CSEdGradConf Day Three Keynote

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SPEAKERS

Dr. Sue Sentance, Benjamin Xie,

Benjamin Xie 1:28:45

Hello and good whatever time of day it is for everyone around the world and thank you for joining us. My name is Benji Xie, pronouns he him and I'm a PhD candidate at the University of Washington information school, and also the session chair for today. Just a bit more about me I'm advised by Dr. Amy Ko, who's also chairing a handbook q&a later today, and also research intern with code.org and my, my researches and how to design interaction that translate data into equitable action within computing education, and it is my pleasure and privilege today to introduce our keynote speaker, Dr. Sue Sentance. Dr Sentance's work is in teacher professional development in computing physical computing in schools, and developing pedagogical content knowledge and computing, and she does that across her roles as the chief learning officer, as at the Raspberry Pi Foundation, the chair of the teaching and learning committee of the national National Center in computing education, and as a senior lecturer at King's College London. Dr Sentance has previously been involved, as in projects including BBC Micro bit earned her PhD from the University of Edinburgh, and has recently been awarded the Suffrage science award for mathematics and computing. So here's speak about teacher professional development, and CSS research, Dr Sue Sentance.

Dr. Sue Sentance 1:33:04

Excellent. Thank you. You've done lots of homework. That's amazing. So it's really great to be here, and I hope you can see my slide, big, big white slide with pink writing on it somebody nod and. Yep. Great. So, and I'm really delighted to be here and it's great to have a virtual event so I

can be here at six o'clock, it is in in England time. So yeah, I'm coming to you from England I live near Cambridge. And I've changed the title a little bit just because so it's a little bit clearer I'm be talking about teacher professional development and CS Ed research, and the overview of my talk. Click on properly. And I just, I'm going to structure, I'm going to go through today is I'm going to talk for about 30 minutes, then I want you to go into some breakout groups have a little chat with each other about some questions I'm going to give you and then come back for some q&a. We'll try and get that all in, in, in, in the time we've got allowed, so you can see what my, my overview is I want to start by checking, why you might be interested in teacher professional development. So I started off as a while I started off as a do my PhD, but in the middle of my career. I was a teacher. But I'm interested to know what you your interest is in teacher professional development. So when I prepared this, I thought, possibly, that you might fall into one of these four categories. If you're a doctoral students conference, you might be researching the nature of computer science, professional development for teachers yourself, and you might be working in another kind of area in school and need to work with others. You might be not doing nothing to do with professional development, but you want to that you're also involved with offering PD as another part of your role or something else. So could you everybody put 1, 2, 3 or four into the chat. And that gives me an overview of who. That's a two from [inaud]. And so it's interesting to see that you can be things from different perspectives, or none of these and if you're all fours, then maybe I'll have to rewrite my talk quickly. But yeah, I think that's great I can see where there's numbers coming in, so it's lovely to see that the few actually to think about why you're why you know you've got interest in this topic and to see that other people have different perspectives. So I thought I just talked about my with my teacher hat on for a little while. And so, I became a teacher, not straight from, you know, not not straight from university so in my mid, my early 30s. And I done a PhD in at the my Masters and PhD in AI when I was quite young, and then possibly due to having three children in quick succession. I decided that I would leave academia qualifies a teacher. And so, I'm going to talk you through my professional development that I looked at when I was a teacher so first of all I was a new teacher I qualified. And when I first was teaching. I was learning more from the teachers in my school, the teachers in my department who I [inaud] more experienced than me. And I learned from them and greatly when I was a new teacher. As I got more experienced I decided to do some examining, I started to meet teachers outside my own context. And I built up my network of other teachers that I knew who were interested in computing. And then I left a for another school and I started to look at other courses and I started getting interest in pedagogy and active learning and doing courses around there. And then I started to support other teachers I started to train other teachers write curriculum materials, and then I went off to another job where I was ahead, and I decided my whole department should start using Python. So I sent them all on courses and work through that. And then I joined computing at school when it started, we've got about 2009 now. And then I went on and got very excited about competing education basically did some more courses, did a Masters became a teacher educator elect a lecturer, and that takes me up to about 2011, and the rest is the stuff that Benji was talking about. But when I was thinking about this. And I was thinking. I've done research on professional development for teachers but my own experience, and my own experience was that I really learned a lot from experienced teachers around me. The network of teachers that I had was really important. I took lots of opportunities to support others when I could and I learned a lot from that. I involved in action

research projects I developed and shared resources. I use the computing at school community. So I think there might the mandate of my research does actually reflect my own experience so I'm going to talk to you a little bit about the research, but I thought I'd started off by thinking about my own experience in professional development. So, for the rest of this talk. I'm now going to go through some of the research that's been done in this area. And then look at it more generally, and then focus in on computer science and then focus in on some initiatives, and then give you some difficult questions to think about. So if we think about fashion development in education is a huge field, there's lots of research in it. It's been going on since the 1990s. And then, after because I've been so much researching it there's lots of meta studies, lots of studies that have been carried out where researchers have looked at sets of studies and drawn out the main findings across all of the studies. And there's been lots of those as well. And the themes that are emerge are really quite, quite similar. And the themes that emerge basically around teacher professional development should be sustained collaborative and relevant to yours, yours learns outcomes. And actually I could just stop my talk there. Because actually, that kind of says it all. This is how if we think about TIF professional development and think about all the studies that have been done. These are some of the really key themes that come across that we should embed in our teach with valid math teacher professional development and initiatives. So, and I can show you some extracts going through history, so to speak, we call the 90s history now. And so here's one. This is a table from a meta study by Stein, and Smith in silver. You've got the traditional approach on the left and here's this sort of more new modern new model 1999. On the right, so we're interested in. More duration rather than short duration scaffold in learning. Using classrooms to support CPD. Sorry I use the word CPD I slipped out but that's what we call it in the UK continuous professional development. And so this idea of being more focused on pedagogy, more focused on in the school was developing in the 90s. And then we've got another meta review, and this is just the end of a very long table by book Bosco and her colleagues. And here we've got some of the themes coming out again from several studies that she reviewed. Professional Development should be sustained ongoing and intensive should have follow up support. There should be an opportunity to learn over, over time, should be scored based based on outcomes. Then if we skip forward again. 2013. This was a large study carried out in the UK. And these five themes appear so you can just see this, this, you know, the similarity across, as, as the field developed staff should work together in their professional development. They should be supported by specialist expertise, and they should be focused on the aspirations of their students. And this and professional developments are not one of their long interventions that sustain over years, and teachers should be able to explore the evidence themselves by trying new things. And this has been very much my experience in my experience in my professional development activities. And then we come over to the US in 2017, another large study done by Linda darling Hammond to her colleagues she she's published loads in this area until you've got some similar theme themes, but adding to it. Content focused, but incorporate active learning with coaching and expert support, offering feedback and reflection and then the other, the other model is about being collaborative and being sustained. So we've got this very clear message coming through around how we think that professional development should be. And I've taken this. This next slide, I've taken just a screenshot to the page of an another similar report. Because I quite like these two quotes. So in order to produce lasting change. Perfect professional development last at least two terms, two

semesters, more usually a year. Here's another one. A didactic model doesn't lead to positive outcomes for participants or students. So you can you can just at the risk of repeating myself dozens of times, here the messages are coming through about the ways that we wish should really be working with teachers. And then I'm going to look at. And what we're doing in computer science education, research, and there have been some meta studies just around computing, computer science and I pulled out two here. Ones by Lou Atal in 2011, and one by minex say in 2015, and the kind of practice that they're highlighting in those days was around, we were, we were delivering in computer science, maybe quite short PD programs. And, and maybe they. I think the influence about being delivered by CS faculty members, was that the deliverers didn't have much expert experience of school. And then, minex in her study looked at six features of effective CPD which I can see at the bottom of my slide, which are, you know, as you, as we've seen, you know, long and explicit on active learning methods etc pck the sort of things that are emerging from the literature. And she only found one study out of those. It was the Georgia computes professional development thing that actually includes all those six features. So I think, you know, there's some of our practice in CS, that's not aligning to the generic research, but there is some other really excellent and interesting practice. So, if there's examples here of work on professional learning communities for CS teachers so Jean Rio and join a good talking about the work on exploring CS and projects. Communities of Practice that's in UK, and through computing a school and professional learning networks in from Scotland. So examples of, of being collaborative. So, and also the disciplinary comments approach similar but the reason I picked that out separately because of this sustained element, you know, coming back and having monthly meetings and, and I think there's good examples of that from from some of the studies that we have published now. And then there's a few things on action researching in computing two of the examples there are on from Israel. And once from my own study. That's where teachers try out interventions in the classroom. And then they something that really is important to them as interests them and they learn a lot about teaching the subject through those studies. So before I get on to just go back a bit. And so what I want to do next is to move on to some specific examples of professional development that I've been very familiar with. But I wanted just to say, you know, I've given you my teaching story. I got involved in professional development, as soon as I got into teacher education, so 2011 started a program called Python school and running professional development sessions for teachers, etc. and was involved in the curriculum changes in England. But my one takeaway from that is we. It takes a long time. So some of the teachers that I was started training in 2012 that will come into sessions that I was running in England, and now they're just amazing. They're like leading huge regional hubs, they're like, absolutely. You know superstars and pedagogy and it's amazing, but there's a long journey from 2012 or 2013 to 20 and it does take some time. And this, this idea that we can just throw some money in teach teachers how to teach computing, and then withdraw. I think is is a fallacy. So I just wanted to talk through some of the things I've been involved in, for better or for worse. So, and in the context of these. And is that, in England. We started to think about moving over from ICT into computing as a May as a mandatory subject in the national curriculum, between 2010 and 2014, when the curriculum was launched. So, this is where these initiatives have come from through an a need to train teachers who are in situ, who are actually already teaching. And suddenly, were ICT teachers they were labeled as a teacher of something and they suddenly get a new label of something else. So there was an urgency about a lot of training

of teachers in England in Scotland, the situation is, is slightly different because Scotland always had computing science in the curriculum so the teachers there tend to have good subject knowledge. We'll talk about that program in a moment. So if I start back in. Then the master teachers and network of Excellence Program 2013 to 2018. And this approach was built on a kind of a peer to peer approach. We have regional centers based in universities. But those centers, really, the sort of the people on the ground were called master teachers, it's not a very good gender neutral term I apologize on behalf of England for choosing such a naff term, but they were called master teachers, and they were teachers that helped other teachers, it was a peer to peer model of experienced teachers supporting others in their schools, other aspects of that model were CAS competing at school hubs, little meetings after school communities of practice of teachers supporting each other. Getting experts in teachers driving the agenda. So it was, it was a peer to peer sort of model. It was funded by the government but not very much. And it was empowering for those teachers who gained a lot of expertise, through, through this approach and now they are, you know, doing amazing things. The government stopped funding that in 2018 and let's talk about why they did that in a moment. Moving on to the Scottish project so in Scotland, they have teachers who've got good subject knowledge and, but they weren't very confident in teaching. And there was a very rigorous program to engage teachers in pedagogy, they developed a net as a fantastic project, unfortunately didn't last longer than the funding, but they developed a network of teachers, they engage them in literature, they'd be sitting talking about work examples and the block model and, you know, really into the nitty gritty of the best ways of teaching programming. And they had this expectation that you know there was there was some meeting and then there was going away and trying it this kind of the cording ly approach of exploring trying new things. And so that was great led by Quintin cuts in Glasgow. And this was a small scale project or project teaching acquiring computing education, which was given this broader view of professional development that action research, as it's been found in the literature is a key part of professional development, trying new things out in your classroom really helps you to understand the teaching and learning and improve your own teaching and learning. And it helps you to understand your your your own subject better so teachers came with their own projects, academics volunteered their time to come in and support them with the, with the research in elements, and some sort of hand holding intimate so it wasn't so time consuming. And we used when we wrote this up we use the model of Clark and Hollingsworth teacher professional teacher, and professional growth to show that this was really, I'm having an impact on teachers working lives and practice. And, of course, it was very very small scale, and we're now trying to replicate it through online learning. And then the project I'm involved in at the moment is called the National Center for computing education. And what makes this interesting if you've got see that what make greater funding we had 80 million of a four years which is unheard of in England, and from the government to fund this project so it's a very multifaceted approach and covers lots of bases, and it's more funding than we ever had like you know we only have like a million pounds, before for any anything. There's lots of aspects to it as you can see here, and it's a school led model so the regional centers are not now in universities they're based in schools. But the schools have a remit to train ups teachers in their area. Using face to face remotely delivered courses. But we but why teachers can't manage that, there's lots of other offers for their online courses, I'm going to show you some extracts from that in a moment. There are these still these community, and communities these

computing at school communities. We've got a real doing lots of work on pedagogy where we're kind of trying to whittle down the research into like two page summaries so that teachers can understand. You know what the research says apply in classroom. We've got podcasts and pedagogy meetings, etc. Got certification available, and we've written a whole curriculum to support teachers workload. So, lots of things going on there. It's a big project. I thought it might be interesting just to highlight some of the online courses that we have because these were available to you. All you know they're completely freely available, and there's lots of courses there we've got about 33 week future courses on the futurelearn platform now, so I just thought I'd break up the monotony of me talking by playing a little extract if I can get it to play. So here's one little extract of an online course. This is about understanding computing systems and it's for secondary teachers. Most of the input devices we've discussed so far, the keyboard the mouse the microphone on human control your original input, the information is coming from you. Another type of input device is a sensor. Let's take a look at some of the examples of sensors we use every day. Here the Raspberry Pi Foundation, automatic doors keycard panels motion sensors for the alarms. P IR lights, smoke detectors in the milk level in the coffee machine. A great classroom activity is to ask students to design their smart home of the future, often to label inputs sensors outputs, and describe how they would interact through automation, get them to think about the advantages of automation and smile and discuss any disadvantages they can think of to share your thoughts on any potential classroom activities in the comments below. So these courses. That was just an excuse to show you all the things that we have in Raspberry Pi foundation that the these. These courses are teachers join at once and then they can upload examples of what they're doing and share comments, it's trying to generate a kind of community amongst the cohort of teachers taking them. Just thought I'd share another one about this we have some courses on programming pedagogy one for secondary one for primary and to support teachers just show a little bit of this like creating a worked example it's important to avoid this is about work examples and add additional processes to working memory that aren't necessary, especially tension effect is when an example is given to the learner, and the description appears separately, giving the learner that extra job of combining information together. Let's look at an example of how you can break the problem of creating a guest again into manage. I've broken this down into two players. So we're going to hold the value of secret and guests. First of all, and in the interest of time, I'll stop there because you don't necessarily need to see her working through her looking example that was just to give you an example of some of the things that coming out of the National Center. And then we've got. I think underpinning all of this in the UK is computing at school it's a network of teachers It started in 2008 2009, and without and will probably outlive other government funded initiatives. And it's really based on teachers, meeting with each other, developing their professional networks and getting involved sharing resources, there's an upload facility for sharing your resources and discussing with others and you are all welcome to join computing at school haven't put them. The, maybe Jane can put the link on there on the chat and you're all welcome to join computing at school it's a great place to be. Okay. So, to draw all this together. And I'm hoping that if you came in thinking around professional development for teachers as being around, basically summer camps courses seminars, etc. And maybe you didn't that I do think, you know, we need to think about fresh development in a really broad way and think about it from a teacher's point of view how teachers will feel empowered to feel that they're the driver behind their own

professional development by taking part in communities classroom research peer observation, getting in engaging with research supporting others and I think these are really important parts, and that they all you know make up this you know this big umbrella that actually makes up professional development. And my overall recommendations and drawing all this together, would be that sustained collaborative approaches as I said right at the beginning. Those are the things that the research says lead to effective professional development, we should be thinking about how official development aligns to real learning outcomes in the classroom what what what your students are going to achieve. And I can't emphasize enough how important I think it is as a teacher and will the next teacher. You know the communities that we have with other teachers. And this little quote is a teacher explaining how they help other teachers with subject knowledge, they give the people confidence to go away, but that teacher. By doing that, that is their professional development as well, that they are learning by doing that and sharing with others, they're learning from from from their communications. So, I'm coming to the end of my talk, but I have a I have a I made sure I didn't fill the whole time allocator so that we had time to do a breakout, and to have some discussions in the amongst you, one of these I want to think about is the challenges and the. I want you to come back to me really with what you think the challenges are, and what might be problematic about some of the suggestions that I've made about how we should run. Teach freshman development. As an example, I've got a challenge there, you know bottom up approach to pressure development is is great, that you know, but it's slow the reason the government stopped funding. The project we had, in 2018, was because we couldn't scale it what you know we couldn't scale it fast enough to reach everybody in the country and we needed to the top down approach of government funds as says all do this and nobody wants to do it because they've been told to do it. So why does bottom up meet top down, there's an issue for you to think about. There's the whole issue about status, but all very well for su sit there and say we've got to have long, long PD programs, how can we possibly get teachers to spend that amount of time on on PD because they're so busy and they're so stressed and they're so overworked and you know, there are lots of issues there. So I've got further this footage for your to the discussion section, you know, can you think about in some breakout groups. This bottom up top down, issue if you can kind of understand what I mean you know grassroots versus, you know, we tell them what to do. The sort of teacher to teach learning versus the expert. You're sort of dipping in a bit of this a bit of that versus, this is your certification. The something out government gets exercised about the knowledge rich thing you know is it should we all just begin delivering content versus. No, that's the line is to practice what's the best pedagogy. The whole sustained short term thing. And then that, where'd you do it, do you do it in your school do you travel the world learn online, and there's lots of things that we can think about there. Now I've put a link there to is the longest link you've ever seen on the bottom line there. So I don't expect you to memorize that so could could. So I try and put that in the chat. There you go. And then just put that in the chat. So, I'm just before you go into breakout groups, I think, which is this for about six minutes or so, you take it, take a copy of that link, and I'll see you back here for questions. Thank you very much.

Julie Smith 2:06:26

Please feel free to join your breakout room now if you're having any trouble joining the breakout room please let me know.

2:07:11

Julian I see you just joined everybody is in breakout rooms right now if you want to pop into the one that you've been assigned.

Julie Smith 2:15:21

So would you like me to close the breakout rooms now.

Dr. Sue Sentance 2:15:25

Yes, I was expecting I think we've been there too long.

Julie Smith 2:15:27

Okay. Okay,

Dr. Sue Sentance 2:15:29

I think six minutes was enough. And I'm no longer sharing my screen, am I. Welcome back everybody, I see you had some fun with a Padlet and adding some things on there. It was a bit longer. We haven't got much time now to be Benji for questions.

Benjamin Xie 2:16:52

Yeah, we only have about a few more minutes but if anyone wants to raise their hand or drop a question in the chat we can ask Dr Sentance a few closing questions. Alternatively dot duck sounds I'm not sure if you want to look at all the, all the scribbles on the Padlet and comment and give us your thoughts on what what you see there.

2:17:33

If anyone does anybody want to pick out a comment that they wrote on the Padlet in particular, and highlight it there's a lot down there.

Benjamin Xie 2:17:48

Oh, Rene does have a question Rene follow the question in the chat, based on your vast experience and research, what would you say are areas where future research on cspd are most needed.

Dr. Sue Sentance 2:18:04

And what I think we're missing is longitudinal outcomes. I think we, we were I think we need to work more on is now what is if you wait with what what is the what out what impact are we actually having on teachers over teachers knowledge and competence over a long period of time and how does that impact on students. And I'd like to see more longitudinal studies. And it's, you know, obviously it's difficult to just move school, and that sort of thing and to see to see what the the really what the impact is on student learning because we invest a lot in it. And, yeah, that's

Benjamin Xie 2:18:58

great. Yeah, I think that needs to longitudal outcomes is is very necessary. So I think with that we are at time left to conclude. But, Jane just dropped some links to follow up with Sue's work as well as on teach computing.org so I encourage you to follow those links. And in whatever way shape or form please give Sue a big virtual round of applause for an incredible presentation.