah. One hour a week is probably enough of computing if there was another hour of ICT.

Teacher 3: Yeah, exactly. It probably is, if we have ... We've tried to have an hour and a half, but I don't think it's going to happen here. I personally would like an hour of computing and an hour of IT taught as separate subjects, because I think some people will want to take their computer science further and some people will want to take IT further.

Interviewer: Also, appreciating the ICT more than computing in some ways is applicable to every subject that they're in. You will use your ICT skills in English and math, or you can if you know them.

Teacher 3: Yeah. You can bumble on with very basic skills, or you can be given more sophisticated skills than the vast majority of adults have.

 I felt that over, maybe I don't know, the first 10 years or so of teaching here, that is what we were doing. We were teaching pupils skills that their parents didn't have. That was advance spreadsheet things and database things and word processing things, and PowerPoints. It extraordinary, PowerPoint can just be used, can't it, as being a ridiculously trivial way of presenting something about dinosaurs, or it can be used in your working life to convey information to people at all sorts of levels.

 We are reduced now, we've gone back to, kids have the skills of doing a ridiculous dinosaur presentation, instead of being able to use it in real industry.

Interviewer: Yeah. Do you think some of the is Teacher 3 with that almost is that the people who are developing the curriculum don't have those advanced skills in some way?

Teacher 3: No, they don't.

Interviewer: They're not aware of those advanced ICT skills that are out there.

Teacher 3: Yeah.

Interviewer: And how valuable they are.

Teacher 3: They actually think that they're pretty sophisticated users themselves, thank you very much, and they worked it all out on their own, and therefore why on earth would anyone else want to everybody taught. They think that because they don't realise that they only scrape the thin veneer of the software that they're using and that there's actually 98% of its functionality, they simply don't know is there. They don't know that they don't know it, because they don't know it's there.

Interviewer: Yeah. I think Excel is the perfect example of that, actually.

Teacher 3: Yeah.

Interviewer: Nobody actually knows how to use it well.

Teacher 3: Even word processing, nobody knows how to use it properly.

Interviewer: Yeah. There's lots of tricks in it. Actually, interestingly, when I've spoken to kids, they often bring up ICT skills either directly or indirectly as things that actually they really want to learn. They say things like, "We'd like to be taught the tricks of how to make these things work better. We'd like to be taught how to make them do what we want them to, and we're not being taught that."

Teacher 3: In year 10, when I do the couple of lessons in which I teach IT pupils the word processing skills of using heading, styles, using headers and footers, doing automatic page numbering, those sorts of things, making an automatic table of contents, making an index, they find it jaw dropping that these things are possible, and they see, "Oh yes, I could use this in every other subject." I teach ...

Interviewer: Nobody taught me.

Teacher 3: No, nobody's taught them. Nobody's going to teach them.

Interviewer: No. In some ways, the other pupils who probably are really [inaudible 00:45:24] services, for pupils who do A levels and then potentially go into university, they will have to learn things like table of contents and page numbers, because at some point, somebody will say ... They'll say, "Your document needs to have page numbers," and then they'll go find out how.

Teacher 3: They'll work out how to do the page numbers, but it won't actually occur to them that they can make an automatic table of contents. It won't occur, because they won't have been using heading styles because they're a little bit clunky to use. They won't have been using heading styles, so they'll have been making their headings by making things larger and bolder and red without actually using a style.

 Then it won't even occur to go and find a way of putting a table of contents in, because it won't occur to them that that's possible.

Interviewer: Even more so, the pupils who don't go on to do that route, who no one will ever say you need to do a table of contents and a page number, and will probably still use those skills, but won't even never have the need to find them themselves. If they ever have to do something longer, they'll put in page numbers themselves or something.

Teacher 3: I'll just say M–.

M–: Yeah.

Teacher 3: This is Interviewer.

M–: Hello, Interviewer.

Interviewer: Hello.

Teacher 3: Who is interviewing us today about teaching computing.

M–: Oh yeah.

Teacher 3: I presume, are you around at lunch time?

M–: Yeah, I'm doing ... I've got to see some kids now.

Interviewer: Okay.

M–: For their computing. Little joys of helping.

Teacher 3: A-'s got vex anyways, so I think we're going to go through and see the vex people.

M–: What about second half of lunch?

Interviewer: Yeah, sure. I can be here until quite later on, so until about 4:30.

M–: You wouldn't have to do the whole lunch in vex, will you?

Teacher 3: No. I think we're probably quite close to finishing our conversation-

Interviewer: Yeah, we're quite close to finishing.

Teacher 3: -and then I'm handing Interviewer over to A- to do the vex.

M–: All right. See if I come over there about halfway through lunch, is that alight?

Interviewer: Sure, that's fine. Then I'm also coming back next week, or I've scheduled them to come back next week.

Teacher 3: Okay. There's Damien as well, who we haven't seen today.

M–: All right. Cool. See you in a bit, man.

Interviewer: Yeah, see you whenever. Yes, there are more questions left, but a lot of them, we've already covered, so don't worry about it.

Teacher 3: Okay. Should we do them?

Interviewer: I'm sorry I've taken up so much of your time.

Teacher 3: That's okay.

Interviewer: It's really, really useful. I hope it's interesting for you.

Teacher 3: It is, it is interesting. It is. Yeah.

Interviewer: I'm going to ... Which bit do I think is more important. To what extent do you think computing relates to how pupils in your school use computers in their everyday lives?

Teacher 3: How computing relates to how they use computers. At a fundamental level, because we teach the binary thing, and because we show them what's actually inside a computer and what the bits do, and because they then use computers for their schoolwork and for other subjects, but also at home, and because we tell them about chips being in everything from your coffee machine to your washing machine to your car, to everything, it must change the way that they perceive their world and how computing influences absolutely everything that they're doing.

Interviewer: It just changes their perception of it.

Teacher 3: Yeah. It helps them to, it opens their eyes a bit to ...

Interviewer: Do you think it changes how they use computers or does it just change how they see them?

Teacher 3: It definitely does in that we get lots of kids who come to us from primary school who've used scratch to do daft animations, but don't realise some of the things that they can make with scratch, like for example, making writing procedures to draw shapes and then using those shapes to draw beautiful complex other shapes. You do see some of the kids in the library at lunch times and coming into our rooms at lunch times, who have just been fired up with enthusiasm by the things that they can do, because they have developed their computational thinking pattern recognition to see that they can do some things that look really complex and beautiful from very basic steps.

 It does change the way they're using computers. You can see them using it in their leisure time.

Interviewer: Do you think it changes how they relate to computers in ways that they were using them before, or ...

Teacher 3: It's hard to say, because of course I only see them using computers for computing.

Interviewer: Yeah, for computing.

Teacher 3: Yeah. I don't know.

Interviewer: Okay. I'm going to skip that next question. The question I'm skipping is, how would you describe the degree to which pupils find the computing curriculum relevant to their own lives, but I think we've covered that.

Teacher 3: I think we have.

Interviewer: Do you think it changes their choices and decisions about the future, in computing?

Teacher 3: Yes, because computer science is an option that's available to them. It always has been, so we've always had GCSE computing as a choice. It used to be in each subject, and it's become much more widely chosen, because they're doing it at key stage three. I'm absolutely sure that more people are choosing computing as a result of more actively visibly teaching computing at key stage three. I don't think that ... And it's translating into sixth form uptake of computing.

 Also, I think it's had the bizarre effect that it's pulled down the uptake of IT, because they don't do it as a subject and therefore they don't know what it is.

Interviewer: Yep. Yeah.

Teacher 3: I think it has changed the way that they're ... What they're choosing to do in the future and it has pushed up the number of computer scientists, but it's also pulled down the number of IT people.

Interviewer: Why don't you think that translates into sixth form?

Teacher 3: That, I don't know. I don't teach computing at GCSE. It's something that we're ... Have we always done computing at GCSE? No, we haven't, that's a lie. We've always done computing at A level, and we haven't always done it at GCSE. We've only done it for a certain number of years. Maybe that's why, maybe it just hasn't rippled its way through yet successfully. I don't know.

Interviewer: A colleague of mine, a guy down in London has just done a big report, in fact it was on the radio about the computing, and one of the things he found is that there were certain groups who were more likely to do ICT and are now not doing computing, and because you've got this drop in ICT sixth form, you have an arise that actually, your diversity in computing broadly is narrowing rather than broadening.

Teacher 3: I think that's true, yeah. We have far fewer people taking IT at sixth form, which is just a result of far fewer taking it at GCSE.

Interviewer: At GCSE, which is a result of it not being taught explicitly before.

Teacher 3: Yeah. How can that be a good thing?

Interviewer: Yeah. No, absolutely, I think that's a really big deal. Also, observing that we may be getting more diverse computer scientists, but we're not necessarily getting a wider diversity of people who can use computers, if that makes sense.

Teacher 3: Yeah. I think we're actually reducing our pool.

Interviewer: Yeah. If I asked the pupils in five years' time about learning computing, what do you think will have had the most impact or what do you think they'll, or hope that they'll-

Teacher 3: The things they'll remember will be the games they've created for themselves, I'm sure. Because they can relate to them. They'll remember maybe that they had hugely high expectations of what fantastic games they were going to be able to build, but that actually when it came to the reality of building one and they realise their level of programming effort that they had to put in ... Yeah, I know. It's just hard to stop talking when you quite enjoy yourself, isn't it?

Interviewer: I hope that's [crosstalk 00:53:43]

Teacher 3: I'm going to go in a minute. That's what they'll remember. For the vast majority, I'm just saying, A-, I'm sorry, I'm a traitor here. What I'm saying is that ...

A-: No. You need to find a reason [inaudible 00:53:58]. Every opinion is important.

Teacher 3: What I'm saying is that I think that we're teaching computing to everybody in key stage three, but when they move on into their greater lives, a tiny proportion of them will actually need their computer science, whereas absolutely every single one of them would need IT.

Interviewer: First of all, you're not the first person who's said anything. You've said some ... You've bundled it in great ways. You're not the first person to say we're losing ICT. I actually said to my supervisor, Lynn, who you might know-

A-: Yeah.

Teacher 3: I don't, but you do. Have I met Lynn at one of those ...

A-: Yeah, you have.

Interviewer: I said, my feeling as a researcher at this point is that we're in a position where it's like, we think languages are a good idea, so instead of teaching kids about languages, we're teaching everybody Russian, even though only-

Teacher 3: Yeah, that's exactly right, yeah.

Interviewer: -three of them will go to Russia and use Russian. I was speaking specifically about teaching Python, but in order to get those three people ready so that they can go to Russia, we're teaching it to everybody. Instead of thinking about what the more general skills are, they can use. I think the Latin example is really good too, which I think that captures it ...

A-: That's one of the things that frustrates me, because people say, "Oh, it's like teaching two languages, computing and IT." It's not, because a language, you would teach it in the same way. If you're teaching French-

Teacher 3: yep, that's true.

A-: -you use the same skills to teach French, you use the same teaching skills to teach Latin or Swedish or whatever. It's different here. It's like a language teacher all of a sudden teaching ...

Teacher 3: Maths.

A-: Maths. We have to teach it in different ways. It's a massive step that we've had to do. The IT skills, people say that they learn them, but they are. We've ...

Teacher 3: Come in.

A-: We were good. We were really good at teaching IT.

Teacher 3: Though we say it ourselves, and we do.

A-: [inaudible 00:56:08]

Interviewer: I know that you're not just saying that because I know ... A- and I know R-and I know ... I've watched [inaudible 00:56:17] class and I know it's a good school, and I think in some ways as an outside observer, if a school like this is saying these things, I can only imagine what a school that didn't start where you started will everybody saying and how they're finding that transition.

Teacher 3: There'll be schools who will have been delighted to have dropped teaching IT, because the teachers who were teaching IT were business studies teachers or maths teachers who never really wanted-

A-: Or technology teachers.

Teacher 3: Yeah, who never really wanted to teach IT in the first place, and they won't mind it at all. But, we are throwing away skills that-

A-: I have staff meetings every year, I have staff meetings, that's me, the head, the deputy head, and we have meeting with my manager, and everything single year, I [inaudible 00:57:00] don't have enough ... I can't teach three subjects, digital literacy, IT, and computer science, in one hour a week.

Interviewer: One hour a week.

A-: I tell them, you're not teaching to digital literacy anymore, we stopped because we're teaching just computer science. I say it over and over again, and they say, "Yes, you need more time," but there is no ... They recognise it, in particularly our head, and Phil, my manager, they really recognise it. I'm not sure everyone in the leadership team would recognise it. They do recognise it, but there's no pieces left to give out.

 There would be pieces if you want to. There's always a piece if you really, really want to. It seems to be that they don't ...

Teacher 3: It would mean nibbling away at somebody else's ...

A-: Exactly.

Teacher 3: ... subject, and that's just not going to happen.

A-: No.

Interviewer: From a broader point of view, I think a lot of it as well is about thinking about what is the purpose ... Broadly, the whole curriculum, but specifically within the technology area, what is the purpose of teaching the pupils the different things? I think that there has got to be a little bit of deconstruction about, where do we want the pupils to take the skills they have and what skills do we want them to go off into the world with? Looking at it from ICT to computing, and I do think, and this is based on a lot of the research that there's been an overemphasis on some of the computer science, that the computer science voices were the loudest when the computing ... When the curriculum reform was going on, and had the ... Made the most attention, rather than the broad range of everywhere else that uses ICT skills.

Teacher 3: I wonder if the people who were making all the noise about swapping to computer science actually meant to, Interviewer, IT as well, or if they meant we need to start teaching computer science as well.

Interviewer: Computer science as well.

A-: I think it's very, it depends on the person. I think very much so. I think it totally depends on the person. We find that we always, computer science, we always do well with bright kids. It's just how it is. A bright kid will always, might not pick it for their options, but they will do it because it challenged them, and they like it in that sense.

 We really struggle with the weakers. It's such ...

Teacher 3: It's an invisible thing.

A-: Yeah.

Interviewer: It's invisible. The other thing that I found from the group interviews I've done, and some of those have been within classes so with inside of classes, and the kids in the higher set say, don't miss the ICT as much because they feel like they can pick that up themselves, whereas the kids in the lower sets really feel a loss, and feel like they're not prepared for the world that they're going into, because they don't know where to even start.

Teacher 3: Even the higher kids who think they're going to pick up the IT themselves will pick up the basic stuff, but they won't pick up the clever stuff.

Interviewer: Absolutely.

A-: We had one of our highest achievers, like ... Owen [Leven 01:00:11], wasn't it? He did IT because it didn't fit in with the computing, and he never did it. He's doing engineering now. No, material science down at Cambridge.

Teacher 3: Material science, yeah.

A-: He did lots of extra units in our IT, and the kind of spreadsheet skills, word processing skills, all those skills, they have really been useful for him. He's done works there and he's told us how these kind of simple ... Supposedly simply ICT skills ... They're not simple, they're tough IT skills, been teaching them. They are really, they are useful. I'm telling our kids now, when they do options in year nine, I'm saying, other schools will all have qualifications. We won't, unless you choose it.

Teacher 3: Because we don't require year 10s to do anything in IT.

A-: We don't do compulsory.

Teacher 3: Some skills will, yeah.

A-: I have students that are going to arrive at about half past in there, that you could interview if you wanted.

Interviewer: Brilliant. I'll speak to them.

Teacher 3: What do you want to do about lunch?

Interviewer: I'll work through.

A-: How about-