Advancing Education Autumn 2013

Editor: Paul Heinrich

In this edition of Advancing Education we bring you several excellent research papers as well as reports on some very creative projects. With the new curriculum in mind Julia Briggs reports on her research with Year 6 pupils programming in Scratch while Catherine Naamani and Michael Vallance describe an Anglo-Japanese project using Lego robots in a collaborative learning environment. The coding theme continues with a report by Siobhan Ramsey on the Festival of Code 2013 run by Young Rewired State.

With the new curriculum in mind Nick Jackson and Ian Guest have been researching an approach to sharing resources to teach Computing via an established subject-based online community and with an emphasis on Key Stage 3. Mobile technologies are becoming well established in some schools and in teacher education. Christopher Dann from the University of the Sunshine Coast in Australia provides a fascinating paper on the use of mobile technology to increase formative knowledge for the learner in a classroom context, the learners in this case being pre-service teachers.

In our final papers Judy Bloxham discusses augmented reality in the FE and HE sectors, Allison Allen considers how schools might maximise the potential of learning technologies and ensure they are obtaining value for their investment while Nadia Hyeon explores how technology inspires creativity in the classroom. Finally and with the e-safety theme in mind Naace sponsoring partner Lightspeed systems provides a short guide to web filtering in today's schools.

Naace
Editorial Ramblings

Author: Paul Heinrich

Cited in:

- Advancing Education Autumn 2013

In which your editor muses on current thinking about the impact of technology on future society.

So here we go then, a new Computing curriculum is now defined and all we have to do is learn to teach it effectively – with limited training, minimal local authority support and not additional money. Schools and teachers will muddle through as they always do even though the stakes are higher than ever, and not just for the teachers own sanity and job. We have to make the new curriculum work effectively for learners regardless of its flaws and a rationale that is out of tune with developing thinking on the economic and industrial future. The short term thinking, normal for all politicians and based on views stemming from a supposed golden age somewhere in the past does not prepare us for a very different future.

We might do well to consider not only the parlous state of the economy, though the current stagnation will eventually past, but at the increasingly powerful impact of the information economy. Tyler Cowen, an American economist, noted in 2010 that technology or machine intelligence is the driving force behind future economic growth and prosperity further warning that warns that those nations and individuals who do not innovate and are not motivated to learn the new ways will be left behind.

In his latest book Cowen contends that we are about to enter *"the age of the genius machines and it will be the people who work with them that will rise"* (in society). He does not mean the people who code or control the machines in this context, rather he is referring to those who work with and use the information and knowledge available thanks to the technology. We already do this to some extent – who doesn't read the reviews on Amazon before choosing a product for example. At a higher level we may need to trust a computers analysis of a business deal rather than gut instinct – the computer being able to make a cold, logical approach but based on far more data than a human can handle.

The downsides are there though, with computers watching and analysing our every move in the workplace and able to measure output and weed out slackers. A future with an army of subservient, cowed slaves alongside a rebellious but free thinking mass of the disenfranchised perhaps. I do wonder whether humans can and will accept a relationship with technology where computers are effectively in control. Perhaps we already have, when financial markets can crash because the computers go into selling overdrive if a stock weakens too far and where warfare and computer gaming begin to merge.

However, Cowen makes two points that are particularly relevant to the development of the new curriculum. Firstly he points out that computer whizzes will obviously do well in this new society but that **most of us are not like that** (my emphasis). Secondly, that those prepared to work and to use the high quality and often free online education course (MOOCs and similar) will succeed. And of course the technology will monitor a student's performance and track record, a record that employers will have easy access to. The motivated and conscientious will be prized by employers but what about the rest? Will society become even more divided and polarised?

Cowen of course writes from a US, free market perspective not always in tune with the social democracy predominant in Western Europe. Stand back from this for a moment though and consider that Apple, Microsoft, Google, Facebook et al are all US companies while the other contenders such as Samsung are from the Far East. The development of the dominant technologies is not taking place here and our culture is adapting and changing as our young people simply accept these technologies as a normal part of life while older generations simply fail to understand the impact.

So, how does the above impact on the development of the Computing curriculum. This could become a course for geeks with an overpowering emphasis on computer science and coding. As such it will fail because most of us are not like that! We have to ensure that the breadth is still there and in particular that learners understand how to use the technology effectively and safely in their daily lives. They need to know how to publish and market themselves online so creating quality video, images and text becomes important. They need to know how to find relevant and high quality information and turn that into knowledge, to locate and undertake lifelong online learning. They need to understand personal cyber security (and know who is tracking their every move and how to avoid them – hello NSA!). Can we interpret the programme of study to meet these needs, indeed will we be allowed to or will the exam boards and OFSTED insist on a narrow party line. Who knows, but as educators we have a duty of care to our learners.

And so to this issue of Advancing Education where we are able to bring you several excellent research papers as well as reports on some very creative projects. With the new curriculum in mind Julia Briggs reports on her research with Year 6 pupils programming in Scratch while Catherine Naamani and Michael Vallance describe an Anglo-Japanese project using Lego robots in a collaborative learning environment. The coding theme continues with a report by Siobhan Ramsey on the Festival of Code 2013 run by Young Rewired State.

With the new curriculum in mind Nick Jackson and Ian Guest have been researching an approach to sharing resources to teach Computing via an established subject-based online community and with an emphasis on Key Stage 3. Mobile technologies are becoming well established in some schools and in teacher education. Christopher Dann from the University of the Sunshine Coast in Australia provides a fascinating paper on the use of mobile technology to increase formative knowledge for the learner in a classroom context, the learners in this case being pre-service teachers.

In our final papers Judy Bloxham discusses augmented reality in the FE and HE sectors, Allison Allen considers how schools might maximise the potential of learning technologies and ensure they are obtaining value for their investment while Nadia Hyeon explores how technology inspires creativity in the classroom. Finally and with the e-safety theme in mind Naace sponsoring partner Lightspeed systems provides a short guide to web filtering in today's schools

Paul Heinrich
Editor

Paul Heinrich can be contaccst at paul@paulheinrich.co.uk

References:

Cowen T, (2010) The Age of the Infovore: Succeeding in the Information Economy, Penguin Group, New York

Cowen T. (2013) Average Is Over: Powering America Beyond the Age of the Great Stagnation, Penguin Group, New York.

The opinions expressed in this editorial are those of the editor and do not necessarily reflect Naace policy.

RSS

Naace
Programming with Scratch Software: The benefits for year six learners

Thank you for editing the entry. This is how the edited entry will appear in the database.

Author: Julia D Briggs

This paper considers the benefits Computer Science to the individual and specifically the benefits to Year Six children of using Scratch software (Scratch, ca. 2007). It is based on case studies of the software being introduced to classes in three schools in May and June 2013.

A major driver for the change from an ICT to a computing curriculum in England for September 2014, was the needs of industry and the economic well-being of the country.

'The UK had been let down by an Information Communication Technology (ICT) curriculum that neglects the rigorous Computer Science and programming skills which high-tech industries need'. (Gove, 2012).

The 'Shut down or restart?' report (Royal Society, 2012) identified Computer Science as being of enormous importance to society in the United Kingdom in terms of being globally competitive (ibid: 4). However, at the same time it emphasised the need to develop the critical thinking skills of pupils to increase their understanding of the world.

This paper considers the benefits to the individual rather than to society. Specifically the benefits to Year Six children using Scratch software (Scratch, ca. 2007). It is based on case studies of the software being introduced to classes in three schools in May and June 2013.

Overall picture

Twelve benefits from programming with Scratch (figure 1) were identified from the case studies and eight factors which contributed to those benefits (figure 3). There are differences in the amount of evidence from each school for each benefit and factor (figures 2 and 4) but there is overall agreement on which had most impact.

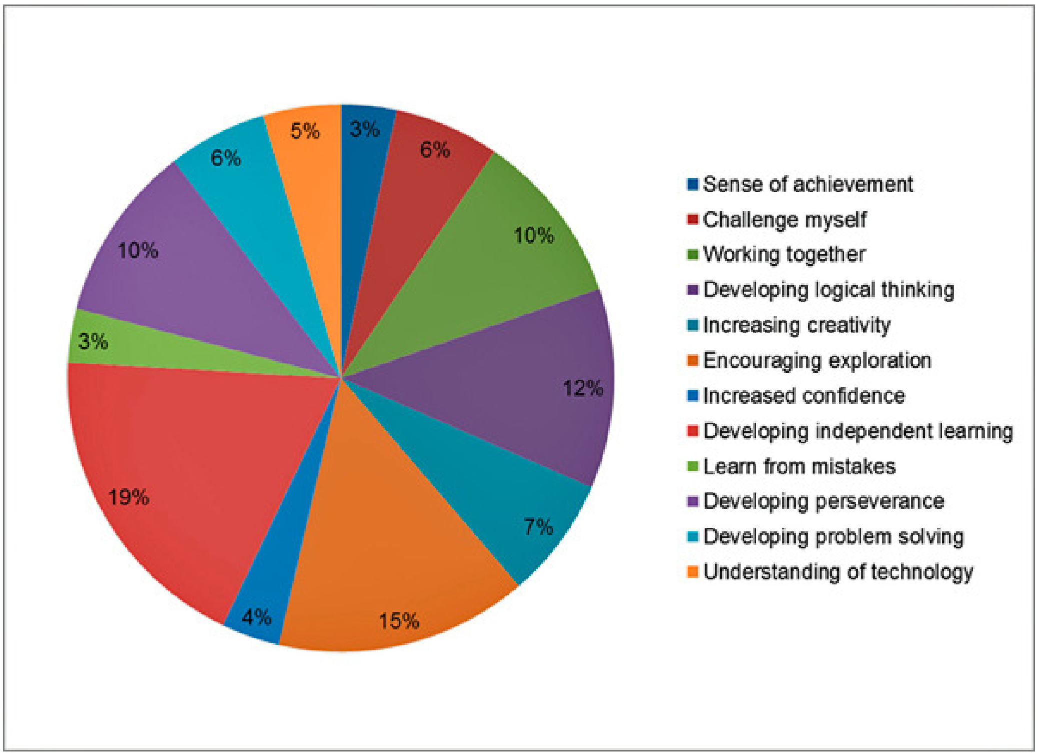


Figure 1: Benefits to learners (Analysis of All data Atlas Ti)

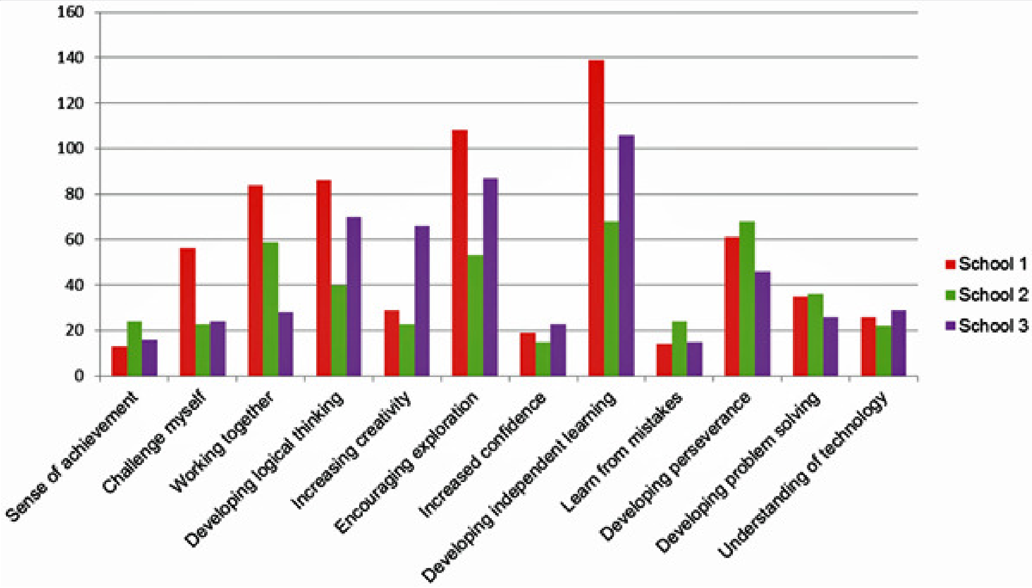


Figure 2: Comparison of benefits in all three case study schools (Atlas-ti)

The development of independent learning, a willingness to explore, logical thinking and perseverance emerged as key benefits. The role of the teacher and an exploratory approach were major factors in contributing to those benefits.

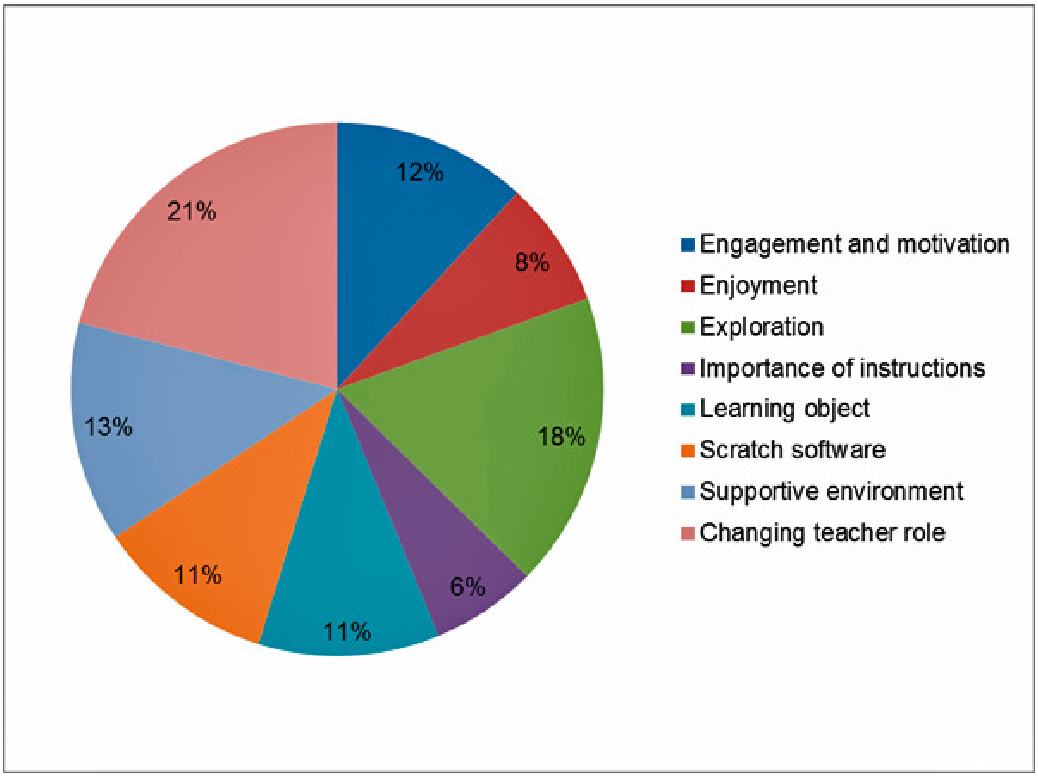


Figure 3: Factors that contributed to the benefits to learners (Atlas Ti Analysis of All data)

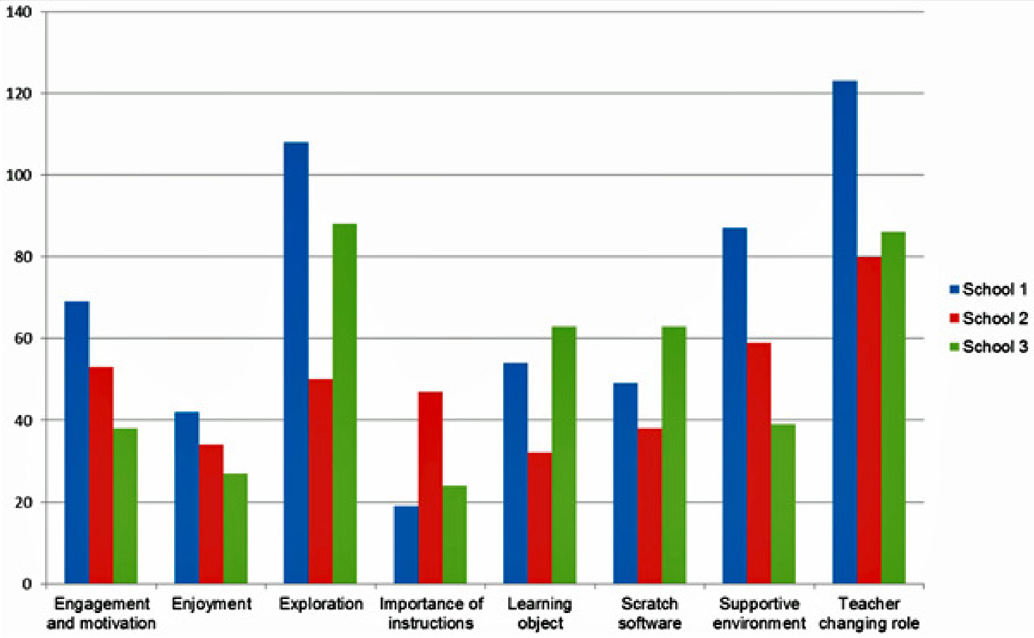


Figure 4: Comparison of factors contributing to benefits in all three case study schools (Atlas-ti)

Case Study One: All Saints Primary

A team teaching approach was adopted with the year six class of seventeen girls and eleven boys as the children were introduced to Scratch and then provided with instructions to make specific games. The children were then challenged to plan and create their own game with the software based on their learning from their history topic of Ancient Greece.

The children initially worked in pairs on laptops in the classroom. The only introduction they had was being asked to go to the software on the Scratch website (Scratch, ca. 2013) and to find out what it could do. The children responded positively to this. Ruby appreciated the planning,

‘I think it was planned out well because we would normally get told what things to do and told what buttons to press but because we got to discover it ourselves it gets stuck in our head a bit more.’

Andrew described how the exploring let him, ‘know the depth of what you could do with the software’ which he was able to use later in his final game.

A few children expressed some initial worry but, in the same way that Toby described his feelings below, they were resilient in managing the difficulties and achieving an outcome:

‘When I first saw Scratch it worried me a bit just seeing all those blocks and having to put them together just to do one little thing. So at the start I felt a bit uneasy about erm using the program in general because of its capacity of blocks. It did sort of put me off a bit but then I did try and carry on and it did feel I understood it.’

After an initial period of totally open ended exploring the children were asked to focus particularly on one sprite (a character on the screen) and see what happens when different programming blocks are clicked or moved into the programming area. The link between the programming blocks and the movement of the sprites was important as the children gained confidence in using the blocks to program a set of actions.

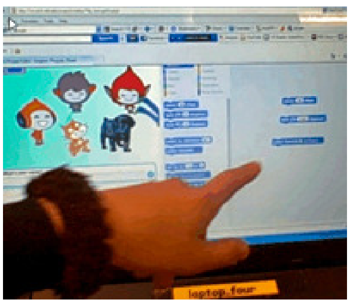


Figure 5: Discovering movements

A pair of girls discovered ways to move and turn their character around the screen. Their enjoyment was clear and also their willingness to ‘have a go’ to see what might happen.

A pair of boys became fascinated by the movements they caused, ‘He’s circling, he’s going sideways because he’s a crab.’

Figure 6: Crab moving sideways

The children then moved on to working individually using a set of instructions (Somerset, 2013a). to create games. Half the class used laptops in the classroom and the other half worked on PCs in a computer suite. The children were working by themselves but encouraged to talk to one another.

The 'Racing Car Game' became important to understand how rules could be set such that, if a sprite touches a particular colour, an action will occur. The knowledge gained from this game and others was used by the children when they planned and created games based on legends that had been part of their Ancient Greece topic. The importance of the instructions they had worked with was expressed by Andrew in answering a question about what had helped him learn to program;

'Well I found the most useful thing was when we had the set of how to make basic games because that really helped me to understand what each block does and then I just used that information for the final project. And I knew which did what. Which I wouldn't of if that hadn't happened. If we'd just tested around and then gone straight to the Greek game.'

The independent following of instructions was important to developing understanding of programming. However, the creativity of the children had been enhanced through the exploration which had let them discover the 'width of the software' (Goldstein and Pratt, 2003). Children had changed the background, added and edited sprites and discovered they could add sound including recordings of their own voices. These discoveries were used by the children to adapt the games they created from the instructions and to inspire ideas when they planned and implemented their own.

The children felt that following this process planned by the class teacher and the researcher provided the right level of challenge. One group of children discussed this together;

'Amy: I liked the way you didn't really rush into everything. You like, first go to the computer and have a little play around and we come back and you'd set something for us and we had to go and do that and then we'd come back

Alfie: A step up

Amy: Yeh there was always a challenge to add on to it. Then you just learnt new things as you were doing it.

Kevin: But not a challenge that would be so hard. But not a challenge that would be too easy. Just right.'

The class teacher, together with the researcher, reflected on the learning process they had planned;

'I think we did it quite well (laugh). I think the exploration was brilliant and they said so to. Then I think giving these games you suggested giving them. That was brilliant because they could then see the possibilities but it was all there. So they had that sort of concrete and some of them were happy to just leave it like that but a lot of them then started seeing the possibilities. If we'd given them endless exploration it would have got quite boring quite quickly but the exploring then using it for this little challenge and then here's your next challenge it's the car game and then the more complicated game. So that by the time they designed their own games they were quite buzzy and just wanted to get on with it.'

The children recognised and appreciated the way in which their learning had been scaffolded. Lisa described it as being,

'almost like a young child learning how to walk and us learning how to use the game.'

The increased confidence of learners was described in each school but at All Saints in particular, some of the children identified that they had learnt that they should not give up on things. Toby, who had expressed his worry about the difficulty of the software, described this;

'I know I wasn't the most confident with it to begin with but as I worked through it I began erm … like I know you have to. I learnt about myself to stop giving up, you've got to keep trying because I would if I did this at home without any support. I would just totally give up and just not bother with it but today and yesterday and the day before I kept going and I felt I did a good game with a good idea.'

Gemma considered how this might help her in the future;

'If in a test or something I didn't get something erm, or in sports or anything I couldn't do something, it would help me to carry on with that certain thing until I get it.

Children also reflected on the way the experience let them feel in control of technology. This was Claire's response to why she liked Scratch;

'Because it's different and normally when you go onto a computer you normally have that feeling, not that you're not in control of the computer but it telling you. But when you're on Scratch you control the computer and its actions and what it is doing.'

Another aspect of the independent learning was the problem solving which took place. Mark described how he solved a problem in his game where he wanted a player to lose a life when Hercules touches a fire,

'I learnt how to make an object associated with something still react to something it's not associated with so that when Hercules touches a fire a heart would disappear..'

The independent problem solving that was developed was seen two weeks later to have an impact on the maths problem solving which was described by the teacher in an email to the researcher (Personal communication, June 2013);

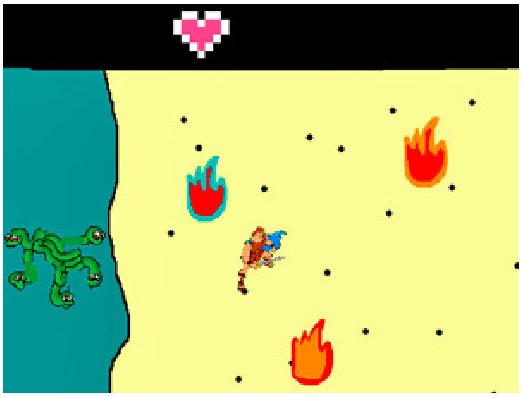


Figure 7: Hercules Game

'Just thought that you would like to know that I gave the class a maths investigation to do in groups of four today. They had to record systematically, although I didn't tell them this and as I went around I was so impressed with what every single person (except Felicity, who was doing a different task) was suggesting. When I told them how amazed I was with their logical approach, Gemma said it was because the Scratch programme had helped them to learn this logical way of thinking! Lots of others then piped up that they agreed. They were definitely approaching the task in a far more systematic way than I have ever seen before.'

The strongest factors that were identified as contributing to the benefits to learners at All Saints (figure 8) were, the teacher changing her role', 'time for exploration' and a 'supportive environment'. The teacher had created a learning environment where the children were empowered to support each other. There was an expectation they would be talking to each other and movement around the classroom and computer suite was allowed to facilitate this.

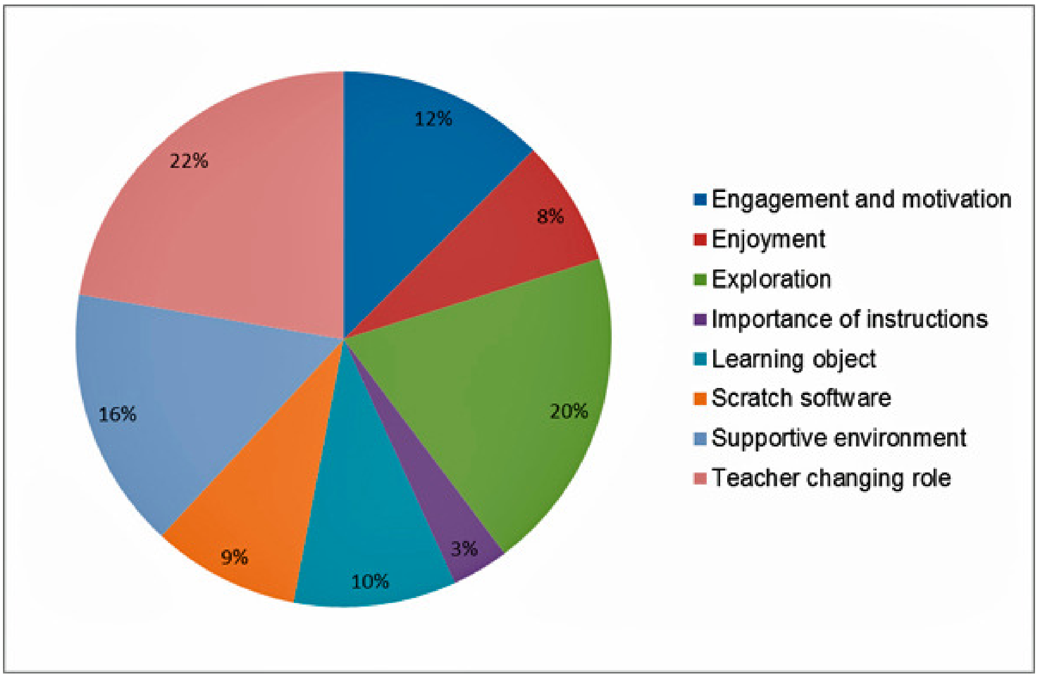


Figure 8: Factors contributing to the benefits to school 1 learners (Atlas-ti)

Alfie responded to the question of 'what helped you in learning to program?' by describing the contribution of his friends.

'Mmm I'd say friends as well because one of us always found out something. So say I didn't know how to change my background, someone else would know, so what I mean is there's always someone there who knows what to do.'

The support for each other was clear in the evidence as continuous interactions took place between learners. Children responded to questions from friends or moved to ask for help from someone they knew would have the answer. They also gained support and ideas from looking across at the screen of their peer. Talk in the classroom and the computer suite was always on task.

Children also worked alone for periods of time, interacting with the learning object of Scratch software. This learning object could be considered Papert's (1984) transitional object for learning or Bruner's (1996) 'work' which is a focus for their learning and talk about their learning. The whole picture of interactions during programming was a mix of those with the learning object and those with their peers as represented in figure 9.

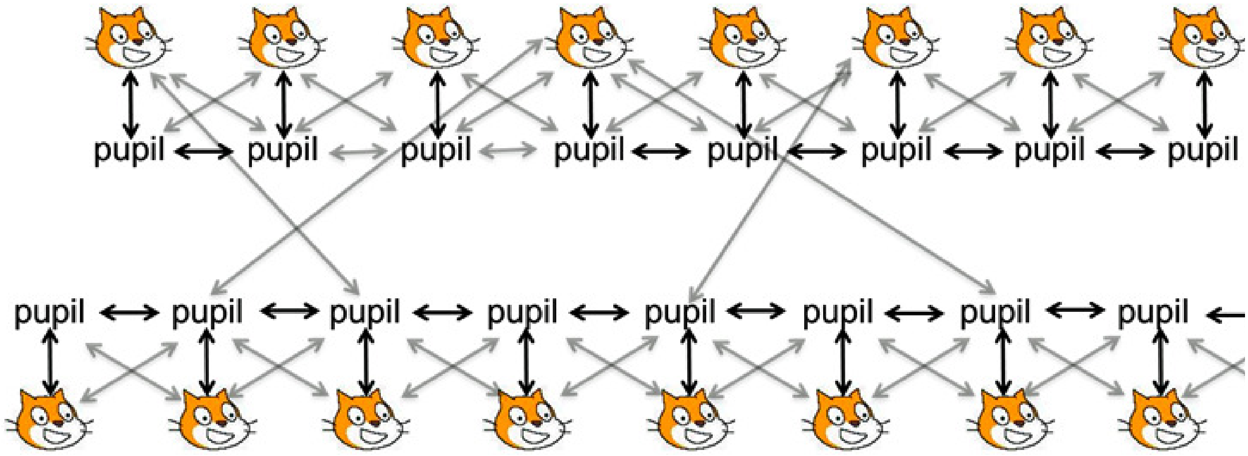


Figure 9: Learning interactions between pupils and Scratch software (black arrows on-going interactions, grey arrows oc interactions)

Case Study Two: Catcott Primary School

In this case study the Higher Level Teacher Assistant (HLTA) who took the class for ICT decided to use the Code Club materials (Code Club, ca. 2012a) to introduce the seventeen girls and seven boys in the class to Scratch. Members of the after school Code Club were available to support the other children. The class was given a set of instructions to create a 'Felix and Herbert' (ibid) game where Felix the cat chases Herbert the mouse. The class worked on PCs in the computer suite with six of the children working in pairs and the rest individually. The children were encouraged to talk to each other to sort out any problems. Five code club boys worked on their own games but responded when asked for support by different children. One boy worked in a pair with a pupil needing additional help.

The children used the instructions and explored the software to make changes to the appearance of the game. Each game became unique as the children discovered the width of the software. The children were also given the 'Ten block challenge' (Somerset, 2013b) and the 'Cat and Dog challenge' (Quinlan, 2012) to assess how much they had learnt about Scratch from following the game instructions. During the second session the children were given a second set of instructions, Whack a Witch (Code Club, ca. 2013b). Again the children supported each other to succeed in creating the game and then adapted it to make it their own.

The children at Catcott described their awareness of learning from mistakes and, alongside this, perseverance.

Miles felt that he learnt most when things went wrong,

'I thought it helped when you made mistakes and then you suddenly understand what has happened wrong. What's gone wrong that helps you more because then you understand the program more.'

Children also expressed their enjoyment of mistakes. Edward was one of these,

'I liked when you did something wrong and it went really funny. Like it just made me laugh instead of being frustrated it made you laugh.'

Being able to make mistakes was one of the two things Jason described when asked about his favourite thing in using Scratch;

'Two things, achieving something and the funniness when something goes wrong (laugh) like something moving on the screen when it's not supposed to.'

Lizzie described the combination of the enjoyment of mistakes but also recognised that mistakes will also cause something to happen,

'I enjoyed it when something went wrong it still did something even if it was something you didn't want.'

The children were aware of the perseverance that was required to put things right. Alison considered this when she was asked what she had learnt about herself through the programming,

'I didn't know I was that determined I must admit. I didn't know I could be that … I'd have thought I would have given up but I didn't.'

Fiona described discovering the determination to keep going as one of the things she enjoyed most about the sessions,

'I enjoyed quite a lot of it. But I think the main thing was it kind of helped me with my determination and everything. Like it helped me continue on with it and kept making me keep going with it so I had something to be proud of at the end.'

An open-ended exploration time had not been included at Catcott but the children were encouraged to take an exploratory approach to using the instructions to create the games. Children could make changes and try different things without any adult intervention. This change in the role of the teacher emerged as the strongest factor in enabling the children to gain benefits from the programming.

The lack of adult intervention was observed by Nicholas,

'I thought that instead of going through the whole process she let us give it a go to see what we could do on our own'.

Tamsin felt it was important to be able to progress at her own rate,

'The problem is if we'd done it on the board. We'd have put it in chunks and been waiting for ever. Because other people would have been at different stages.'

One of the group interviews focussed on the freedom the software allowed:

'Fiona: It doesn't give you a guide line on what you have to do. You can roam free.

Eleanor: You can explore anything. Some games you look at are dull and boring but when you look at it there's all these different things you can press. You can explore all over it.

Fiona: It's not like you have to do this. You have to do this. Sometimes there's only a certain amount of things you can click but in this you can do anything. You can change the colours and everything.'

Eleanor described the 'Ten block challenge' (Somerset, 2013b) as one of her favourite things,

'Like that ten block challenge. There were so many different things you could do with those blocks and you didn't really know what you can do but when you experimented you saw how many different things your sprite could do. It was really interesting.'

As had been seen at All Saints there was continuous conversation while the children continued on task. Interaction between pupils was balanced by learners working alone.

In reflecting on the two sessions the HLTA felt the Scratch software and the instruction hand-outs had enabled the appropriate level of challenge to be set;

'That's where it targets it well because it makes it achievable doesn't it. Without making it so simple that you could do it in five seconds… It's enough of a challenge but it's eminently possible.'

Case Study Three: Beechgrove Primary School

A team teaching approach was used for a 'Programming Day with the mixed year five (twenty pupils) and six (fourteen pupils) class. There were nineteen girls and fifteen boys.

The children worked in a computer suite on individual PCs to explore Scatch then moved to work in pairs on the 'Cat and Dog challenge' (Quinlan, 2012). They were then grouped by their teacher according to their literacy and mathematical ability and provided with instructions to make a game. The least able children created an 'Etch a Sketch game', the middle ability children created a 'Dance sequence' or the 'Racing car game', and the most able created a 'Tennis Game'.

(Somerset, 2012a). As had happened at the other schools, the children worked individually but with continuous conversations focussed on their projects.

After the individual work the class reviewed the games created. They paired with their 'Talking Partners' then showed each other the different programming they had done. Following this a session allowed all of the children to create the 'racing car game' and then to adapt it to their own version of a game moving a 'sprite' around a background. A wide variety of versions was created and, as had happened with the Greek games at All Saints, showed how the earlier exploration had allowed children to recognise possibilities which were made use of to make unique creations (figure 10).

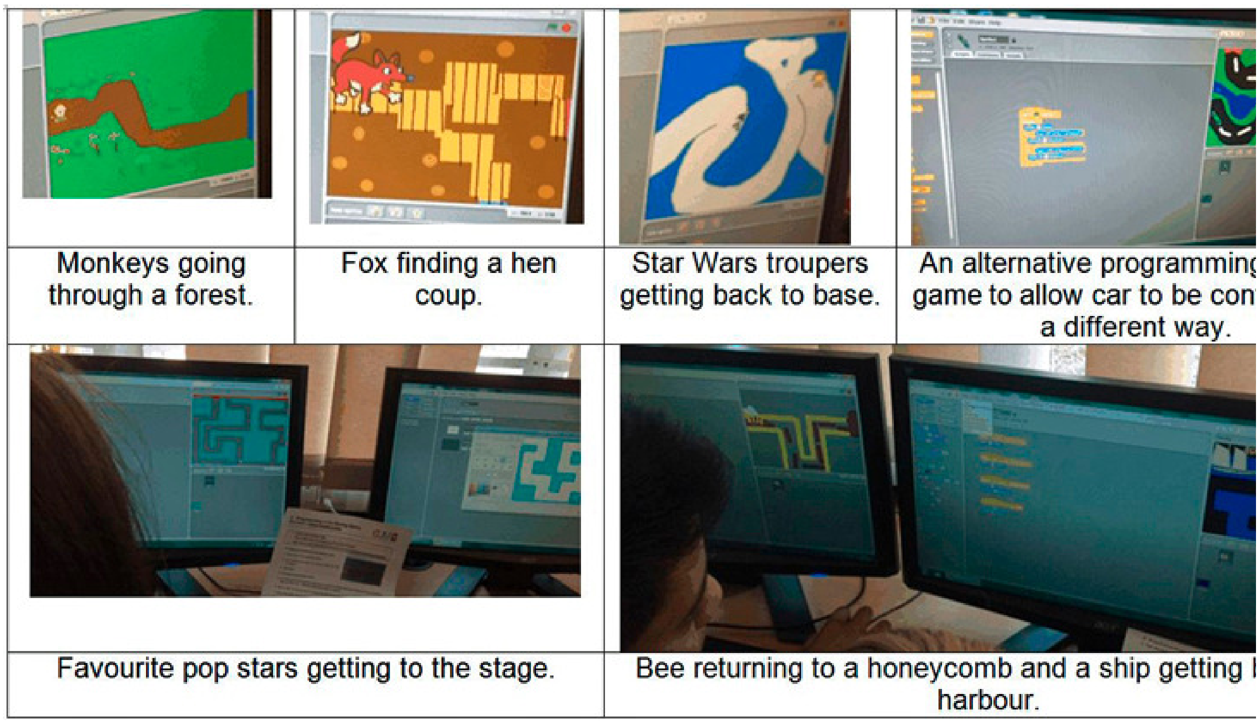
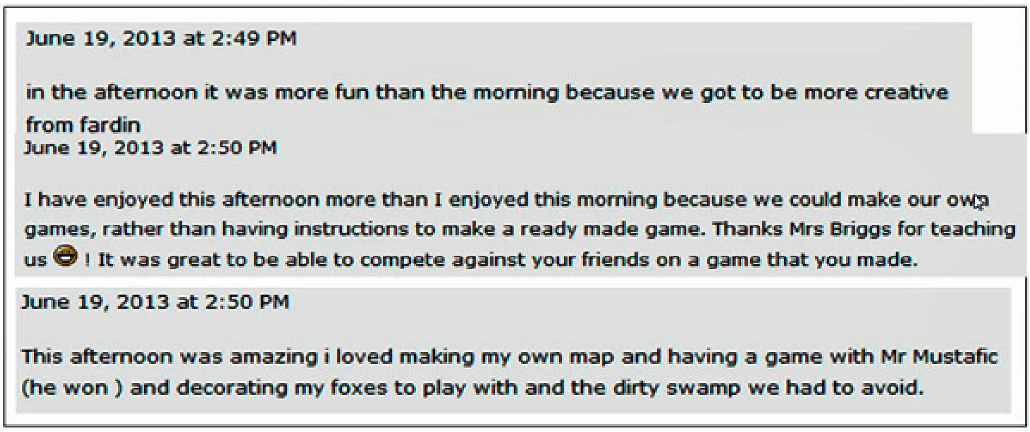


Figure 10: Variations based on the programming for Racing Car Game

Feedback on the class blog (Swallows, 2013) showed that the opportunity to create their own 'racing car game' was the part of the day that had been enjoyed the most (figure 11).


June 19, 2013 at 2:49 PM

in the afternoon it was more fun than the morning because we got to be more creative

from fardin

June 19, 2013 at 2:50 PM

I have enjoyed this afternoon more than I enjoyed this morning because we could make our own games, rather than having instructions to make a ready made game. Thanks Mrs Briggs for teaching us ! It was great to be able to compete against your friends on a game that you made.

June 19, 2013 at 2:50 PM

This afternoon was amazing i loved making my own map and having a game with Mr Mustafic (he won) and decorating my foxes to play with and the dirty swamp we had to avoid.

Figure 11: Blog posts School 3 Afternoon of Programming Day (Swallow, 2013)

When interviewed the class teacher talked about the attitudes to ICT that were already in place and the different ways the class had worked previously;

'They were used to exploring a program and investigating without being told what to do. That's something I do with them anyway. So they were quite happy to do that and to not know what they were doing to start with. They are very used to working in different ways. So they are used to working independently, to working in groups and supporting each other, they've got talking partners they are used to working with. So on the day when we asked them to work in those different ways that was all in place and … that didn't cause any issues.'

However he went on to describe the difference he felt that programming with Scratch had made to the learners.

'The one thing I really noticed that day is a kind of pro-activity. This class is not typically pro-active. They want to achieve, they want to achieve a challenge, but they are not always motivated to do that, to achieve that themselves. They want that support, they want to be given that next step in order to get to the challenge. Not every single one of them, but that is a feel you get from the class quite often and I feel when I am teaching them that I have to work really quite hard sometimes to get them motivating themselves. I'm motivating them to motivate themselves. On Wednesday I didn't have to do that at all. They were completely self-motivated. I mean Miles … he was stretching himself all day. And he is often very reluctant to stretch himself. He will do what's he's been asked to do but he won't do anywhere beyond at all. But he, with possibly Alex was the most advance of all of them.'

Leanne prompted other children around her to be imaginative in their adaptation of the 'racing car game'. She created a monkey to move along a jungle track. In the group interview she expressed her appreciation of being able to do what she wanted.

'And then you had your own like, you had to do your own like extra bits to it. I think that was better because you could work out more stuff like yourself. Instead of just being told what to do.'

As emerged in the other case studies the changing role of the teacher was one of greatest factors contributing to the benefits for learners.

Discoveries

The researcher is cautiously excited by the findings as they suggest that for these children the software and the approach taken by the teachers has made an impact on, not only their learning, but their attitudes to other experiences in the future. Scratch as a learning object has the potential to allow a child to be an 'emancipated, self-directing learner' (Goodyear, 1984: 24).

The 'dynamic relationship' between teacher, learner and Scratch seems to be similar to that of the model shared by Catlin and Blamires (figure 12) from their research around the use of a floor turtle.

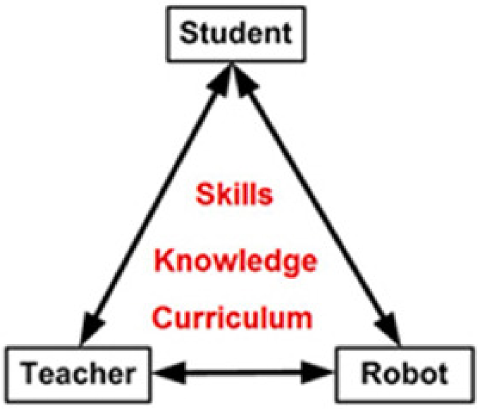


Figure 12 'The dynamic relationship between teacher, student and robot shows that the learning and teaching interactions are bi-directional', (Catlin and Blamires, 2012).

The researcher recognised that, not only were the learners using the learning object of their Scratch project to talk through problems, but they were looking across and gaining ideas from others. The diagram in figure 9 aimed to show these different interactions which are consistent with the 'collaborative social interaction' of the socio-cultural theory of Seely-Brown et al (1989).

Looking at the overall findings in figure 3 the 'teacher changing role' and the 'exploratory approach' provided for the children were the two strongest factors in achieving the benefits. Bruner's (1996) 'enabling culture' allowed the children to develop their own possibilities but also to become peer teachers. The learner group interviews included descriptions of the children solving each other's problems. Alfie, at All Saints Primary, refers to the way that 'someone else would know' so he did not need to rely on the teacher as the only source of help.

Papert's (1984) description of the turtle in logo programming, as being body syntonic, was echoed by the children who explored the use of programming blocks to create movements for sprites. In the All Saints case study a pair of girls giggled as their actions caused the character to turn or move off the stage (figure 5). A pair of boys was proud of their crab which moved sideways round a circle (figure 6).

The importance of instructions in the sequence of learning was expressed by learners such as Andrew. They helped him to 'understand what each block does' and he 'used that information for the final project'. In this way children develop habits through imitation (Bruner, 1998). They gain 'Habits of Mind' (Costa and Killick, 2000) where the learner develops skills and cues to give them confidence to work on problems which may not be easily solvable.

The process suggested by the mix of exploration and the use of instructions could be considered the cycle of becoming a programmer (figure 13).

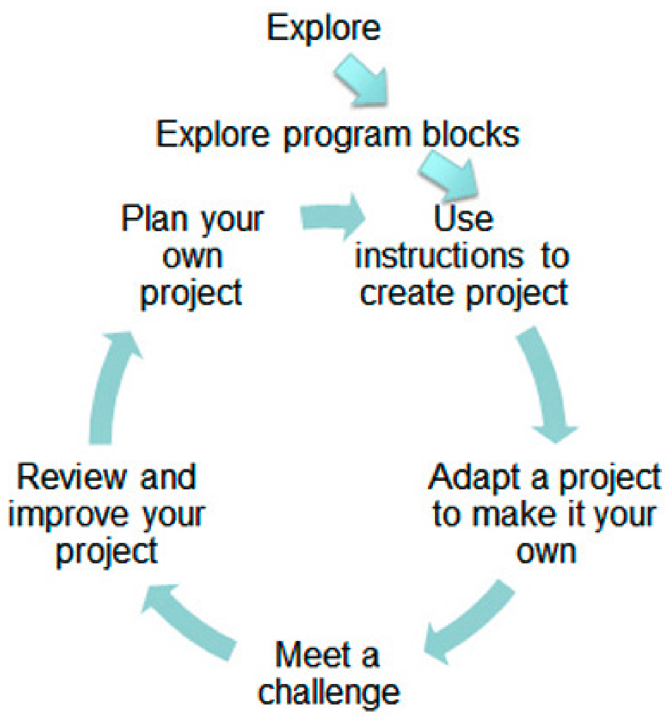


Figure 13: Cycle of programming

The experience at Catcott Primary, suggests that consideration should be given in the future to ways in which exploration can be introduced at different points in the cycle. This idea has been developed further as the researcher has gone on to work with other classes in other schools where physical role play became a strategy for encouraging on-going exploration.

This research suggests that, in order for the benefits described in the case studies to emerge an 'Exploration Triangle' (figure 14) is required.

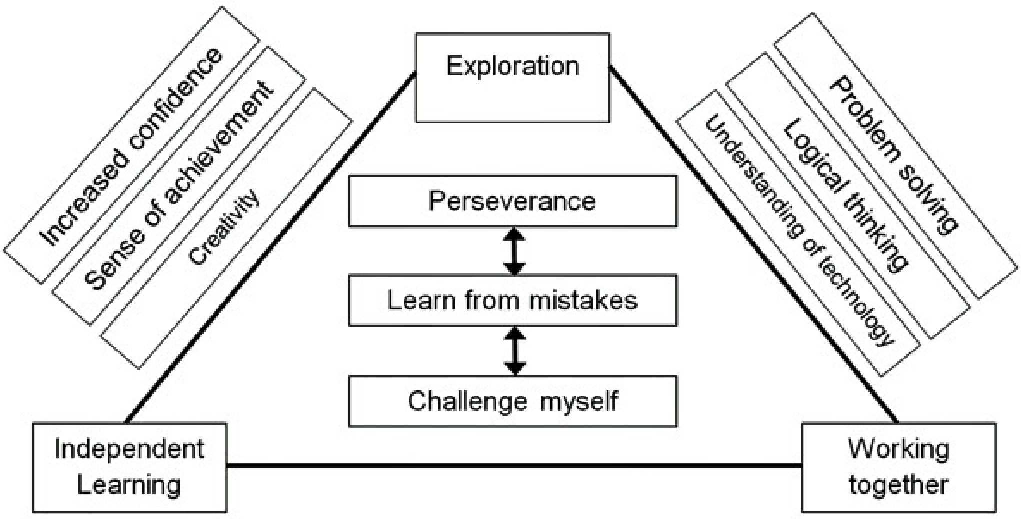


Figure 14: The exploration triangle

The teachers in all three case studies identified the way in which programming with Scratch allowed children to recognise the contribution perseverance can make to their learning.
The teacher at Beechgrove Primary was keen to harness this discovery by using the same programming experience as part of the induction process for his class at the beginning of the school year. He felt it would provide a reference, for the

children, of the attitudes required for achievement in all areas of the curriculum.

The researcher has grouped the benefits (figure 15) in four categories to consider the overall gains for learners.

Personal attributes	Learner understanding	Attitude to learning	Ways of learning
Challenge myself	Developing logical thinking	Increasing creativity	Working together
Increase confidence	Developing problem solving	Learn from mistakes	Encouraging exploration
Developing perseverance	Understanding of technology	Sense of achievement	Developing independent learning

Figure 15: Benefits to year 6 learners in adopting an exploratory approach to introducing Scratch

Conclusions

The researcher was inspired by the excitement of the teachers and learners that contributed to the case studies. The classrooms were buzzing as children used Scratch as Papert's (1984) 'transitional object'. They were creating 'objects-to-think-with' (Fjeld et al, 2002) using a technology that was part of their culture. This reflected Vygotsky's (1962) theory of the culture developing the thought and language which allowed the children to learn.

Papert (1984) was concerned that children are held back when they are concerned about getting things right or wrong. Children at Catcott were laughing at the results of their mistakes and using them to develop their learning.

There appears to be an inextricable link between the learning environment established by the teacher and the degree to which the children see themselves as programmers. The learning environment is not only the classroom ethos but the width and height offered by Scratch software.

The recommendations that have evolved from the case studies are:

- Children should be allowed to experience an introduction to programming which allows them to 'explore and discover' before being guided as they develop their skills, knowledge and understanding further. It is not something to be taught to them but something which is 'scaffolded' across Vygotsky's (1962) Zone of Promixal Development. Bruner (1996: 151) quotes Ella Fitzgerald, 'When you're talking about it, you ain't doing it'.
- On-going opportunities for exploration need to be planned into programming experiences with Scratch. The possibility of using physical role play to set challenges for this should be investigated. This can support children to add 'imagining and reasoning' to 'observing and experimenting' (Lucas and Claxton 2010: 59), and has the potential to make the learning more powerful.
- Programming with Scratch could be used as part of the induction process for a new school year. It can help the children develop an attitude which can increase how much they learn (Goodyear, 1984).
- Children should have the opportunity to make links between programming and problem solving in mathematics. Research into how best to make the connection could contribute to raising attainment in this area. It may be that, as seemed to have occurred at All Saints, the children will transfer the skills and understanding without a need for guidance from their teacher.

The vision for learners beginning to program that has emerged for the researcher could be that described by a fourteen year old glider pilot on BBC breakfast News in May 2013,

'Freedom to go everywhere and anywhere, as far as the eye can see.'

Julia Briggs can be contacted at JBriggs1@somerset.gov.uk

References

Atlas.ti 7 [Online] available from http://www.atlasti.com [accessed 26th August 2013].
BBC Points West (2013) Breakfast News 23rd May 2013. BBC Somerset.

Bruner, J.S. (1996) The Culture of Education. Harvard University Press.

Catlin, D. and Blamires, M. (2012) The Principles of Educational Robotic Applications (ERA): A framework for understanding and developing educational robots and their activities, Advancing Education Summer 2012, NAACE. [Online] available from http://www.naace.co.uk/1948 [accessed 24th November 2012].

Costa, A. and Kallick, B. (2000) Describing Sixteen Habits of the Mind. Adapted from Costa, A. and Kallick, B. (2000) Habits of Mind: A Developmental Series. Alexandria, VA: Association for Supervision and Curriculum Development.

Fjeld, M., Lauch, K., Bichsel, M., Voorhorst, F., Krueger, H., Rauterberg, M. (2002) Physical and Virtual Tools: Activity Theory applied to the Design of Groupware. Computer Supported Cooperative Work 11: 153–180, 2002. Kluwer Academic Publishers.

Game 2013, Hercules in progress . [Online] available from http://scratch.mit.edu/projects/10405964/ accessed 23rd May 2013.

Goldstein, R. and Pratt, D. (2003) Teaching the Computer in, ICT and mathematics edited by Way, J. and Beardon, T, 2003. Open University Press.

Goodyear, P. (1984) Logo, a guide to learning through programming. Ellis Horwood Ltd.

Gove, M. (2012) Speech at BETT show 2012. [Online] available from Department for Education http://www.education.gov.uk/inthenews/speeches/a00201868/michael-gove-speech-at-the-bett-show-2012, [accessed 26th March 2012].

Lucas, B. and Claxton, G. (2010) New Kinds of Smart, How the science of learnable intelligence is changing education. McGraw Hill, Open University Press.

Papert, S. (1984) (2nd Edition) Mindstorms: Children, Computers, and Powerful Ideas. Harvester Wheatsheaf.

Scratch (ca 2007). [Online] available from http://scratch.mit.edu/ accessed 8th September 2013.

Seely-Brown, J., Collins, A. & Duguid, P. (1989) 'Situated Cognition and the Culture of Learning'. Educational Researcher, 18 (1), 32-42.

Somerset (2013a) Programming with Scratch. [Online] https://slp.somerset.gov.uk/cypd/elim/somersetict/Site%20Pages/Scratch.aspx [accessed 12th September 2013].

Somerset, (2013b) Scratch: 10 Block Challenge. [Online] https://slp.somerset.gov.uk/cypd/elim/somersetict/Innovative%20Use%20of%20ICT/Programming/Scratch/Questions/Scratch%2010blocks.pdf [accessed 15th September].

Sutcliffe, C. and Sandvik, L. (2012a) Code Club. [Online] https://www.codeclub.org.uk [accessed 26th August 2013].

Sutcliffe, C. and Sandvik, L. (2012b) Whack a Witch. [Online] http://codeclub-assets.s3.amazonaws.com/public/codeclub-whackawitch.pdf [accessed 26th August 2013].

The Royal Society (2012), Shut down or restart? The way forward for computing in UK schools. The Royal Society. [Online] available from http://royalsociety.org/education/policy/computing-in-schools/report/ [accessed 20th October 2012].

Vygotsky, L.S. (1962) Thought and Language. M. I. T. Press Cambridge, Massachusetts

Naace
The Sir Colin Campbell Building
University of Nottingham Innovation Park
Triumph Road
Nottingham
NG7 2TU
Phone: 0870 240 0480
Fax: 0870 241 4115
Email: office@naace.co.uk

Naace

Avatars, LEGO Robots and Immersive Learning: a case study exploring the development of learners' programming and cognitive skills using LEGO robots in an international collaborative learning environment.

Author: Catherine Naamani, University of South Wales, UK and Michael Vallance, Future University Hakodate, Japan.

Cited in:

- Advancing Education Autumn 2013

This paper reports on an engaging but challenging project involving the programming of robots to provide opportunities for learning content in the Science, Technology, Engineering and Math (STEM) subjects in context. It captures students' procedural processes as they work through specific tasks, and capture students' learning reflections during, and after completion of, these tasks. Some tasks have involved Japanese students collaborating with other remotely located Japanese students, and some with Japanese students working with the UK students.

Knowledge is not merely a commodity to be transmitted, encoded and retained, but is personal experience to be actively constructed (Papert and Harel, 1993). The subsequent learning is based on intuition, experimentation and discovery (DiSessa, 2001). According to Jukes et al. (2010) this is the learning that engages and motivates learners, and can be implemented through collaborative tasks. Our current collaboration is continuing the work of Vallance and Martin (2012) to explore the development of an evidence-based framework of learning for tasks of measurable complexity in virtual worlds. This is undertaken by collecting data of procedural and declarative knowledge as students collaborate in the programming of LEGO robots in a virtual world. In our research project we capture students' procedural processes as they work through specific tasks, and capture students' learning reflections during, and after completion of, these tasks. From this data we aim to associate specific learning within a task process as defined by Anderson et al's neo-Bloomian taxonomy (2001), and analyze the learning reflections through the use of the Welsh Baccalaureate Qualification Essential Skills taxonomy (WJEC, 2103).

The initial motivation for our project was the Fukushima nuclear power plant disaster of March 2011 in Japan. One of the most surprising technology related episodes during the post-disaster efforts was Japan's lack of robots to assist with the recovery operations. Japan, a robotics-friendly nation with the world's highest levels of automation, had to count on foreign assistance. Less than a week after the tsunami and earthquake, iRobot USA donated PackBot and Warrior robots to enable inspection of highly radioactive areas. iRobot USA engineers trained the Japanese operators the following week. However, due to ineffective communication at all levels from management to operators, it took three weeks for the nuclear company to authorize their use (Vallance et al., 2013). Two specific observations can be made from the multitude of issues surrounding these tragic events:

1. People need to be better informed and also equipped to make sense and meaning of information. In education contexts, we should not tell students what to think but to give them learning opportunities for reflecting, organizing, negotiating, and creating. An engaging but challenging project like programming robots provides opportunities for learning content in the Science, Technology, Engineering and Math (STEM) subjects in context.
2. International collaboration and communication are essential. A virtual world as a future 3D space provides a safe medium for international communication, collaboration, and subsequent experiential learning.

It is therefore reasoned then that researchers and school educators need to find ways to support experience of collaboration, and provide awareness of the benefits and challenges of working in virtual-to-real augmented environments.

Our current research, entitled Robot-Mediated Interaction (website URL is http://www.mvallance.net), has developed a virtual space using OpenSim technologies and also a simulation of the Fukushima nuclear power plant in a Unity3D virtual space (Vallance and Martin, 2012). Our project has been designed for students to collaborate, at a distance, to program robots to follow pre-determined circuits. Each circuit task represents tangible and quantifiably measured outcomes. The robot selected for the programming tasks is LEGO Mindstorms with NXT software version 2.1. See Figures 1, 2 and 3. Robot project work has been shown to develop independent learning skills, creativity, motivation, confidence and resilience (Barker and Ansorge, 2007).

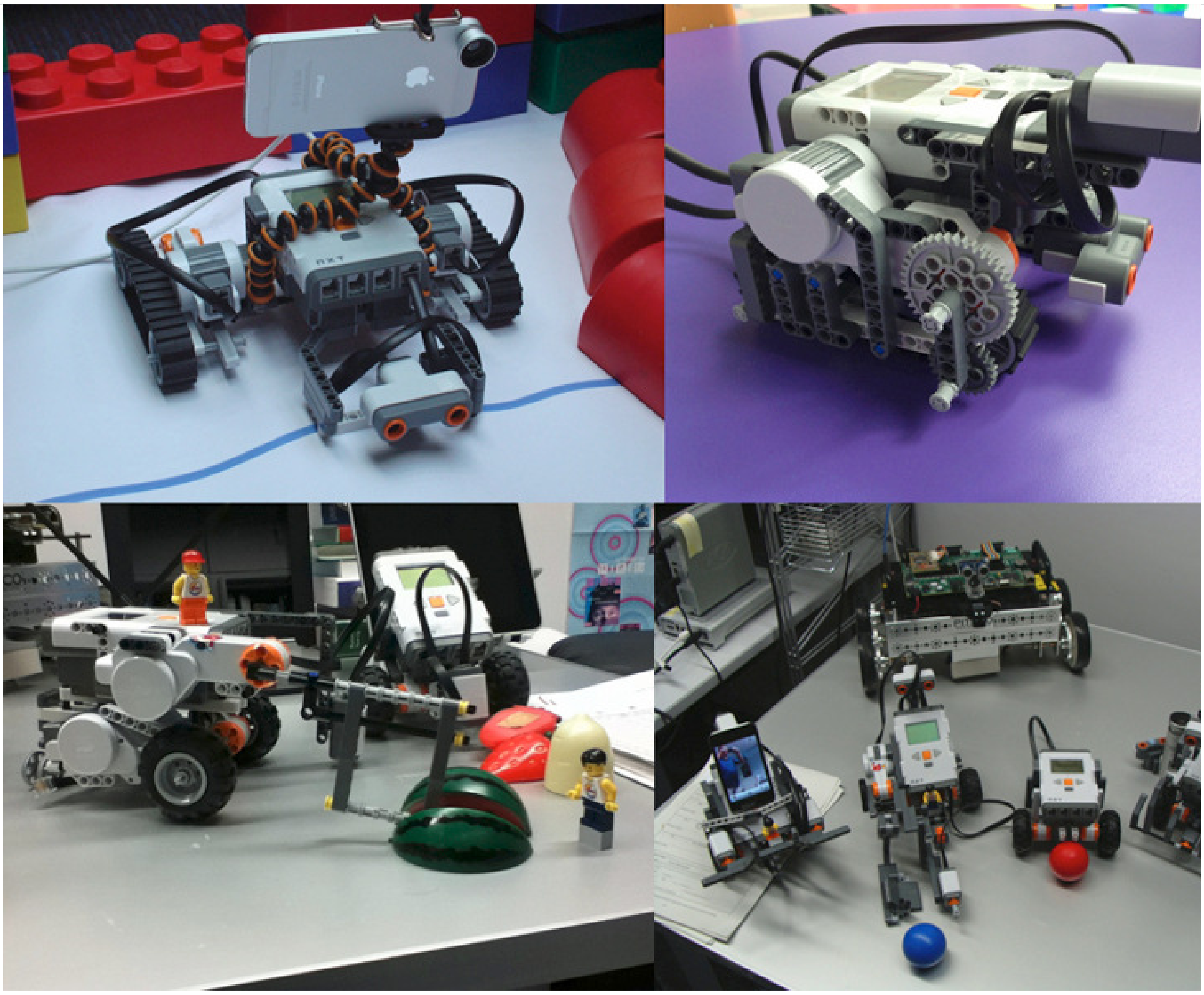


Figure 1: Selection of LEGO robots constructed

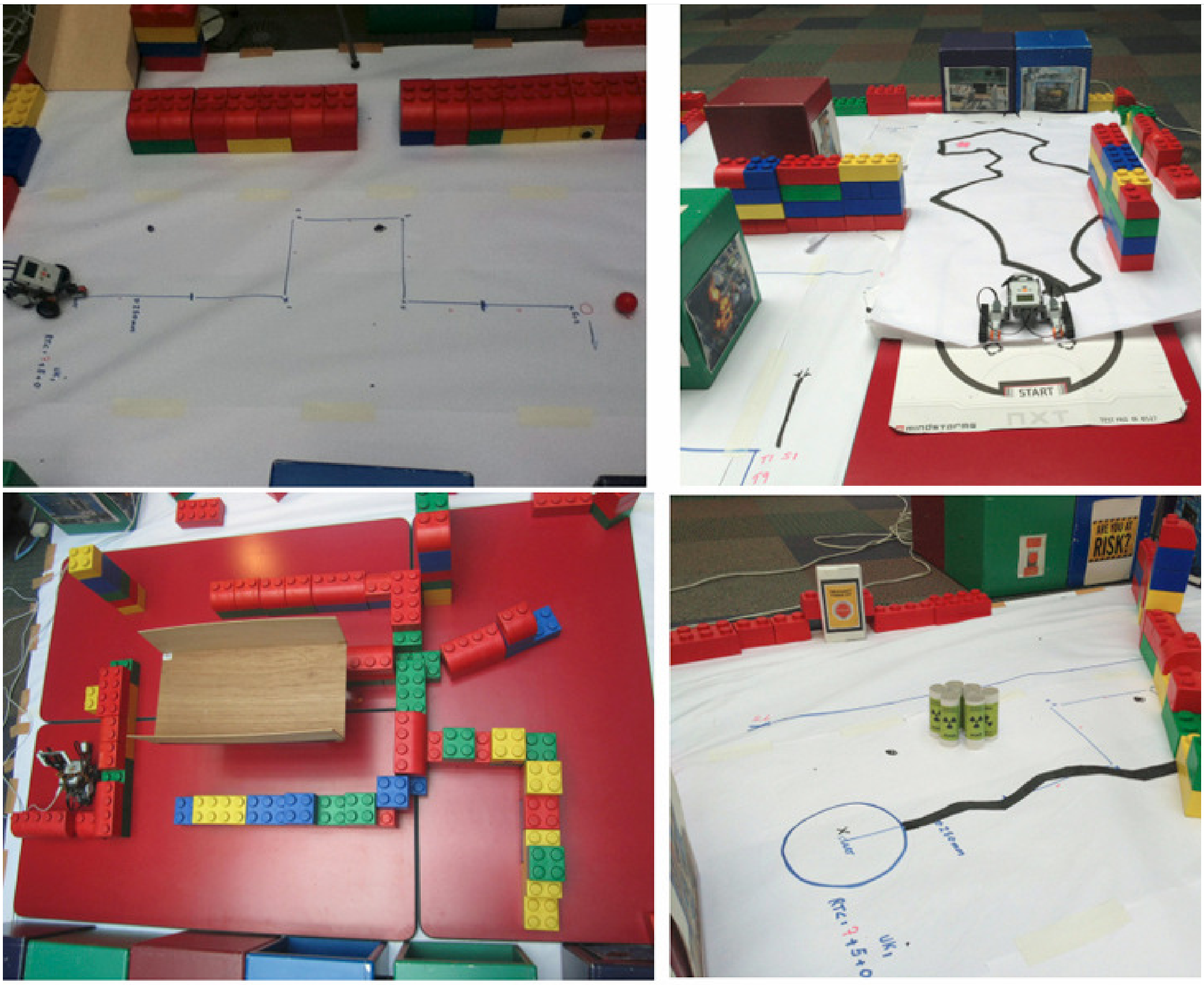


Figure 2: Real world tasks

Figure 3: Virtual world collaboration

The research is a collaborative effort between Future University Hakodate, Japan and University of South Wales, United Kingdom, working with 6th Form students at local schools. In Japan, there are four second year undergraduate students, all males aged 19, studying Media Architecture. In the UK, there are two groups of students: one group in Mountain Ash Comprehensive School, and the second in Aberdare High School. The groups are mainly male, aged 17 to 18, with one girl. They study a variety of science-based subjects at A-level. Some of the students are planning on progressing into Higher Education, while others intend to seek Engineering apprenticeships or similar on leaving school. None had experienced working with LEGO Mindstorms or in OpenSim prior to this project.

The schools in Wales became involved in the project for three main reasons:

1. To provide a unique opportunity for them to collaborate on an international scale that would otherwise not have been possible
2. To develop students' key skills, with a focus on communication, collaboration and problem solving in the context of the Welsh Baccalaureate Qualification and Essential Skills Wales.
3. To improve students' programming skills

The students meet with their teachers to plan and prepare prior to the international real-time collaboration task. The students in Wales are taking part in the project in their own time and it is often difficult to find a time for them all to meet. Additionally, at the start of the project, numerous technological barriers were encountered, not least of which, the firewalls protecting the schools' internet access blocked the collaborative technologies we hoped to use for the project. This was overcome largely thanks to the help of the schools' ICT technicians who were able to set up alternative internet access for the project. The university in Japan had similar port-blocking issues which were overcome by purchasing a dedicated network line to the research lab.

At this stage of the research, twenty one tasks have been undertaken of increasing complexity. Some tasks have involved Japanese students collaborating with other remotely located Japanese students, and some with Japanese students working with the UK students. Tasks have included maneuvering around obstacles using distance and turn commands, using touch sensors to find ways around obstacles, constructing a bridge and subsequently programming robot sensors to move over obstacles, using light sensors to avoid obstacles, using touch and light sensors to scoop up objects, and using RGB sensors to locate items. We have collected data of Circuit Task Complexity, Robot Task Complexity, and Immersion. Ideally, instructors such as school teachers and university lecturers should provide tasks commensurate with the expected successful outcomes to be developed by the learners. But often there are differences between a task's complexity set by a teacher and the task outcome performed by a student. In our research using robots in virtual worlds we have measured the difference; which we call Task Fidelity. For details of tasks and Task Fidelity values, see Vallance et al., 2013.

This cumulative data is also being explored to see how task processes by learners can be located within Anderson et al's neo-Bloomian taxonomy. The six categories associated with cognitive processes identified in the taxonomy are: remember, understand, apply, analyze, evaluate and create. The taxonomy provides an instrument upon which to scrutinize learning and relate the outcomes to the observable learning instances expected by education boards and awarding authorities. Assessment schemes presume an ordered relationship between the indications of increasing intellectual competence and the actual acquisition of incrementally higher-order cognition by individuals. There is widespread use by many educators of assessment schemes based on an ordered hierarchy of cognitive activity, where the judgments about the learning progress of students is commonly expressed using either percentage marks or ranked alphanumeric grades. Such schemes possess high face-validity because they appear to represent common-sense descriptions of learning progression. Given this assumption there is thus a direct inference that cognitive processes develop linearly from low-order thinking (such as 'remember') to high order thinking (such as 'create') (Vallance and Martin, 2012).

The skills based core component of the WJEC - Welsh Baccalaureate Qualification is also used (see Table 1). Cognitive descriptors in the Essential Skills Assessment Record have been extracted from the three levels of the Wales Baccalaureate documentation (see column 2). These have then been assigned their equivalent Bloom's descriptor (see column 3). Column 4 shows the cognitive processes attributed within the neo-Bloomian hierarchy. It can be seen that the Baccalaureate Essential Skills ensures assessment of higher cognitive process of 'evaluate' and 'create' at each level; referred within the documentation as "increasing ability to manage the whole process". Moreover, as skills development focuses on the context and complexity of the task, it is feasible to use the same descriptors for different levels. For example, complex tasks at Level 3 require 'analysis' and 'evaluation'. Likewise, it is possible to have a simple task at Level 1 requiring the same cognitive process of 'analysis' and 'evaluation'.

Welsh Baccalaureate Qualification	Cognitive descriptors in WJEC Essential Skills Assessment Record	Equivalent Bloom's descriptors (+ verb sub-set) of WJEC	Bloom's hierarchy assessed (*not assessed)* in WJEC
L3	Explore Identify Analyze Compare Plan Check Reflect	Evaluate (critique) Analyze (attribute) Analyze Analyze - (differentiate) Create Analyze (differentiate) Evaluate	Create Evaluate Analyze *(Apply)* *(Understand)* *(Remember)*
L2	Identify Plan Check Reflect	Remember (recognise) Create Analyze (differentiate) Evaluate	Create Evaluate Analyze *(Apply)* *(Understand)* Remember
L1 - low	Understand Plan Reflect (for improvement)	Understand Create Evaluate	Create Evaluate *(Analyze)* *(Apply)* Understand *(Remember)*

Table 1. Cognitive descriptors in WJEC Essential Skills Assessment Record.

During implementation the first task set for the students did not involve any programming, but focused rather on ensuring students could access the environment and allowing the students to get to know one another. The students responded positively to this opportunity as it gave them confidence to interact in a more challenging, task focused environment as the project evolved. This approach is reflected in the research literature introduced in Salmon's (2001) 5 stage model and further developed as an approach to developing e-learning skills in virtual worlds by Salmon, Nie and Edirisingha (2010) who conclude that Salmon's original model is equally valid for learners in Second Life.

As tasks became increasingly more complex, the students became more comfortable with the technology and while they have reported feeling increasingly challenged by the levels of complexity associated with the programming, other 'softer' skills, in particular collaboration and problem solving, have developed notably.

Similar to the students' data captured in previous research by Vallance and Martin (2012), the procedural knowledge appeared unrelated to instances of 'remembering' and 'understanding' and was instead more frequently associated with 'applying' or 'evaluating'. Also, there was no consistent trend found in the frequency with which instances of the cognitive descriptors appeared over time in the tasks. The relative frequency with which particular kinds of cognition appeared in the data (e.g. 'applying procedural knowledge') was not patterned as tasks progressed and difficulty increased. However, it is acknowledged that Vallance and Martin (ibid) determined their findings based upon 60 hours of recorded interactions, while our less reliable data was captured from the students' reflections and the researchers' observations.

As the tasks then became more complex according to our Robot Task Complexity criteria, the students indicated that even though the tasks were considered 'demanding' they deemed their skills to be 'competent' thereby indicating some degree of development. However, in later tasks the students revealed that as the level of challenge increased (from 'manageable' to 'difficult'), their skill level in attempting to seek successful outcomes decreased (from 'competent' to 'reasonable'). Looking at the task communication transcripts and screen captures, it appeared that the students had to utilize different procedural knowledge involving, for instance, programming a touch sensor to coordinate with a motor action. These latter tasks required students to 'analyze' and 'create' unique solutions based upon their prior task experiences and were thus deemed most challenging. The increased task complexity necessitated a higher level of programing skill incorporating sensor variables and loops. Also, observing the video captures from Task 1 and then Task 16 (of 21) revealed that students' communication skills had improved (Vallance et al., 2013).

As anticipated, students' data revealed that they found programming sensor related tasks difficult. However, student success and Task Fidelity values were commensurate with the instructor's expected outcome 'when the students were immersed' in a task'; even when programming sensors. Another observation is that the UK students were better at giving instructions than the Japanese students. We suggest this has more to do with cultural communication strategies than English fluency, but a factor which all international collaborations must consider. Even though both nationalities were competent users of multiple media such as video, audio, image and virtual spaces, it has to be acknowledged though that the Japanese students were most confident when in synchronous text-based communication.

In conclusion, our project has enabled students in a Japanese university and two UK schools in South Wales to actively engage in international collaboration, problem solving, construction of solutions, communication and effective team working within the context of programming LEGO robots in a virtual world.

Catherine Naamani can be contacted at catherine.naamani@southwales.ac.uk and Michael Valance can be contacted at mvallance@mac.com

References

Anderson, L.W., Krathwohl, D.R., Airasian, P.W., Cruicshank, K.A., Mayer, R.E., Pintrich, P.R., Raths, J. and Wittrock, M.C. (2001). A taxonomy for learning, teaching and assessing: A revision of Bloom's taxonomy of educational objectives. Longman: New York, USA.

Barker, S.B. and Ansorge, J. (2007). Robotics as means to increase achievement scores in an informal learning environment. Journal of Research in Technology and Education, Vol. 39, Issue 3, pp. 229-243.

DiSessa, A. (2001). Changing minds: computers, learning and literacy. MIT Press: Massachusetts, USA

Jukes, I., McCain, T. and Crockett, L. (2010). Understanding the digital generation. Sage: Canada.

Papert, S. and Harel, I. (1993). Constructionism. Ablex: USA.

Salmon, G. (2001). E-moderating: the key to teaching and learning online. Kogan Page: London.

Salmon, G,, Nie, M. and Edirisingha, P. (2010). Developing a five-stage model of learning in Second Life. Educational Research, Vol. 52, Issue 2, pp. 169 – 182.

Vallance, M. and Martin, S. (2012). Assessment and Learning in the Virtual World: Tasks, Taxonomies and Teaching For Real. Journal of Virtual Worlds Research Vol. 5, No. 2. Asian Perspectives. pp. 1-13.

Vallance, M., Naamani, C., Thomas, M. and Thomas, J. (2013). Applied Information Science Research in a Virtual World Simulation to Support Robot Mediated Interaction Following the Fukushima Nuclear Disaster. Communications in Information Science and ManagementEngineering (CISME). Vol. 3 Issue 5, pp. 222-232.

WJEC - Welsh Baccalaureate Qualification Essential Skills, Viewed 9 January, 2013. http://tinyurl.com/cayuo64

Acknowledgements.

The authors express thanks to UK teachers and students at Aberdare High and Mountain Ash schools in South Wales, and research assistants at Future University Hakodate in Japan. This project was presented at the 3rd Global conference on Experiential Learning in Virtual Worlds, March 7-9, 2013, Lisbon, Portugal.

Authors

Catherine Naamani, MA, FHEA is Head of Technology Enhanced Learning at the University of South Wales, UK. She leads the University's strategy to research and develop innovative approaches to Technology Enhanced Learning, Teaching and Assessment. Her website is http://staff.southwales.ac.uk/users/1338-cnaamani

Michael Vallance Ed.D. MSc., BSc(Hons), PGCE is a researcher at Future University Hakodate, Japan. He was awarded the second prize in the Distributed Learning category at the United States Army's 2012 Federal Virtual Worlds Challenge for his research in virtual collaboration. His website is http://www.mvallance.net

Naace
Festival of Code 2013: Young Rewired State Bradford

Thank you for editing the entry. This is how the edited entry will appear in the database.

Author: Siobhan Ramsey, Director of Sandbox Education

Cited in:

- Advancing Education Autumn 2013

Siobhan Ramsey is a specialist in Computing, Digital & Text Literacies with extensive experience in schools working with children and teachers as computational thinkers and digital makers.

As a sponsor for Computing at Schools, she has a lead role in digital badges for the CAS network of excellence, is a Fellow of Naace and MirandaNet and a member of ALT, CSTA and ISTE.

Sandbox Education runs a free code club, and recently launched a social network hosting infographics and data visualisation tools curated by learners teaching themselves to code. She has expertise in building responsive, retina ready web sites, networks and learning systems for schools and the third sector.

Contact http://www.sandboxeducation.co.uk or by mobile 07984403380

Background

The Festival of Code is an annual celebration of code for under 18s run by Young Rewired State, a philanthropic movement which finds children driven to teach themselves how to code. YRS introduces under 18s to open data, invites them to join a worldwide network of young programmers and work together to Code a Better Country by solving real world problems.

In the summer, Siobhan Ramsey, Director of Sandbox Education, successfully mentored young 18s programmers in visual programming, physical computing and application development to reach the final of Young Rewired State. This article gives an outline of this work during the 2013 Festival of Code. It provides a list of resources for learning the fundamentals of visual or text based programming.

"In addition to curriculum opportunities to explore the creative side of Computing, we would like to see this taken further in extra-curricular activities such as computer clubs. These clubs would encourage motivated pupils to explore the creative side of Computing further, and universities and industry should get involved." (Shut down or restart? The way forward for computing in UK schools 2012, Royal Society).

The Week

The week starts in Bradford as the young programmers arrive from Leeds, Bradford, Keighley and York, uncertain what to expect. They quietly plug in laptops, open screens, log on to the wifi. The tension breaks after the group watches a welcome video presented by Emma Mulqueeny: who explains YRS and encourages everyone to bring their creative projects to the weekend event at the Custard Factory in Birmingham.

They start to quietly chat and explore data sets, using links to resources provided by YRS and its sponsors. With a little prompting, they formulate ideas for applications using open data, the annual challenge of YRS.

One states that he would like to see if they can find the location of the 'North-South divide': exploring social inequality. A team forms around this idea and sets to work coding in Python.

Another group decides to build an application using an event based API that will help users find events in any local area using the post code. The lead programmer in this team, has skills in Ruby, mainly self-taught and is keen to code on Ruby. We explain to him that he is on is own, as no one has expertise in Ruby. He cheerfully sets to work programming the full application, without mentor help, using web based resources.

The young programmers write their applications on cloud based interface development environments (IDEs) using Heroku or Cloud9 and and store their code on GitHub. The mentors curate the room, observing and strategically intervene to help when needed. Sessions run throughout the week drawing on the coders' and mentors' interests and skills. One young programmers demonstrates Github a code repository used by professional programmers. He creates a new account, pushes code to Github from the IDE, where it can shared, forked, merged or reverted back to earlier versions if the worst happens and the code is corrupted and can't be fixed.

Mentors provide expertise on agile workflow, programming in Python, Scratch, HTML, CSS, Web Standards and domain name registration. We help to install and configure Wordpress blogs with responsive designs. The bloggers post images and videos to sites that dynamically adapt to display well on all devices: tablet, phone, laptops and desktop.

Some programmers code, run and debug the backend of the apps, while others focus on the front-end or user interface. They explore the Twitter Bootstrap framework but opt to use a flat user interface kit (UI kit) instead and style their web pages following the key design trend now found in IOS7 and Google. Others create QR codes and design leaflets in Adobe Illustrator.

The mentors work as a team to facilitate social dynamics, occasionally stepping in to divert programmers not coding projects for the YRS event in Birmingham, to new challenges on Codeacademy, the Raspberry Pi and Scratch. We guide a less socially confident coder into a role commensurate with his skills.

Aware of the absorption and intense concentration we instigate and enforce rest breaks and the host centre provides free snacks and drinks. The coders socialise as a group over lunch and games of table football. A mix of concentration, collaboration, humour, excitement and anticipation, pervades the week.

As that the week culminates in public 'show and tell' sessions in Birmingham the young programmers prepare from day one. At the end of each day teams deliver presentations to the whole group.

Mentors give feedback and the whole group ask questions and comments. This triggers reflection which leads the teams to debug their apps, clarify roles and evaluate progress.

One team realises that their application is not quite on track to provide the answers they seek. With mentor assistance they decide to find and cross reference new data sets including data on poverty and reported crime.

Most of the programmers emerge, through a series of low-key rehearsals, from self–conscious hesitancy, to confident team members. One who is uncomfortable speaking publicly, opts to run technology on stage at the Custard Factory. This is the culture of the week nothing is forced apart from rest!

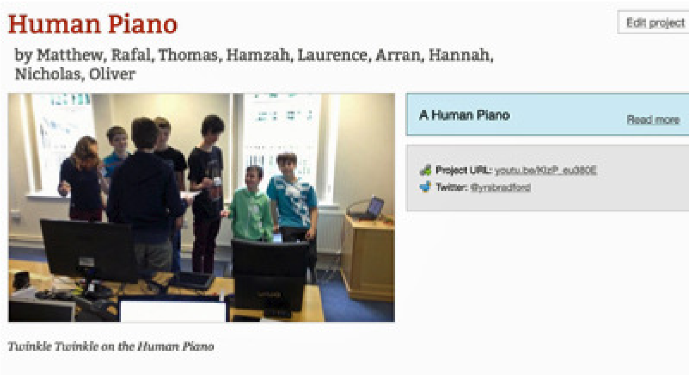
By the end of the week the teams have worked iteratively through the stages of ideation, prototyping, rigours user testing and built fully working applications. They have used project control lists to monitor progress and track modifications, in response to user tests and group feedback.

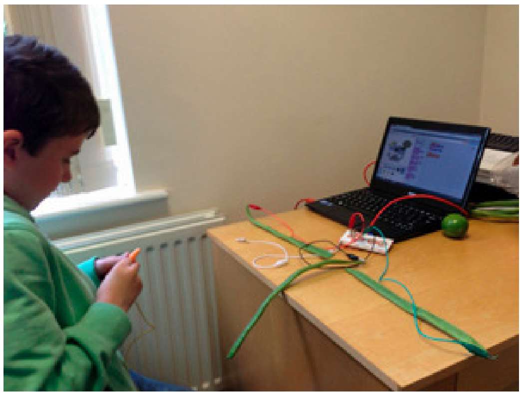
They have polished their presentations with the potential viewpoints of the individual judges in mind, formed self-organising teams and are ready to present in public, in roles that work to their strengths. All have taken part in video interviews, photo-shoots, tweets and blogs and adopted the ninja bunny as the official mascot. Photo Set http://flic.kr/ps/2wwdgw

Makey Makey

At the start of the week I took along a Makey Makey to introduce physical computing and help explain the 'Internet of Things'. This is a small device built on an Arduino which when connected to a computer, turns objects, people and even pets into track pads or keys. Developed by two MiT students, crowd funded on Kick Starter, it fuels a series of creative projects throughout the week.

These include the invention of a digital drum kit where chilli peppers, limes and green beans, (donated by a local grocer) form the digital drum sticks; a computer alarm which sounds when a cupboard is opened; the composition of music with glasses of water.





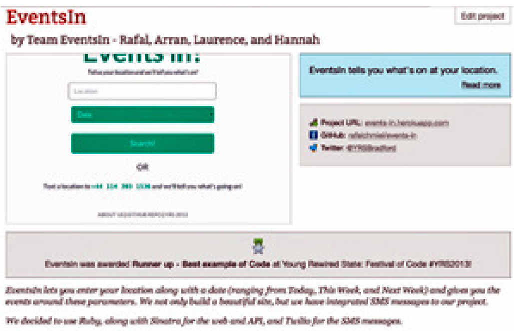
It culminates in the creation of a working human piano powered by the Makey Makey, wires, tinfoil and people, filmed and uploaded to YouTube and Twitter. All the inventions are programmed in Scratch, a visual programming language, which is accessible to all and the hands-in nature of the activities brings the group together as a whole.

Applications Built With Open Data

EventsIn

Team: Rafal, Lawrence, Hannah, Aaron

" EventsIn (events-in.yrsbradford.com), allows you (the user) to find out about various events that are happening in your area; you simply have to input the location of where you are in the United Kingdom, and the date you'd like the events to be in. As we finished a bit early, we decided to integrate SMS messaging to the service where you can text a location to +441143031536, and after a couple of seconds you'll receive a response with the top 2-3 popular events around the location you have specified. The whole service was built with the Ruby programming language (ruby-lang.org) using the Sinatra web framework (sinatrarb.com), which allowed us to handle the HTTP requests and therefore display the web pages.



As for the sources of our data, we decided to use the Eventful API (api.eventful.com) for all the events information. Lastly, for the SMS messages we used Twilio (twilio.com) which handled everything from that aspect including receiving, reading, and sending SMS messages. After everything was done, we deployed our project to Heroku (heroku.com) and released it open source at GitHub (github.com/rafalchmiel/events-in)"
Rafal Chmiel 2013

North- South Divide

"North-South Divide was a project to try and calculate where the North- South divide is which was builtin a few days during the Festival of Code run by Young Rewired State (YRS). In order to do this we used a number of data sets including crime data, population and child poverty data. The program draws a line where there is the most difference between the North and the South."
Matthew Hall 17

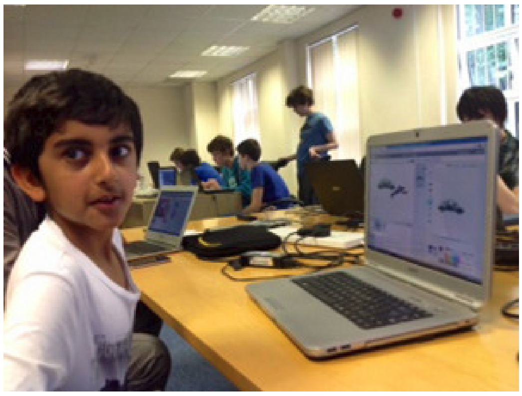
At The Custard Factory

On Friday we travel to the Custard Factory, Birmingham in a minibus paid for by Exa Networks, hosts of the Bradford YRS week. We are joined by two programmers from France working at Exa and a parent of one of the young programmers who is under 13.

Over the weekend we sit in large rooms full of people programming. We wander down corridors, past towers of pizza boxes, crates of bottles of water, past ice cream vans, huge statues, join queues for meals.

On Saturday we watch numerous presentations including: the PiCycle a bicycle powered by the Raspberry Pi (the winner of YRS 2013), an app entitled Evil MP built to engage young people in politics and an amazing young girl who takes centre stage and talks eloquently about her app built with Scratch. Overnight programmers over 14 bed down in sleeping bags in a safe communal areas which stay lit all night. The next day the people are visibly tired but remain interested.

We are delighted when we learn that the EventsIn Team are winners in the category 'Best Use of Code' and discover they have reached the YRS final. After another round of presentations to the judges on Sunday morning, we learn that another team has won, but our team does not appear to be at all dejected.



The competition aspect of YRS serves to gives the week structure, focus and pace. However, taking part as programmer or mentor is in itself an inspiring experience. So much so, that we all agree, on the way back in the minibus, to run a free programming club,the first session of which took place a few weeks later.

I come way feeling energised, determined to take my programming skills to the next level. For those interested in getting started or as YRS puts it becoming 'newly minted' here are some starting points.

Learn the Fundamentals of Computing

Tutorials

http://scratch.mit.edu
Learn Scratch

http://net.tutsplus.com/tutorials/ruby/ruby-for-newbies-installing-ruby-and-getting-started/
Learn Ruby from scratch

http://www.codecademy.com
Learn Python, Ruby, HTML, CSS and JavaScript

Cloud based IDEs

Cloud based are IDEs are an development environments provide an online workspace to write run and debug code, access code frameworks and libraries, collaborate and communicate in real time.

Heroku
https://www.heroku.com

Ruby, Node.js, Clojure, Java, Python and Scala.

Cloud9
https://c9.io
HTML, CSS, Javascript, Java, Ruby and 23 other languages.

Social Code Repository

Github
https://github.com

Github a version control system hosts 5.7 million code repositories. Git is used to store, backup, share, merge and restore code.

Thanks

Thanks to Young Rewired State http://www.youngrewiredstate.org

Mentors: Siobhan Ramsey, Director Sandbox Education, Michael Syree, Director Exa Networks, Martin Cottrell, Section Leader Media and Business, Shipley College, Franklin Raccah, Laure Delisle,Thomas Mangin, Developers at Exa Networks

YRS Programmers: Arran Curtis-King, Hamzah Yousaf, Hannah Pirie,Laurence Syree, Matthew Hall, Nicholas Dyson, Oliver Brown, Rafal Chmiel, Thomas Davies.

Contact Details

To get involved in the 2014 Festival of Code contact Young Rewired State via the website http://www.youngrewiredstate.org.

Siobhan Ramsey: work with Sandbox Education or nominate a young programmer who is interested in joining the safe, free social coding curation team.
M 07084403380 W http://www.sandboxeducation.co.uk E info@sandboxeducation.co.uk

Naace
The Sir Colin Campbell Building
University of Nottingham Innovation Park
Triumph Road
Nottingham
NG7 2TU
Phone: 0870 240 0480
Fax: 0870 241 4115
Email: office@naace.co.uk

Naace
An approach to sharing resources to teach Computing

Author: Nicholas Jackson and Ian Guest

Concerns have been raised by many commentators regarding the merits of replacing ICT with Computing and how this will equip learners in a digital age. Issues that seem to have received less publicity are the approaches to teaching the new curriculum, resources to be used in these approaches and any unease amongst teachers charged with addressing these issues. This paper outlines an approach to sharing resources to teach Computing at Key Stage 3 and discusses links between the approach, having an established online community and the demand for teaching resources in this area.

Background

July 2013 saw the publication of the new National Curriculum (DFEE, 2013) and although still labelled 'draft', it is unlikely that the Programme of Study will change radically in the foreseeable future given the extensive consultation leading to this stage (Twining, 2013). Concerns have been raised by many commentators: around the merits of replacing ICT with Computing (The Royal Society, 2012), (Jackson, 2011), updating an out-dated ICT Programme of Study, how this will equip learners in a digital age (Mee, 2013) and indeed the naming of the subject itself - Computing, Computer Science, etc (The Royal Society, 2012). Yet, equally as significant in all this, are the concerns from teachers and schools around the actual teaching of this new subject (Marshall, 2013).

Issues that seem to have received less publicity are the approaches to teaching the new curriculum, resources to be used in these approaches and any unease amongst teachers charged with addressing these issues. This paper outlines an approach to sharing resources to teach Computing at Key Stage 3 and discusses links between the approach, having an established online community and the demand for teaching resources in this area. Further, this paper discusses the role that such an approach to sharing resources may have in the growth of the open content movement.

Method

Resources for the teaching of Computing were developed, used in the classroom and shared with an online community. Feedback was then sought from those educators who requested access to the shared resources.

Development and use of the resources

In the very early stages of discussions around Computing becoming part of the National Curriculum, a set of resources used for teaching Computing at Key Stage 3 were developed[1]. These formed part of an approach to teaching ICT that the developer saw as giving students a broad experience and digital skills set to students. They were used in a state secondary school in Northern England between 2011 and 2012. These resources were intended primarily for classroom use internally, but were developed by practitioners with a history of sharing such material. The resources focussed on elements of computational thinking (CS4FN) and application of this through programming and were taught to all Year 8 students (usually 12 years old) in a number of classes over a school term.

The resources were developed to be accessed through an open source platform, Moodle[2] as this was the school's preferred system for delivering and managing learning content to its students. This platform allows for relatively straightforward sharing of content where courses and their materials can be exported in a single zip file. The teaching materials consisted mainly of embedded multimedia resources created and curated from online sources. Web 2.0 tools, images, animations and video from video-sharing websites were combined with teaching materials taken and/or adapted from other sources for example, csfn.org. Instructions, learning objectives and small amounts of information in text format provided the scaffolding for the materials.

Well-structured learning environments are particularly suitable for scaffolding problem solving activities (Jonassen, 1997) and facilitating a constructivist approach to learning (Kolb, 1984). The resources were therefore designed and structured to be task-based with two specific Web 2.0 tools, Robomind[3] and CodeAvengers[4], playing a significant role in the learning experience, as they offered programming and interaction for students. However, they were not the only interactive experiences in the materials as the resources were developed for experiential, discovery, hands-on (virtually, in most cases) learning.

Following guidance provided in 'Computer Science: A Curriculum for Schools' (Computing at School working group, 2013), the content of the resources was designed to address Key Stage 3 aspects of the Computer Science theory strand. This meant opportunities were provided to learn about algorithms, programs, data, computers, communication and the Internet. However, the guidance was not followed rigidly and the structure and sequence were adapted. This was due to these resources being for only a term's worth of work (i.e. about 8 week) and to fit a theme that suggested a different order was logical.

Sharing of resources

The developer of the resources enjoys the benefits of an extensive professional learning network, one element of which includes educators who have an active interest in the teaching of ICT and Computing. The main communication channel of this well-established online community is Twitter[5], with Tweets aggregated by the #ictcurric hashtag. This rallying point provides the hub of a community space used for discussing issues, exploring ideas and sharing resources related to the teaching of ICT and more recently, Computing. In addition to Twitter, the developer frequently explored topics and materials in greater depth through a blog, drawing the audience largely from the same network of people.

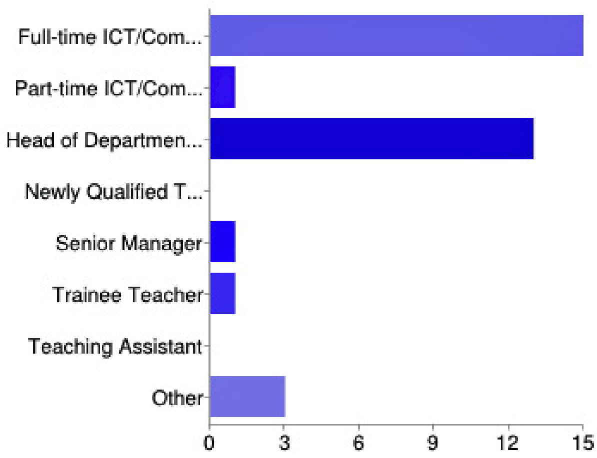
These resources were launched through a blog post in April 2012 (Jackson, 2012) and publicised on several occasions (Jackson (largerama), 2012) using the #ictcurric hashtag on Twitter. The post gave brief information on what the resources were about, a link directly to the resources on the school learning platform from which they could be viewed and instructions on how to obtain a copy of them. To obtain a copy of the resources, email addresses had to be provided through the blog or on Twitter and a Dropbox[6] folder was then shared with the applicant. This folder housed the exported zip file of all the resources and could be downloaded for use at the recipient's discretion. Similar tweets offering the resources were sent intermittently over a fifteen month period after the original blog post.

Results

Feedback was sought from those who had provided their email address and had been invited to share the Dropbox folder containing the resources. A questionnaire was designed to gather feedback. Ethical issues of anonymity were preserved in the questionnaire, as was openness with potential respondents. Potential bias was acknowledged during both the questionnaire design and in not seeking responses from anyone involved with the design or development of the resources plus those who had taught with the resources already. A link to an online questionnaire was distributed and provided the following results:

At the time of publishing the questionnaire, the number of ‘members’ in the shared Dropbox folder had reached 98 and there were 113 comments on the blog post (where comments provided email addresses to access the resources they became ‘members’ of the shared Dropbox folder). Given issues of bias detailed above and some instances of emails not allowing delivery of the questionnaire, 65 questionnaires were sent and 28 responded. Judging the response rate of questionnaires is always difficult (Deutskens, De Ruyter, Wetzels, & Oosterveld, 2004) as there are a number of factors involved but 43% seems to be somewhere close to the median suggested by Baruch & Holtom (2008), given they were sent to individuals. However it must also be noted that given the nature of the population who were solicited (those involved in education particularly ICT and Computing), there is argument that this should have been higher.
From the responses received, the role of those requesting the resources is shown in Figure 1:

Please choose from the following which best describes your role:



Full-time ICT/Computing teacher	15	44%
Part-time ICT/Computing teacher	1	3%
Head of Department/Subject	13	38%
Newly Qualified Teacher	0	0%
Senior Manager	1	3%
Trainee Teacher	1	3%
Teaching Assistant	0	0%
Other	3	9%

Figure 1: Description of the role of the respondent

Whether they were used and how they were used is shown in Figure 2:

Figure 2: Responses regarding use of the resources

The three respondents in Figure 2, who said that they had 'not used them at all' gave their reasons for this as 'not going to be teaching Computing', 'couldn't access the resources in the format they were in' and 'not had the time to go through them'.

Discussion

Commentators have aired their views on the ability of those ICT teachers already in the profession to teach Computing (Smith, 2013) and teachers have shown a demand for information, advice and pointers to resources. Evidence for the latter can be seen in a live chat that was held and the comment section on this issue (Smith, 2013), and in comments made during consultations around the changes to the National Curriculum (NAACE, 2013). The number of requests for these resources and the evidence that a significantly large proportion of those who requested access, actually used them, (Figure 1) and (Figure 2), lends credence to the views on teacher unease regarding the changes to the National Curriculum, particularly in respect of approaches to teaching Computing.

Although online communities exist for a variety of reasons, Elen and Clark (2006) suggested that sharing as an explicit intent is a strong motivating factor. It could be argued that by 'enrolling' into a community with shared purpose, whether loose and/or virtual, was undertaken precisely for situations such as the changes to the National Curriculum in respect of Computing. The idea of benefitting from the knowledge, experience and expertise of others i.e. community wisdom, is borne out of this community practice (Elen and Clark, 2006) and the take up of these resources would seem to support that.

According to McGill, Currier and Duncan (2008), the amount of sharing increases when online communities are centred around, "subject based repositories" (McGill, Currier and Duncan, 2008). Further, they predicted that the strength of online communities will be enhanced by social networking. The approach to sharing resources for the teaching of Computing described in this paper re-emphasised this observation. Not only were these resources shared in a subject-based community, but one where connectedness and capability of practitioners to cope with repurposing was probably more likely, given the role of the recipients as shown in Figure 1.

Open content is a term credited to Wiley who in 2003 tried to explain the concept by likening it to "free and open software" (Wiley, 2003). These Computing resources satisfied Wiley's vision of free and open in that they were offered without charge, without conditions as to their use and could be adapted, modified or reused in any way chosen. They were offered with an intention akin to the Creative Commons Attribution licence[7] however, this was not specifically stated in the resources, the blog post nor the tweet when the resources were shared. The recent Horizon Report (Johnson, Adams, Cummins, Estrada, Freeman, & Ludgate, 2013), cites the open content movement as a significant emerging trend in education. Referring to rising costs of resources offered by publishers but more relevant to this paper, "a wider recognition of the collaborative philosophy behind creating and sharing free content" (Johnson, Adams, Cummins, Estrada, Freeman, & Ludgate, 2013), the report says open content is becoming relatively mainstream practice. However, whereas the Horizon Report provides examples of resources shared through organised, structured repositories and databases, the resources discussed in this paper were publicised and distributed using a well-used social media platform; arguably a more 'DIY' approach. Nevertheless, the resources here were indeed provided '...not just free in economic terms, but ... freely copyable, freely remixable, and free of barriers to access, sharing, and educational use' (Johnson, Adams, Cummins, Estrada, Freeman, & Ludgate, 2013).

Conclusions

Through this paper, we have shown that there has been demand from teachers, mainly ICT specialists, for resources developed to teach Computing at Key Stage 3 and of those who have requested access, many reused and repurposed the resources in different ways to suit their needs. The method used for sharing these resources through an established online, subject-based community using well-established social media channels suggests there should be a space generated within the open content movement for a more home-grown model. It is intended that this paper will promote further sharing in a similar vein to what is described here thereby growing the activity within these subject-based communities and/or the size of the communities themselves. Furthermore, it is hoped that by documenting all of the development and sharing process, others educators will be encouraged to share resources they have developed and used in their classrooms.

Nicholas Jackson may be contacted at nmjcksn@yahoo.co.uk and Ian Guest may be contacted at ian@guesty.me.uk .

References

Baruch, Y., & Holtom, B. C. (2008). Survey response rate levels and trends in organizational research. Human Relations, 61(8), 1139-1160.
Computing at School working group (2012), Computer Science, A curriculum for schools, Computing At School
CS4FN (date unknown), What is Computational Thinking? [online] http://www.cs4fn.org/computationalthinking/

Deutskens, E., De Ruyter, K., Wetzels, M., & Oosterveld, P. (2004). Response rate and response quality of internet-based surveys: an experimental study. Marketing letters, 15(1), 21-36

DFEE (2013), The national curriculum in England, Framework document [online] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/210969/NC_framework_document_-_FINAL.pdf

Elen, J, Clark, RE, (2006), Handling Complexity in Learning Environments: Theory and Research. Emerald Group Publishing

Jackson, N (2011), Put the brakes on [Web log post]. Retrieved from http://largerama.creativeblogs.net/2011/10/13/brakes/#more-228

Jackson, N (largerama) (2012), “Well that's 64 people who have requested access to my KS3 Computing SOW to date though http://t.co/kJQb32NJ - Quite amazin really #ictcurric” 10 Nov 2012, 10:46 a.m. Tweet.

Jackson, N (2012), Anyone for Computer Science at KS3? [Web log post]. Retrieved from http://largerama.creativeblogs.net/2012/04/19/computingks3/

Johnson, L, Adams, S, Cummins, M, Estrada, V, Freeman, A, & Ludgate, H (2013), The NMC Horizon Report: 2013 Higher Education Edition.

Jonassen, DH (1997), Instructional design models for well-structured and III-structured problem-solving learning outcomes. Educational Technology Research and Development, 45(1), 65-94.

Kolb, D (1984), Experiential Learning: Experience as the Source of Learning and Development. Englewood Cliffs, NJ: Prentice Hall.

McGill, L, Currier, S, Duncan, C, (2008), Good intentions: improving the evidence base in support of sharing learning materials. project report, JISC, http://ie-repository. jisc. ac. uk/265.

Marshall, R (2013) Ofsted warns of skills shortage among computing teachers. Retrieved from http://www.v3.co.uk/v3-uk/news/2252198/ofsted-warns-of-skills-shortage-among-computing-teachers

Mee, A (2013), Developing a curriculum for a digital society, NAACE Advancing Education, Summer 2013, http://www.naace.co.uk/2292

NAACE (2013), Naace Response to National Curriculum Consultation – Supporting Evidence

Smith, E (2013), Ian Livingstone Says Teachers 'Not Equipped' for ICT Curriculum, International Business Times. [Online] http://www.ibtimes.co.uk/articles/444557/20130311/ian-livingstone-teachs-sadly-equipped-new-ict.htm

The Royal Society (2012), Shut down or restart? The way forward for computing in UK schools, The Royal Academy of Engineering. [Online] http://royalsociety.org/uploadedFiles/Royal_Society_Content/education/policy/computing-in-schools/2012-01-12-Computing-in-Schools.pdf

Twining, P (2013) Peter T’s bliki [Web log post]. Retrieved from http://edfutures.net/PeterT%27s_bliki

Wiley, D. A. (2003). A modest history of OpenCourseWare. [Web log post]. Retrieved November 20, 2007 from: http://www.reusability.org/blogs/david/archives/000044.html

1 http://vle.fulford.york.sch.uk/course/view.php?id=542
2 https://moodle.org/about/
3 http://www.robomind.net/en/index.html
4 http://www.codeavengers.com/
5 https://twitter.com/
6 https://www.dropbox.com
7 http://creativecommons.org/licenses/

RSS What is RSS?

SPECIAL TOOLS

My Profile
Change password
Add article to CMS
Moderate articles in the CMS
Resource finder
Advancing Education
Computer Education
Naace Communities
Naace CPD
Naace Knowledge
Conference Networking
ICTCPD4Free

Naace
The Sir Colin Campbell Building
University of Nottingham Innovation Park
Triumph Road
Nottingham
NG7 2TU
Phone: 0870 240 0480
Fax: 0870 241 4115
Email: office@naace.co.uk

Naace
Using mobile technology to increase formative knowledge for the learner in classroom context

Thank you for editing the entry. This is how the edited entry will appear in the database.

Author: Christopher E Dann, University of the Sunshine Coast, Australia and Tony Richardson

Cited in:

- Advancing Education Autumn 2013

Abstract

The purpose of this paper is to outline how the use of mobile video enabled devices; with a bespoke web and iOS system, developed at a regional Australian University, and currently being applied to pre-service teachers, can be utilized to assist in facilitating quality teaching. It is the opinion of the authors that this educational teaching and learning platform can assist in facilitating quality teaching via its highly effective feedback processes. In outlining this opinion the authors will present the following argument. That teachers matter when it comes to student outcomes, within an educational context. If teachers matter, when it comes to student outcomes, then the quality of their teaching will play a significant role. That knowledge in practice; via real time; which is facilitated by this platform, can capture effective feedback of the teacher in practice. Finally, that whilst it is difficult to clearly define all of the specific skills aligned with quality teaching, effective feedback in real time; focusing on the teaching and learning process, will assist in facilitating quality teaching. The paper will conclude by highlighting the relationship between the quality teacher indicators and how a bespoke mobile feedback system assists in the development process of quality teachers.

Key Words: Mobile, assessment, Video assessment, Teacher Quality

Introduction

A number of researchers (Marzano, Pickering, Pollock, 2001; Whitehurst, 2002; Nye, Konstantopoulos & Heges, 2004; Johnson, Berg & Donaldson, 2005; Marzano, 2007; Auguste, Hancock, and Laboissière, 2009; Hattie, 2009; Hanushek 2010; Jensen, 2010; Caldwell, 2012) argue that teachers make a difference to student outcomes. Further evidence of the significance of teachers is found in a report commissioned by the Organization of Economic and Cooperative Development (OECD) (2005) which highlights that whilst the largest variation in student outcomes is attributable to social background, and student abilities, the most important influence “potentially open to policy influence” is the teaching undertaken by the classroom teacher (p. 26). There is sufficient evidence to suggest that teachers matter and that they do impact on the outcomes of their students. Whilst the varying social backgrounds of students; can have an impact on their educational outcomes, it is their teacher who can have the greatest impact on those outcomes; as a result of their professional association with those students. Consequently, teachers matter when it comes to student outcomes, within an educational context.

With an emphasis being placed on the quality of teachers, in improving the outcomes of students (Berg & Donaldson, 2005; Leigh & Ryan 2006; Marzano, 2007; Johnson; Hattie, 2009; Caldwell 2012; Dinham, 2012), there is also a commensurate interest in identifying ways in which replications of quality teaching could be studied and promulgated because teacher quality varies within schools (Dinham, 2010). Consequently, the utilization of a teaching and learning platform capable of assisting in the facilitation of quality teaching, through replication, would be useful because of the cogent link between student outcomes, the quality of their teacher and the variation of quality teaching within schools. Hence, as Goldhaber writes:

"Good teaching is clearly important to raising student achievement. In fact, most research suggests that the benefit of improving the quality of the nation’s teaching workforce is far greater than other policy interventions, such as lowering class size." (Goldhaber 2002, p.6)

It is without doubt that the research emphasises quality teaching as a determinant of student outcomes, and as such, should become one of the main focuses of educational organizations (Darling-Hammond & Baratz-Snowden, 2005; Marzano, 2007; Hattie, 2009; Darling-Hammond, 2009; Hanushek, 2010; Caldwell, 2012). Therefore, it would be reasonable to argue that if teachers matter, when it comes to student outcomes, then the quality of their teaching will play a significant role.

Knowledge in practice (real time) and Feedback

Dann (2012) builds on the earlier work of McLaughlin and Talbert (1993) and their reference to two levels of knowledge; knowledge of practice and knowledge for practice. Dann (2012) expands on their view by exploring the notion of knowledge in practice or real time. Within the context of McLaughlin and Talbert’s (1993) work the process associated with their two levels of knowledge would, as Timperley, Wilson, Barrar and Fung (2007) suggest, be for the teacher to reflect on what they need to know; to meet the needs of their students, to teach accordingly and then re-run the reflective process. Dann’s (2012) real time approach lends another dimension to this reflection. The focus of real time suggests that knowledge is collected immediately; what Dann (2012) refers to as knowledge in practice, by an observer; for reflection, against agreed standards. This use of knowledge in practice, applied through this approach, assists with the effectiveness of the reflective process because it:

". . . accurately reflects[s] [the] intended learning outcomes and emphasizes authentic products and process; [those] intended learning outcomes are clearly defined; assessment criteria including levels and standards are clearly defined; and critical reflection [is undertaken] on learning from experiences within the classroom setting." (Keating 2006, p. iii)

To add further weight to Dann's (2013) knowledge in practice Hattie and Timperley (2007) identify feedback that is immediate, specific, positive and corrective as having a powerful influence on the teacher; and it is this feedback that Dann (2013) refers to as real time. Hence, Dann's (2013) knowledge in practice, the actual learning and teaching taking place in the classroom, at that moment, is captured by real time feedback; feedback that is immediate, specific, positive and corrective to that individual teacher. Feedback, as the research highlights, that is very important to the teacher for their reflective process. Danns' (2013) research also indicates that feedback, stored on the web and collected via mobile devices, increases the opportunity for students or teachers to reflect when it is most effective for them.

Keating's (2006) and Marzano's (2007) research suggests that for feedback to be effective it needs to focus not only on the teacher's content knowledge but also the teaching and the learning taking place in their classroom. This feedback would also be complimented by the involvement of educational institutions; State and Federal Governments, Private providers and Teacher Registration, via the introduction of professional standards (Churchill et. al. 2011). Dann's (2013) use of knowledge in practice enables a link to teaching and learning in these two areas. First, knowledge in practice reflects this through its association with real time feedback; to the teacher, about their teaching and their student's learning. Second, educational organizations have the capacity to link professional standards; their expectations of quality teaching, to the teaching and learning process with a view to guiding teachers along the pathway to quality (Churchill. et. al., 2011). Hence, knowledge in practice, when used this way will culminate in effective feedback for the teacher. This approach to delivering real time feedback will be effective because it is immediate, specific, positive and corrective and therefore, will have a powerful influence on the teacher.

The quality of this feedback would be commensurate with one, the ability of that feedback to guide teachers along the pathway to quality and two, assist them in their teaching so as to impact on their student's learning. Consequently, feedback via this system has the potential to assist both the teacher and educational institutions in discussions centring on detailed guidance. The emphasis of an association to professional standards reflects the need to link teacher subject content knowledge with the pedagogical skills necessary to deliver that content so as to assist their students' learning. In the future this assistance will become more complex and demanding because, as Dinham (2013) highlights, society's growing concern for teacher's to be able to diagnose and prescribe appropriate strategies to deal with student differentiation will increase. As a result of this, there will be a greater need to develop technology, with the capacity to deliver on real time knowledge. Technology developed around real time will have the capacity to meet the future needs of teachers and educational institutions, as Dinham (2013) outlines, because it has the potential to, in Boyer's (1995) view, develop connections. From Boyer's (1995) perspective, and earlier work by Darling-Hammond (1993), the most successful learning for students takes place when teachers teach effectively in their own classrooms in conjunction with discovering solutions together. Clearly, the more effective and together the feedback is, with respect to their teaching and learning; obtained in real time and against agreed standards, the more in-depth their solutions will be. As a result, there would also be, Schleicher (2012) argues, a positive impact on the quality of teaching and student outcomes. The capacity to deliver real time on the teaching and learning taking place in the classroom, coupled with linking that teaching and learning to professional standards that are designed to facilitate teaching quality. Hence, this platform can capture effective feedback of the teacher in practice that will facilitate quality teaching.

The Bespoke System

An action research cycle involving teachers, principals and academics unearthed a debate over what evidence of quality teaching and learning should be collected (Winchester-Seeto, Mackaway, Coulson & Harvey, 2010) to meet the standards of the University's placement courses. This resulted is the development of a system to accommodate any set of standards and competencies that could inform the development of quality teaching by pre-service teachers. The researchers connected with a network of supervising teachers, pre-service teachers and academics in order to improve the communication feedback of these standards, to students and teachers. This led to a development phase. Once development was completed the system was piloted and the research moved from the actions research cycle to a mixed methods approach; due to the lack of funding available to maintain the actions research cycles. Mobile learning has been associated with Personal Digital Assistants (PDA's) and mobile (MacCallum & Jeffrey 2009) phones, and this includes tablet technology, smart phones and wireless devices that have Internet access with increasingly powerful processing capabilities. All of which are available for teacher content production and consumption for educational purposes. This is seen as a growth aspect of mobile technology (Caudill, 2007). At the request of teachers, smart phone technology, including video, became the tool of choice. This decision reflected the view of learning as a process and one where actionable knowledge (Siemans, 2004) needed to be viewed by the network in order to support the development of a teacher.

The key features were drawn up in wire frames and prototypes were shown and tested within the development team to suit the iPhone platform that was most prevalent and appropriate at the time for the supervising teacher group. The Web interface and iPhone app (Figure 1) were developed so that there was an interface that could manage the input of multiple criteria for multiple courses and have various login levels for the various stakeholders involved in the assessment for and of learning.

Fig: 1

Central to the design process were the workflow processes described by supervising teachers. The design aimed to incorporate the four main benefits of mobile technology including, freedom of location and time, presence within the teaching and learning processes, enabling one-to-one conversations (togetherness) with educational histories and allowing teachers to keep up with new education subjects for future education (Kim, Mims & Holmes, 2006) These descriptions resulted in the layout and functions offered on each of the platforms. A more detailed technical view of this development is presented by (Willis, et al 2012). The next section aligns the processes and capabilities of the system with critical aspects of quality teaching and the facilitation of quality teaching.

Critical aspect of Quality Teaching – A discussion

1. Capacity to articulate expectations of quality.

Educational institutions are focusing on ensuring that they are able to articulate expectations of quality, in their teachers, and those qualities are juxtaposed to professional standards designed to guide teachers along the pathway to quality (Churchill. et. al., 2011). The emphasis of this association with standards reflects the need to link teacher content knowledge with the pedagogical knowledge and technological knowledge (TPACK) necessary to deliver that content; so as to assist their students' learning. The bespoke system under discussion has the capacity to allow an institution to import their expectations of quality in a way that observer and the teacher can see and focus conversations on. Collection of data around each of the articulated expectations increases the common language and culture focusing on that educational institution's understanding of quality. The system allows for quality to be articulated in a hierarchical manor ensuring depth of understanding, and if used correctly, increasing the association of standard descriptors with professional standards. A capacity to deliver on a depth of understanding is significant because a pilot of the system; involving pre-service teachers, indicates that they sought feedback on expectations every day (Dann & Allen, 2013) with some control of planned and unplanned use of video capture. This type of use would enhance the system's ability to provide a holistic approach to the connected assessment environment that satisfies teachers, the institution, and industry needs (Mackaway et al, 2011). In this way, there exists the capacity to deliver effective feedback because it has been captured in real time against agreed and mandated professional standards; in the case of educational institutions.

2. Teachers engaged in quality teaching.

Dinham (2010) writes that it is the ultimate aim of educational institutions to ensure that each classroom has a teacher engaged in quality teaching. The bespoke system attempts to address this problem. The ability to embed the observation tool in the learning of the teacher and for this device to capture evidence of teacher performance has numerous implications for the teacher and the educational institution. The teacher has the ability to view their teaching practice and personally reflect on their ability. The video also allows for collective conversations between the teacher and other trusted professionals about how the teacher has engaged in quality teaching. Having the system available on mobile devices; that are present in many classrooms and owned by classroom teachers, also has the potential to put the system into each classroom within an educational institution. With these options it can reasonably be argued that there will be three positive outcomes associated with teaching quality. First, more teachers can access a view of their engagement in quality teaching. Second, the educational institution can ensure a greater number of teachers can have access to reflective opportunities to review their teaching. As a result of this quality teaching can be promulgated amongst different educational institutions. Third, that due to the nature of this reflective process the feedback obtained by the teacher and the educational institution would be effective.

3. Real time – Knowledge in practice - In the context of actual practice

The reality is that much of what teachers must know in order to teach effectively emerges in the context of actual practice. In order to teach effectively information regarding students' understandings or misconceptions; relating to the success of certain strategies with varying student groups, or about how different learners learn best, can only be fully understood in the actual work of teaching (AACTE 2010). The development of technology, associated with this ability to capture data of this nature, is a recent phenomenon. Educational Data Mining (EDM) (2013), for example, would be an indicator of this type of inchoate technology. The goals of EDM (2013) are:

- Predicting students' future learning behaviour by creating student models that incorporate such detailed information as students' knowledge, motivation, metacognition, and attitudes;
- Discovering or improving domain models that characterize the content to be learned and optimal instructional

sequences;

- Studying the effects of different kinds of pedagogical support that can be provided by learning software; and
- Advancing scientific knowledge about learning and learners through building computational models that incorporate models of the student, the domain, and the software's pedagogy.

EDM is an emerging discipline that focuses on developing ways in which data, unique to educational settings, can be collected and studied so as to improve the outcomes for all students. The system that is being presented here is of a similar nature and is focusing on obtaining data, in real time, on the teaching and learning taking place within the classroom. With respect to this system it captures data on the agreed standards through real time feedback. Added to this because there is a capacity to capture text videos and images, about specific criteria; coupled with a mobile design, the system allows for the freedom to enter data at any time and place. Consequently, it can easily be transportable and therefore, accessible to a number of participants at a number of sites. This increased access to feedback; over time and at their convenience, enables specific one-on-one feedback. Utilizing this process, data captured, on quality teaching standards, would effectively streamline the retrieval of data for judgement about quality teaching discussions due to its real time nature.

4. Reflective process of teachers

Strategies, that are capable of enhancing the reflective process of teachers would be very useful because as Dinham (2008) highlights, it takes a lot of time to move from a beginning teacher to an expert teacher and not all teachers will become experts. Consequently, while it could not be cogently argued that an expert teacher is simply a reflective teacher no doubt reflecting on one's teaching could assist that teacher in moving towards becoming an expert teacher. Therefore, the assumption would be that in becoming an expert teacher the quality of teaching, of that teacher, would improve. The corollary to this statement would be that there is a commensurate improvement on student outcomes (Maslowski, Scheerens and Luyten 2007).

The continuum from beginning teacher to expert teacher implies a continuum of development. It follows that teachers will be at various points along this continuum and improvements will come with feedback on specific quality indicators that relate to individual teachers. The bespoke system allows for quality indicators to be set and then feedback, over extended periods of time, to be provided. This feedback could possibly expand on; what they taught, how they taught it, what knowledge their students now possess and how can they use that knowledge to reach more of their student's next lesson? Within the context of this process feedback, associated with the teacher's knowledge of practice would play an important role in facilitating the teacher's knowledge for practice. The emphasis, of the bespoke system, is that it focuses on the knowledge in practice. This is achieved in a number of ways.

The system allows text feedback in the form of comments. This is traditionally the accepted type of feedback. However, the system goes further by allowing the observer to set or negotiate goals for the teacher, develop a set of suggested strategies and time lines about specific criteria. Each entry is housed in a secure server and can be retrieved on mobile devices by the teacher and the observer. This adds a new dimension because as it facilitates the possibility of change by delivering feedback on indicator/s that the teacher may be working towards. Consequently, if the indicators relate to quality teaching then by applying this process the teacher would receive feedback about that/those indicator/s. The nexus to this would be that this specific feedback would assist in facilitating possible changes to the way in which the teacher could enhance their quality of teaching.

Added to this Gilbert (2005) expresses the view, from their research, that time pressures, paperwork, and non-instructional meetings are also a major source of concern for teachers. For teachers, particularly beginning their teaching, these challengers can become quite daunting. Indeed beginning teachers consider that effective disciplinary strategies take priority and as a consequence behaviour management is at the forefront of their classroom operation (Bullough, Knowles & Crow, 1989; Kagan, 1992; Lee, 1994; Nelson & DeLorenzo, 2011). They also spend significant amounts of time in the acquisition of knowledge about their pupils (Bullough, Knowles & Crow, 1989; Kagan, 1992; Churchill et.al., 2011). This information gathering centres mainly on details of students' differing abilities, learning styles, personalities and educational needs as they begin the process of instructional design (Bullough, Knowles & Crow, 1989; Kagan, 1992; Churchill et.al., 2011).

Observation of teaching in a holistic manor may increase the chance of feedback, and teacher focus, moving away from the specific quality behaviours the teacher needs to focus on. The literature cited above acknowledges that behaviour management and student interests become a focus for beginning teachers. The system under discussion can provide the mentor and the beginning teacher with a greater capacity for reflection, as its focus can be broader than just student interest and behaviour management. To achieve this goal the system would encourage face-to-face discussion about specific aspects of, for example, behaviour management based on agreed strategies linked to standards. In this way, the potential for changes in behaviour of the beginning teacher increases and if those changes are positive, and enhance their quality teaching, it holds that students learning outcomes will also be impacted upon positively.

In a conventional classroom, there are numerous issues associated with the capacity of the teacher to effectively engage in meeting standards linked to quality teaching; via the above processes. Hence, for the teacher there is a plethora of areas that need their attention and therefore, a similar number that would require observation and comment. This situation, according to Debuse, Lawley and Shibl (2008), would result in feedback that is ineffective if it is not on-going, immediate and therefore, will not be of a high calibre. However, the use of technology, capable of delivering real time knowledge in practice; through its' capability of being on-going and immediate, ensures that there is an effective link made to high calibre feedback. By delivering on these applications, through this technology, the capacity to effectively impact on the challenges faced by teachers and mentors can be ameliorated. Clearly, this impact is due to the ability of the technology to deliver highly effective feedback to the teacher; which is directly related to their teaching (Cappizi et. al. 2010; Cappizi, Wehby & Sandmel, 2010 & Scheeler, Ruhl & McAfee 2011). Appropriate effective feedback, directed at the teacher's current pedagogy, would no doubt assist that teacher in exploring ways in which they could be more innovative in their teaching and learning. Therefore, the use of effective feedback to assist the teacher in being innovative would be very timely and useful.

With the capacity to deliver feedback, which can be directed to specific criteria or standards, the system moves the teacher and the enhancement of classroom observations in to the 21st century. Referring back to Dinham's (2013) poignant statement that future societies will have a growing concern for teacher's to be able to diagnose and prescribe appropriate strategies to deal with student differentiation highlights the need for teachers to be viewed, as no doubt Dinham (2013) would argue, as professionals; individuals capable of seeing the problem, diagnosing the problem and most importantly, prescribing effective ways in which the problem could be solved. This system is one should tool that addresses the needs of the professional teacher.

Conclusion

In a profession that has for many years maintained a cloak of classroom secrecy over performance management this system attempts to move teachers in to the world of 21st century. The system outlined attempts to achieve this by having a positive impact on the teacher through enhancing the usefulness of the teacher's feedback. The feedback responds to real time and focuses specifically on knowledge in practice. By utilizing this process there exists the capacity to explore standards across continuous real time feedback as opposed to one off snips. Further research needs to be conducted in to an exploration of the development of the educational data mining tools that could be linked to the system.

Christopher Dann may be contacted at CDann@usc.edu.au .

References

Auguste, B., Kihn, P., & Miller, M. September, 2010. Closing the talent gap: Attracting and retaining top third graduates to a career in teaching. Retrieved 3 November, 2011 from http://mckinseyonsociety.com/closing-the-talent-gap/

Auguste. B., Hancock, B., & Laboissière, M. June, 2009. The economic cost of the US education gap. Gaps in academic achievement cost the US economy trillions of dollars a year. Yet there is reason to think they could be closed. Retrieved 3 November, 2011, from https://www.mckinseyquarterly.com/Public_Sector/Education/The_economic_cost_of_the_US_education_gap_2388

Boyer, E. (1995) http://www.sedl.org/pubs/change34/5.html viewed 16/9/13

Caldwell, B. (2012). Education review leader Professor Brian Caldwell claims teacher quality remains key to improving student outcomes, Retrieved 2 November, 2012 from http://www.news.com.au/top-stories/education-review-leader-professor-brian-caldwell-claims-teacher-quality-remains-key-to-improving-student-outcomes/story-e6frfkp9-1226391647715

Calnin, G. Rewarding high-quality teaching. Australian Council of Educational Research, Professional Education, Vol.8. No.1. (12-16), March, 2009.

Capizzi, A. M., Wehby, J. H., & Sandmel, K. N. (2010). Enhancing mentoring of teacher candidates through consultative feedback and self-evaluation of instructional delivery. Teacher Education and Special Education: The Journal of the Teacher Education Division of the Council for Exceptional Children, 33(3), 191-212.

Caudill, J. (2007). The growth of m-learning and the growth of mobile computing: Parallel developments. International Review of Research in Open and Distance Learning, 8(2).

Dann, C. (2013) Using mobile technology to increase formative knowledge for the learner in classroom context. Accepted as conference proceedings at LICE conference 2013

Dann, C. (2013) UNPUBLISHED WORK Mobile video collection in Preservice teacher practicum placements – a Connectivist view.

Darling-Hammond. L. (1993) http://www.sedl.org/pubs/change34/5.html viewed 16/9/13

Darling-Hammond, L. (2009). President Obama and education: The possibility for dramatic improvements in teaching and

Learning. Harvard Educational Review, 79(2), pp.210-223.

Darling-Hammond, L., & Bransford. (2005). Preparing teachers for a changing world. What teachers should learn and be able to do. Sydney: Allen &Unwin.

Dinham, S. (2012). A political education: hijacking the quality teaching movement. Retrieved 10 December, 2012 from http://theconversation.edu.au/a-political-education-hijacking-the-quality-teaching-movement-9017

Educational Data Mining (2012) Retrieved 18 September 2013 from http://edtechreview.in/dictionary/394-what-is-educational-data-mining

Goldhaber, D. (2002). The Mystery of Good Teaching. Education Next. pp. 1-7. Retrieved 25 February 2013 from https://www.stcloudstate.edu/tpi/initiative/documents/preparation/The%20Mystery%20of%20Good%20Teaching.pdf

Hanushek, E.A. (2010) Waiting for “Superman” How we can save America’s failing public system. Edited by Karl Webber. The difference is Great Teachers. pp. 81 – 100. USA: Participant Media Guide.

Hattie, J. (2009). Visible Learning. A synthesis of over 800 meta-analyses relating to achievement. Oxford: Routledge.

Hargreaves, A., and Fullan, M. (2012). Professional Capital : transforming teaching in every school. Abingdon, Oxon. : Routledge ; New York : Teachers College Press. Retrievedon15Februaryfromhttp://books.google.com.au /books?id=2sRWQxBBsj4C&pg=PA10&source=gbs_toc_r&cad=4#v=onepage&q&f=false

Jensen, B. (2010). What teachers wan: Better teacher management, Grattan Institute, Melbourne.

Johnson, S.M., Berg, J.H., and Donaldson, M.L. The Project on the Next Generation of Teachers, Harvard Graduate School of Education, February 2005.

Mackaway, J. A., Winchester-Seeto, T., Coulson, D., & Harvey, M. (2011). Practical and pedagogical aspects of learning through participation: The LTP assessment design framework. Journal of University Teaching & Learning Practice, 8(3), 5.

Marzano, R. J. (2007). The art and science of teaching. Alexandria, VA: ASCD.

Marzano, R. J., Pickering, D. J., & Pollock, J. E. (2001). Classroom instruction that works: Research-base strategies for increasing student achievement. Alexandria, VA: ASCD.

McLennan, B. & Keating, S. (2008,). Work-integrated learning (WIL) in Australian universities: The challenges of mainstreaming WIL. In Proceedings of the Career Development Learning–Maximising the Contribution of Work Integrated Learning to the Student Experience NAGCAS Symposium.

Nye, B., Konstantopoulos, S. and Hedges, L.V., "How Large Are Teacher Effects," 2004.Retrieved:11July,2011fromhttp://steinhardt.nyu.edu/scmsAdmin/uploads/002/834 /127%2520-%2520Nye%2520B%2520%2520Hedge

OECD (2005). Teachers Matter: Attracting developing and retaining effective teachers. Final Report. Paris: OECD Owen, S., Kos, J., and McKenzie P. January 2008.

Siemens, G. (2004). Connectivism. A Learning Theory for the Digital Age: http://www. elearnspace. org/Articles /connectivism. htm.

Whitehurst, G.J. Scientifically Based Research on Teacher Quality: Research on Teacher Preparation and Professional Development. White House Conference on Preparing Tomorrow’s Teachers. March 5, 2002.

Willis, M., Dann, C, E., Jones, C., Toohey, E,. & Lowe, J. (2012). OZCHI’2012 Designing Mobile information systems to support WIL experiences. Accepted as conference proceedings.

Winchester-Seeto, T. H. E. R. E. S. A., Mackaway, J. A. C. Q. U. E. L. I. N. E., Coulson, D. E. B. R. A., & Harvey, M. A. R. I. N. A. (2010). ‘But how do we assess it?’ An analysis of assessment strategies for learning through participation (LTP). Asia Pacific Journal of Cooperative Education, 11(3).

SPECIAL TOOLS

Naace
The Sir Colin Campbell Building
University of Nottingham Innovation Park
Triumph Road
Nottingham
NG7 2TU
Phone: 0870 240 0480
Fax: 0870 241 4115
Email: office@naace.co.uk

My Profile
Change password
Add article to CMS
Moderate articles in the CMS
Resource finder
Advancing Education
Computer Education
Naace Communities
Naace CPD
Naace Knowledge
Conference Networking
ICTCPD4Free

Naace
Immersive Learning Experiences through Augmented Reality

Thank you for editing the entry. This is how the edited entry will appear in the database.

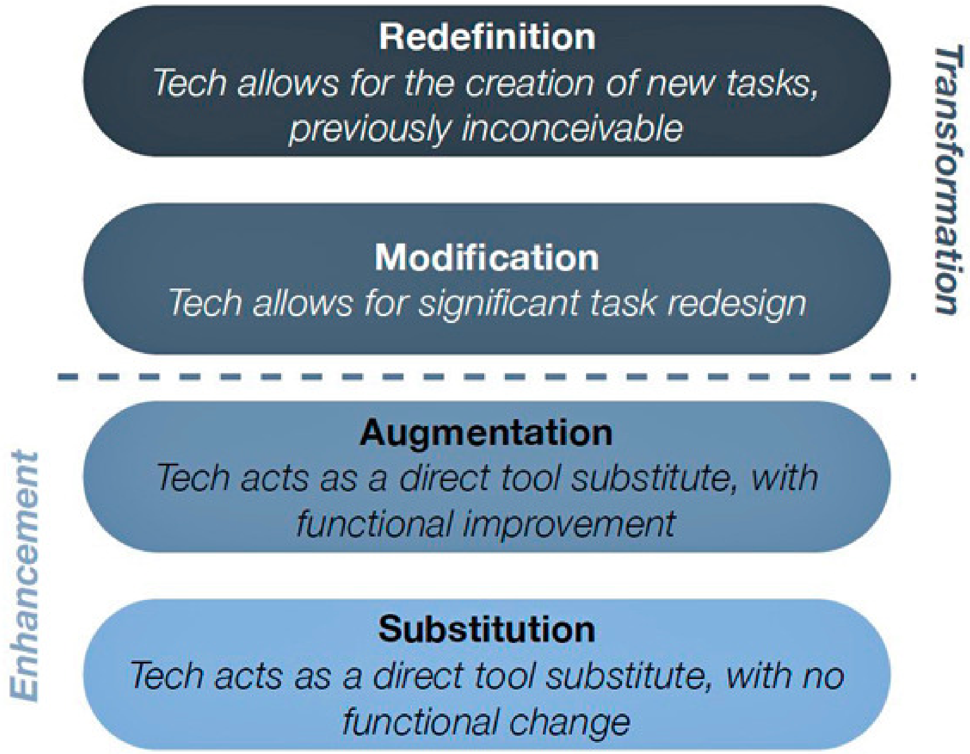
Author: Judy Bloxham - Jisc RSC Northwest; Allen Crawford-Thomas - Jisc RSC West Midlands; Stephen Wileman - South Staffordshire College

Technology is enhancing learning in all sectors of education. In this article Judy Bloxham and her colleagues explain how augmented reality can support FE and HE students.

Introduction

Much of what is done with technology in learning and teaching simply repositions existing material or enhances existing teaching methods and styles of learning. There is no real challenge or change; little advantage is taken of the possibilities for technology to transform the act of learning. Recently a few learning providers have started to explore how technology can be used to present material in a completely different way, by making use of Augmented Reality (AR) to and deliver learning at the point of need.

Puentedura (2009) devised the SAMR model to represent how technology could transform learning, each letter of the acronym standing for the level of modification of activities. The goal being 'Redefinition' of tasks "that have been previously inconceivable without the technology" (Puentedura, 2009). AR is a platform with potential to redefine learning.



What is Augmented Reality?

Augmented Reality overlays the digital world over the physical world - thus 'augmenting' the real world experience. Today examples of AR use can be seen in museums where AR is used to bring objects to life or as wearable technology such as the Google Glass project.

AR is not a new concept, in fact, it has been around since the 1990's. Early examples of AR use in mass education made use of QR (Quick Reference) codes. QR codes provide short piece of information via digitise web links. Recently platforms have been developed that allow people to easily create their own AR experiences, which make use of visual browsers, GPS, or a combination of the two. By using the camera on a smart device you can retrieve AR content via images or by your location. Like a QR code this can simply be a quick link to a web page or content that invites the viewer to interact, rather than just be a passive onlooker.

AR and Pedagogy

So how does AR relate to learning and what are the pedagogical arguments? In the words of Luckin and Stanton Fraser (2011) it can, “bridge the learning gap between abstract descriptions and the real world phenomena“ By overlaying information onto real world situations, it can link higher level, abstract concepts with tangible, real world environments. Continuing with this theme, Vygotsky (1978) argued that human consciousness is associated with the use of tools and artifacts, AR has the ability to bring these two together and seamlessly integrate them into the surrounding world around.

Placing learning into the context to which it is relevant, relates to the concept of situated learning (Johnson, L. et al, 2011). Usually this is seen as an apprenticeship situation, where the learner is introduced to the language and skills associated with the tasks, in a contextual setting. AR can provide a form of scaffolding to assist this integration, by providing contextually aware digital information. If the learner does not grasp the learning first time, they are able to revisit, as and when they need, the result is the ability to deliver ‘just enough, just in time, just for me’ learning.

Smart devices and their ever-ready ability makes them ideal tools to harness and present learning content via AR; bringing together cloud computing, ubiquitous computing, connectivity and personal, smart devices through “cyberinfrastructure mediation” (Pea, 2005). In educational terms, teachers can make use of everyday technology, and the technology which is now driving the world around us. In some learning situations it is not possible or desirable to provide first-hand experience, so an effective use of AR is to provide the next-best-thing to real experience, for example, overlaying historical data onto a site or enabling a view of something which is a safety hazard - introducing learners to the inside of a nuclear reactor is possible. Unlike just showing a video or linking to a website, this data can be shown in relation to its real world context - seamless learning in action.

Engaging learners by making use of their own familiar devices can be a powerful motivator, as well as a constructive way to develop ‘Bring Your Own Device’ (BYOD) practice. Providing intuitive ways for learners to access content means their concentration can be focused on the desired learning outcomes, and not expended on learning how to use a system to access it. An issue with AR is that most studies utilizing the technology have concentrated on the technology itself, not the benefits to learning. The pedagogy has been largely ignored; however there is emerging evidence for the practical benefits of the technology.

Many vocational subjects require lecturers to deliver practical demonstrations to their learners. If learners struggle to see these demonstrations, due to space issues, then they will not all receive the same experience, and this will lower the impact of the learning experience. Colleges and universities have already identified AR can improve the learner experience, making it more entertaining and rewarding. Links to further support literature can be embedded to enhance, engage and stretch the learners. Some learning providers have addressed these issues with the adoption of AR in their curriculum areas and it has provided a more effective way to enable learners to access content, and has improved learner achievement.

One of the most exciting aspects offered by AR is the potential to motivate both learners and teachers to re-think the way they engage in learning and teaching with each other. Such a re-think in the relationship between the provider and the consumer has already been adopted by broadcasting media and the Gaming industry. Both now offer what has become known as the “lean forward experience”, i.e the participant is encouraged to actively engage with content. In the context of television, the viewer can interact with the content of a programme to alter or change its outcome. Gaming rewards achievement by using badges to signify completion of a level proficiency. In education this can be seen as ‘learner ownership’ of learning, and technology can help to embed this.

Practical Examples of the use of AR in Education

In September 2011, Kendal College was the talk of Twitter, when it launched the world’s first AR prospectus for an FE college. The person behind the prospectus was actually a lecturer not a marketer, Dan Hodge, and he saw its potential for learning as much as for advertising. A year later Kendal College produced Living Learning: Plumbing, a Jisc funded project that made use of AR in the plumbing workshop. Although no formal pedagogical analysis of the project has been made, there has been verbal feedback from users. The learners themselves express ‘enjoyment’ and the usefulness of being able to ‘access the learning when they need’. Support staff have also said that they find the ability to go over the learning with the student they are supporting, at times convenient to them, has been invaluable too.

Myerscough College has been making use of AR in several curriculum areas. In Teacher Education it has been used to explain the information and rationale behind posters that are used as assessment for the course. In Photography the students have brought their images to life, so they explain the inspiration behind their work. Again there is no formal analysis, but there is increased engagement.

At Hopwood Hall, students have been involved in creating AR training material for exercise equipment. Reaseheath College has made use of it to aid learning of plant identification in Horticulture. Both have reported that learners are engaged by the process.

South Staffordshire College began to make use of AR within its curriculum at the beginning of the 2012 academic year. One of the areas which took up the new technology was Bricklaying, a discipline not always associated with making use of cutting edge technology. The pedagogical evidence for improved engagement and learning from this area is measurable. Quite rapidly the lecturers noticed changes in their learners. The activity of cutting a brick in half is one that has been taught the same way for many years, when this was supplemented by an AR poster that allowed learners to revisit the technique, the success rate for getting it right first time went up from around 50% to 100%. In the second year of using this technique this has been 95%, so it is sustainable. Alongside this the tutors have noticed that the learners' progress is accelerated. At first the tutors thought the learners were straying off task, but what they noticed was they were dipping into other topics through the AR resources, taking ownership of their learning.

The range of curriculum areas making use of the technology is growing. Areas like Animal Management are using it to show how to handle animals. Posters are being used to engage learners in Equality and Diversity, linking with national awareness days. School Links programs have made use of the ability for pupils to create their own AR experiences to engage them, and the result has been an increased interest in applying for ICT courses.

The Evidence of Impact

Learners' reactions to using the technology initially show a 'wow' factor. They are engaged simply by the novelty. This reaction has frequently been observed when introducing the technology to both learners and teaching staff. This initial reaction was captured beautifully by Jon Kerrigan (Myerscough College) through the phrase "mystifying learners". He then continues to describe how this can subsequently draw learners into tasks, and engage them in learning. The benefit of utilising 'curiosity, mystery and intrigue' is you can draw even reluctant learners into an activity, and even disguise the act of learning as something else.

This initial 'gimmick' attraction begins to give way to a serious way to engage learners. At South Staffordshire College, as more departments make use of AR as a tool to engage learners, the evidence suggests that AR is successful. In Floristry one learner commented "I can still practice skills at home if I miss a class and I can continue to develop my skills independently without a tutor. I find it easier to understand one of the videos for revision of practical tasks rather than reading notes". Staff have noticed benefits, as they can make use of AR to provide scaffolding for skills and concepts that they frequently need to revisit with learners, this in turn frees them up to interact more with the learners rather than having to repeat the same thing multiple times. Of the five departments at the college that were observed during the recent Ofsted inspection, those making use of AR gained a grade 2 and those not were judged as 3s.

Although not purely attributable to the implementation of AR as a tool in the curriculum, South Staffordshire saw a massive improvement in retention and success in Level 1 Bricklaying. Last year saw them achieve 6% above national benchmark. In real terms for the college though, this was an even better improvement, 2012 Retention/Success was 74%, 2013 89%, an increase of 20%. The cohort was an average group, with several learners requiring additional support, so an above average standard recruitment was not a reason for the change. Some of the reasons behind this could be, the knock on effect of increasing the confidence in staff use of technology, thus improving learner engagement.

Counter Arguments

It is very easy to dismiss the technology as a mere gimmick, and something of a novelty that will wear off, and eventually detract or distract from learning. However looking at the evidence from South Staffordshire College the learners are making use of the technology to provide learning on demand, and make use of it when they need, rather than having to wait for support and potentially becoming bored and distracted.

As with any new technology it is very easy to get caught up in the technological aspects of it, and allow these to dictate the learning experience. In a review of Augmented Reality projects Luckin and Stanton Fraser (2011) reported that "few have been evaluated to any extent, and formal studies are rare: a recent review found that only 8% of work in this area had any formal evaluation". Examples of this are the University of Exeter's 'Unlocking the Hidden Curriculum' project, whose outcomes focused on the mechanisms of the technology and evaluating the platforms available, rather than its educational benefits (Rose, Potter, Newcombe, 2010). An issue with this lack of statistical data is "learning may not be driven by the pedagogy but more by the AR tools' strengths and weaknesses" (Fitzgerald et al., 2012). However as the technology matures, the way that the end user is able to interact more seamlessly and naturally is improving and creating less of a barrier.

Another argument that can be put forwards is that the digital can detract from the actual. By overlaying data learners can be removed from reality. Similarly another argument is that it can provide too much scaffolding and lower self-reliance, a phenomenon seen in many drivers who have become over reliant on their sat nav! Tackling this is a question of working out the balance in any learning situation, and activity, as with any structured learning, needs to be designed to fit the situation and learner level.

A frequently raised objection to the technology is the access to viable smart devices by learners, and the equality of access. However the government report, Simple Things, Done Well: Making practical progress on digital engagement and inclusion found that 71% of 16-24 year olds now own smart phones. In its 2012 report Ofcom found that tablet ownership had increased from 2% to 11% in a year. Coupled with this the increase in availability of tablets in schools is set to rise to over a quarter of a million by the end of this year (Vaughn, 2013). The availability of the technology is rapidly increasing, and whilst not everyone has personal access, it should not stop such a valuable technology been made use of in education.

The Future......

Only a few years ago QR codes were a thing of curiosity, making an appearance in a few places with people wondering what they were. Now they can be seen everywhere, even on the shampoo bottle in the shower. People understand what they are, how to use them and they do make use of them.

Now Augmented Reality is gathering pace in the marketing world, and it would appear that it will become, like the QR code, a commonplace experience for those with Smart devices. If this technology is out there, and the public is used to using it, then there is a very real argument to harness its power for education.

Currently there are many platforms out there vying for attention. This can be one of the downsides of making use of AR. However, just as the QR code and Microsoft tag fought it out for dominance and the establishment of a single standard, a similar action is happening in the AR world. There is a body established to develop a single interoperable standard for the technology, AR Standards for Open and Interoperable Augmented Reality Experiences. Although this is some time away, the establishment of a single standard would really embed the technology into our everyday lives.

AR content generates 21st century resources to meet the evolving learning needs and styles of our 21st century learners. Aspirations of utilizing 3d modeling coupled with Augmented Reality will radically change the learning experiences of today, into the teaching styles of tomorrow. By the end of this year Google Glass will be publically available, and already there are examples of similar technologies in industrial use. VW are the latest manufacturer to make use of this technology to enhance vehicle servicing. If the technology is going to be used in industry in this way, it is another imperative for us to give learners the experience of using it during their learning.

Conclusions

The pedagogical evidence for the use of this technology is still emerging. The earlier issues with complex creation and management of AR content, have been overcome, by the emergence of easy to use platforms. However, one aspect of AR that we should recognise is a vision about how students could use these new technologies to live and to learn as part of their environment. The ability to embed digital content in context is a powerful tool.

As other sectors like manufacturing begin to utilize the technology to make efficiencies in areas like maintenance and retail to promote goods and events; AR will become a necessary part of the curriculum for some areas of education. For educators and those involved with learning support, there is an opportunity to harness AR and help to shape it so it is recognised as a valuable educational tool.

Judy Bloxham can be contacted at jb@rsc-northwest.ac.uk

References

Johnson, L., Smith, R., Willis, H., Levine, A., and Haywood, K., (2011). The 2011 Horizon Report. Austin, Texas: The New Media Consortium.

Luckin, R. and Stanton Fraser, D. (2011) 'Limitless or pointless? An evaluation of augmented reality technology in the school and home', International Journal of Technology Enhanced Learning, vol. 3, no.5, pp. 510-524 [Online]. Available at http://knowledgeillusion.files.wordpress.com/2012/02/limitlessorpointlessarpaper2011ijtel.pdf

Ofcom (2013) 'UK is now texting more than talking', Ofcom [Online]. July 18 2012. Available at http://media.ofcom.org.uk/2012/07/18/uk-is-now-texting-more-than-talking/

Pea, R. (2008) 'Fostering learning in the networked world', Becta's Research Conference 2008: Exploring technology-enabled change in education. Sheffield, Nov 6. Becta

Puentedura, R. (2009) 'TPCK and SAMR Models for Enhancing technology Integration (Transcript)', As we may Teach: educational Technology, From Theory Into Practice, [Online]. Available at https://itunes.apple.com/itunes-u/as-we-may-teach-educational/id380294705?mt=10#ls=1

Rose, S. Potter, D. Newcombe, M. 2010 Augmented Reality: A review of available Augmented Reality Packages and evaluation of their potential use in an educational context, Exeter University [Online]. Available at http://blogs.exeter.ac.uk/augmentedreality/blog/2010/11/16/review-of-available-augmented-reality-packages/

Vaughn, R. 2013 'Tablets in schools double in one year', TES, 14 June 2013

Vygotsky, L.S. (1978) Mind and society: the development of higher mental processes, Cambridge, CA., Harvard University Press.

Naace
The Sir Colin Campbell Building
University of Nottingham Innovation Park
Triumph Road
Nottingham
NG7 2TU
Phone: 0870 240 0480
Fax: 0870 241 4115
Email: office@naace.co.uk

Naace
Maximising the Potential of Learning Technologies – value for investment?

Author: Allison Allen, Outstream Consulting

Computers have been in schools for over 30 years but despite the excitement and advances they engendered, technology is sometimes now viewed with suspicion as distraction, dangerous and even 'boring'! Yet in the face of major recent curriculum changes and challenges, however, there are so many schools that know better - such as those with ICT Mark and the 3rd Millennium Learning Award - they recognise the benefits of Technology Enhanced Learning (TEL) and use it to effect real improvements to learning with cost saving; it is worth examining what models and pathways work. The challenge for learning institutions is to value the role that a teacher plays in mediating technology enhanced learning; and for teachers in particular to challenge their position in the learning environment.

Over thirty years ago, computers were introduced into schools, launching a new and still young subject and cross-curricular tools – memorably the BBC Micro, but despite the excitement and advances they engendered, technology is sometimes now viewed with suspicion as distraction, dangerous and even 'boring'! Yet in the face of major recent curriculum changes and challenges, however, there are so many schools that know better - such as those with ICT Mark and the 3rd Millennium Learning Award - they recognise the benefits of Technology Enhanced Learning (TEL) and use it to effect real improvements to learning with cost saving; it is worth examining what models and pathways work.

The pressure on schools to ensure that students and staff have access to the best in technology is increasing. It is hard to keep up with the pace of technological developments and even harder to understand how they can deliver learning enhancements. We can be dazzled by what technology can deliver - to do a task faster; make a task easier; give a better quality outcome; make a task more interesting or engaging to do; and enable us to do something we couldn't otherwise do; for many schools this is hard to understand and leads to cupboards full of technology 'used once and we don't know what to do with them' 'such a waste of thousands of pounds – technology isn't what it's cracked up to be'.

As Professor Diana Laurillard (2002) stated *"the potential of the technology to serve a different kind of learning cannot be exploited by an academic community that clings only to what it knows"*. The challenge for learning institutions alike then, is to value the role that a teacher plays in mediating online learning; and for teachers in particular to challenge their position in the learning environment.

In many cases, it requires the courage to relinquish the position of expert in favour of a role of guide; something which is foreign to many. In many classrooms, the teacher teaches and the students listen and take notes. The teacher is the central figure, the "sage on the stage", the one who has the knowledge and transmits that knowledge to the students, who simply memorize the information and later reproduce it on an exam-often without even thinking about it. This model of the teaching- learning process, called the transmittal model, assumes that the student's brain is like an empty container into which the teacher pours knowledge. In this view of teaching and learning, students are passive learners rather than active ones. This model does not prepare students for life now, where individuals are expected to use higher thinking skills, to think for themselves, pose and solve complex problems, and generally produce knowledge rather than reproduce it.

In contrast to the transmittal model, the constructivist model places students at the centre of the process - actively participating in thinking and discussing ideas while making meaning for themselves. And the teacher, instead of being the "sage on the stage," functions as a "guide on the side," facilitating learning in less directive ways. The teacher is still responsible for presenting the course material, but he or she presents that material in ways that make the students do something with the information and relate it to what they already know. Essentially, the teacher's role is to facilitate students' interaction with the material and with each other in their knowledge-producing effort. In the constructivist model the student is like a carpenter (or sculptor) who uses new information and prior knowledge and experience, along with previously learned cognitive tools (such as learning strategies, algorithms, and critical thinking skills) to build new knowledge structures and rearrange existing knowledge. (King, 1993).

Technology has had a significant impact on the pedagogical practice of teachers in the most of the education sector. For most teachers, this has meant a struggle to adapt to different approaches to learning design. At worst, technology has resulted in traditional methods of learning design in an online environment; delivering content in a linear way. For others, online facilitation of learning is an opportunity to transform learning into an engaging and authentic experience for the student, using approaches available only in the online environment.

These tools bring with them a need to consider the processes and infrastructure that can support staff in designing, developing and working in the online environment. As online learning has evolved, so to have the roles of the student, teacher and institution. It is evident that some institutions, even though willing to adopt and use new technologies in teaching, often expect the teachers to play a range of roles for which they are unsupported. The more traditional methods have long been criticised for their limitations and inability to appeal to a wide variety of learning styles because they have been based on a teacher-centred approach. The gradual shift in the instructional paradigm has moved away from the teacher to become more student centred (Laurillard, 2002).

There is an implicit link with the role of assessor and the role of designer - in many institutions, these roles are one and the same. It is often difficult for the teacher to move beyond a standard assessment procedure; that is to teach and test as separate activities. In an online environment however, an authentic based assessment can be a rich learning experience if matched with well structured learning outcomes (Herrington, Oliver, & Stoney, 2000). (Fleming & Becker 2007)

To illustrate the issues for learning institutions, the following student survey of 'Out of School use of ICT' is relevant:

"A typical student from 'School' owns a laptop and spends four hours a night on their computer during the week. They are skilled at multi-tasking and have MSN or Windows live running with conversations with a number of their friends. They will also have Facebook running at the same time and they will be using the instant messenger aspect of it as well as adding comments on their friend's sites."

"During the time they are online they will type about 400 words but few extended sentences. They will also be listening to music at the same time. Students use Youtube extensively but largely to listen to music although some time is spent watching the videos."

"About half of students use computers for games, this half is most probably mainly male. Half of this group play online games and about 20% of games players have a games console."

"Two thirds of students use computers to catch up with TV programmes they have missed. Half of students use computer for photography including uploading and sharing images. A interesting minority use computers for Graphics, manipulating and creating original artwork."

"At weekends the use of computers grows significantly to over five and half hours a day although the activities do not change noticeably, with instant messaging, social networks and music occupying 90% of the time."

"Although two thirds of students visit the school website at sometime, 75% spend one hour a week or less using a computer for homework. Given that they do it for four or five hours a week, most of it must be done on paper using photocopies or exercise books."

"Across a week a student will use a computer at home for about 30 hours, when they come to school their average exposure will be about two hours a week. For most students, coming to school is moving toward a low technology environment. For most adults in the working world, going to work is moving toward a higher technology environment. Taken altogether the home and work are high technology areas, school is a low technology area.

1. *71% laptops, 23% desktop, 4% netbooks, 2% other, only one student answered 'none'*
2. *MSN 55%, Windows Live 23% 9% 'none'*
3. *Music 3.2 hours a day weekdays, 4.67 at the weekend.*
4. *97% use Youtube*
5. *20-25% photography and graphics"*

(http://moodlexchange.com/?p=411#more-411 June 23, 2010)

To maximise the potential of the changes, Jisc proposes that learning institutions undertake development activities in an e-learning programme. Although targeted at HE, they are relevant to other institutions:

1. Investigate the role technology can play in enhancing teaching and learning - for example through piloting agile development of new technologies or agile adoption of more established technologies in new ways;
2. Describe or model the e-learning domain - for example by undertaking targeted research studies, by process modelling, and other technical approaches such as domain mapping;
3. Analyse the outcomes of its investigations and synthesise the outcomes of its modelling activities;
4. Create draft standards and specifications, prototype tools, proofs of concept and exemplars for potential adoption by partner organisations and services (Note -in some areas this worked well for initiatives such as BSF technology procurement/partnership);
5. Inform and consult with others on the development of e-learning systems, standards and policies;

6. Guide users by helping practitioners, learners and institutions to make sense of these outcomes and to apply these models, exemplars, tools and standards effectively.

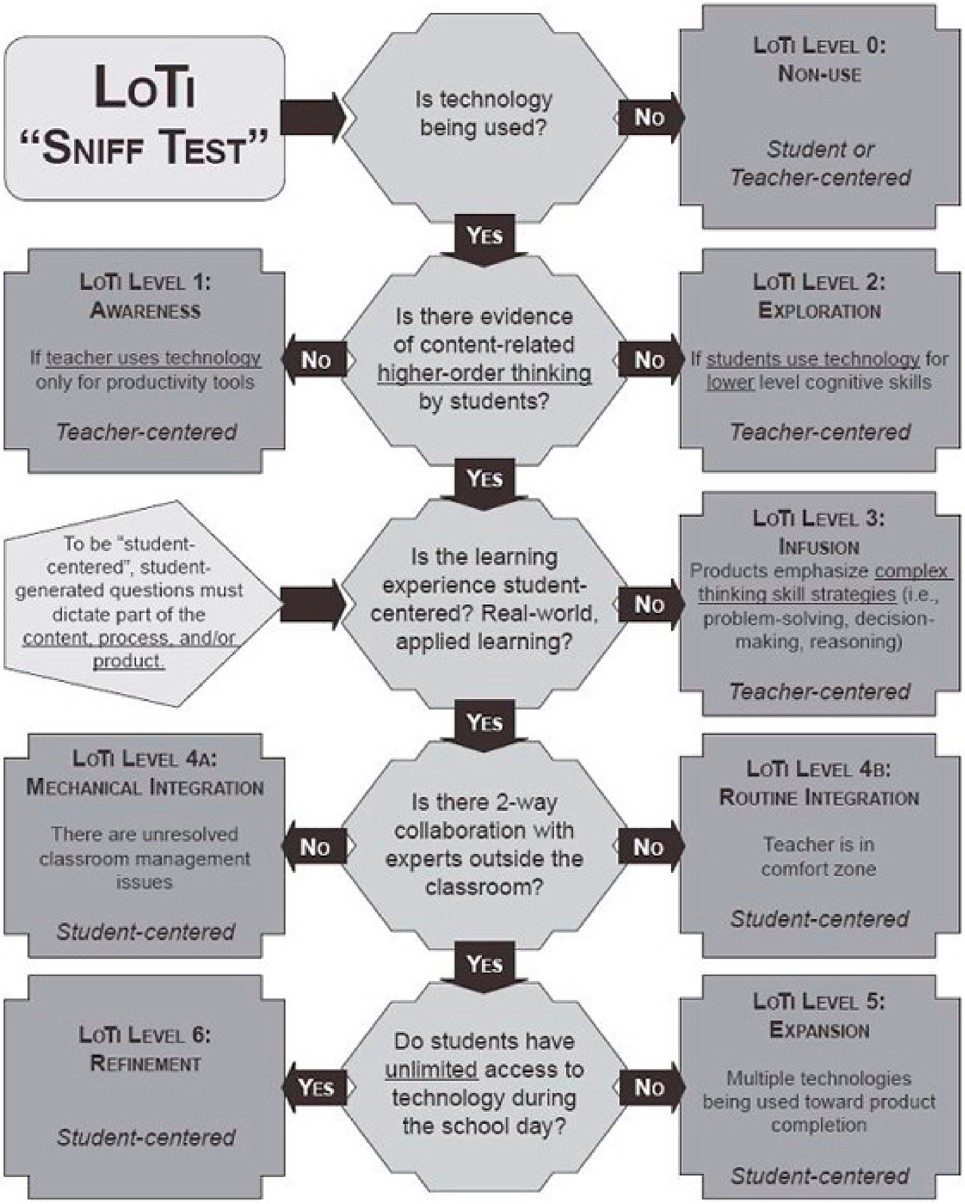
If the eLearning Programme is successful the resulting benefits will be:
Learners will be able to access a wide range of different learning experiences, to make informed choices about their use of e-learning services and materials, and to progress between courses and institutions with their own learning records;

1. Practitioners will be developing the confidence and skills to manage and facilitate e-learning in different contexts, with a variety of innovative pedagogical approaches;
2. Institutions will be using e-learning as an integral part of their approach to widening participation, work-based learning, flexible delivery and personalised learner experiences;
3. Technical infrastructures will support flexibility, diversity and extendibility, and have the potential to reduce the cost of implementation
4. There will be effective and responsive e-learning policies, systems and structures in place at local, regional and national level; guidance and support will be available to help institutions make more informed decisions on the strategic use of e-learning
5. All participants in the learning/teaching process will have easy access to appropriate, high-quality learning materials and to flexible learning systems and tools, which they will be able to customise to suit their own preferences and needs.

In order to establish your institution's baseline and potential to maximise the potential afforded by changes, I think the LoTi (Levels of Technology Implementation: Moersch) "Sniff Test" offers a useful framework to explore the current role of technology use in the classroom by measuring three key areas:

1. Classroom teachers' Level of Technology Implementation, based on the LoTi framework;
2. Personal Computer Use, which measures teachers comfort and skill level with using a personal computer; and
3. Current Instructional Practices, which measures a teacher's likelihood to conduct inquiry-based classrooms.

Following this route will enable you to evaluate the impact of TEL and – no more unused technology!



http://loticonnection.cachefly.net/pennsylvania/LoTiSniffTest.pdf

Allison Allen is an independent education consultant and may be contacted by email at allison.allen@outstream.co.uk or via Outstream Consulting.

References

Laurillard, D. (2002). 'Rethinking teaching for the knowledge society'. EDUCAUSE Review

Fleming, J. & Becker, K. (2007). The roles we play in ICT-based learning design: Do academics have it all? Providing choices for learners and learning. Proceedings asciliteSingapore 2007. http://www.ascilite.org.au/conferences/singapore07/procs/fleming.pdf

Herrington, J., Oliver, R., & Stoney, S. (2000). Engaging learners in complex, authentic contexts: Instructional design for the web. Paper presented at the Moving On Line Conference, Brisbane.

King, A (1993) From Sage on the Stage to Guide on the Side: College Teaching, Heldref Publications Moersch, Christopher. (1994). Labs for learning: An experiential based action model. National Business Education Alliance; Levels of Technology Implementation: http://loticonnection.com/index.html

RSS What is RSS?

SPECIAL TOOLS

My Profile
Change password
Add article to CMS
Moderate articles in the CMS
Resource finder
Advancing Education
Computer Education
Naace Communities
Naace CPD
Naace Knowledge
Conference Networking
ICTCPD4Free

Naace
The Sir Colin Campbell Building
University of Nottingham Innovation Park
Triumph Road
Nottingham
NG7 2TU
Phone: 0870 240 0480
Fax: 0870 241 4115
Email: office@naace.co.uk

Naace
How Technology Inspires Creativity in the Classroom

Thank you for editing the entry. This is how the edited entry will appear in the database.

Author: Nadia Hyeong

Creative children need technology. Nadia Hyeong explains how tablet and smartphone devices in the classroom can inspire creativity.

Image courtesy of Tuchodi of Flickr

The classroom—the last bastion of education still using traditional methods, but also one of the most effective ways of learning. But banning all modern technology from it can be severely damaging not only to a child's ability to learn, but also to the creativity they harbour deep within themselves - or in some cases, far closer to the surface.

Have you ever seen a child wander over to a musical instrument and pick it up for a quick few strums? That's because having any kind of instrument, tool or device accessible to them in a learning environment will encourage them to try it out. This is no different for technology - if anything you're more likely to see them go for a tablet because it's a new, exciting, or even potentially familiar object to them.

That's not to say they'll procrastinate. The temptation is there for many children, of course - they're children! Keeping them engaged is important, and technology can manage this by giving them enough creative freedom that they feel like they've defined how they spent their time in each class, while still taking enough away from it to justify there being a class in the first place.

There are many apps that can offer them creative expression - sketching apps, adventure games, music production softwares - and a lot of it is very cheap, so you can outfit an entire classroom with the ability to get creative should they so wish.

The advantage here is that students are already incredibly familiar with almost all of the technology you're likely to hand them. If they're in secondary school education, a Galaxy S4 is not an entirely unlikely item to find in their possession, and as a result asking them to explore the history of the Second World War on a tablet is not going to be a major stretch of their technological abilities.

It's also an opportunity for teachers to get a better idea of what they're likely to be teaching with directly in the near future - tablets instead of textbooks is a real likelihood, and one that could separate the technophobic teachers from everyone else. Of course, adults are more likely to own and use this technology anyway, but it never hurts to ensure that you're prepared.

When it comes to lesson plans and getting children interested in creating something impressive with technology, always rely on the fact that creative apps often have example work for you to see what the software in question is capable of. Once you've wowed them with that software, one of the best approaches is to jump in with them and create something too.

There's a reason for this - if you're learning too, it becomes an experience where some of the children (don't be surprised) may overtake you and create something even more impressive. That's a major achievement for them, and something that should be celebrated. Joining in as a beginner also offers them something that they normally don't have in traditional academic subjects when it comes to their teacher - a level playing field.

Creative children need technology - allowing them to use their generational affinity with hardware in the classroom to engage with music, art or other creative subjects is a positive step forward for education as a whole. Now, go and take them on a digital finger-painting adventure!

Nadia Hyeong is a tech aficionado and a fan of new gadgets and games. Feel free to follow her on Twitter and Google+.

SPECIAL TOOLS

My Profile
Change password
Add article to CMS
Moderate articles in the CMS
Resource finder
Advancing Education
Computer Education
Naace Communities
Naace CPD
Naace Knowledge
Conference Networking
ICTCPD4Free

Naace
The Sir Colin Campbell Building
University of Nottingham Innovation Park
Triumph Road
Nottingham
NG7 2TU
Phone: 0870 240 0480
Fax: 0870 241 4115
Email: office@naace.co.uk

Naace
Guide to Web Filtering in today's Schools: Balancing IT and Educator Needs

Thank you for editing the entry. This is how the edited entry will appear in the database.

Author: Lightspeed Systems

Cited in:

- Advancing Education Autumn 2013

Secure but flexible web filtering is essential but has to meet the needs of all school users. Lightspeed Systems 'REimagine' offers this and much more.

To teach and engage students and arm them with 21st century skills they need for success, educators turn to the web and often get blocked by the filter. Whereas on the other hand, to manage the school network, meet requirement, monitor adherence, control bandwidth and ensure safety and security of online users, IT department rely on web filters. Schools need to balance the needs of both sides. Content filtering has changed. It used to be a matter of block now, and ask questions later. But to engage students with online content and social collaboration, schools need to balance safety with learning- letting good content, resources, and connections in while blocking the bad. "Blocking inappropriate content doesn't have to block learning", But why do schools need to filter?

- Safety of students
- Security of network
- Identification of cyberbullying
- Enforcement of Acceptable Use Policies
- Monitoring use of school resources
- Controlling traffic for bandwidth purposes
- Monitor mobile device usage

Challenges of Web Filtering

- Balancing security and safety with learning and education
- Meeting needs of various groups and individuals
- Ensuring overblocking doesn't hinder learning
- Ensuring underblocking doesn't impede safety and security
- Enforcing policies despite sophisticated new proxy technologies
- Providing safe access to dynamic content and collaborative tools
- BYOD and mobile learning programs

Best practices in filtering

Differentiate Policies. Teachers and students need to access different things to do their jobs. In addition, a primary school student requires access to different sites than a secondary school student. And one user who abuses online access shouldn't lead to overblocking across the board. Differentiated policies should allow you to set different levels of access and different filtering policies by user type, grade, and even individual.

Trust Teachers. The people who work with students all day in the classroom, who create lessons and plan activities, who research a topic and dig up new resources
to make it engaging for students, should also be trusted to access the Internet and determine what students can see for a specific lesson or class. Allowing several hours (let alone several days or weeks) for an adjustment to a filtering policy by IT is often a hindrance to learning—as well as a drain on IT resources. Aside from differentiated policies for teachers, trusting and empowering teachers can be accomplished safely with Overrides and other filtering features that allow teachers to bring resources together for student access (all under the monitoring of IT).

Collaborate. Though the school network has shifted from being primarily an infrastructural element to a learning tool, educators often feel left out of decisions about what content has educational benefits and what filtering policies should block and allow. Making the creation of filtering policies a collaborative effort between IT, teachers, administrators, school boards, parents, and even students can ensure that all needs are met—and varied viewpoints are considered

Be Transparent. When users know the schools filtering policy, the reasons behind it, and the specific reasons certain sites are blocked, they are generally more understanding and accepting. In addition to a transparent policy, users feel less frustrated about filtering when they are able to search a transparent database (that allows users to see how and why a site is categorised) and to recommend sites for review.

Considerations when choosing a web filter

Does it get education? Schools aren't businesses, and only a solution made for schools can properly categorise web sites and implement features that promote educational goals.

Can it filter your mobile devices? Even if you don't have a mobile learning program now, chances are you will eventually. And you probably already have students and staff bringing their own devices and using them on your network.

What does it do about dynamic content and web 2.0? 'Block it' or 'allow it' for broad categories of content isn't a good enough choice. Schools need a way to allow the educational aspects of Web 2.0 while blocking the inappropriate content.

Can you customise it? Your school is unique and you need a filter that you can granularly control to meet your specific needs.

Do you have to customise it? While customisation is essential, so are default best practices — because extra time is one thing most IT teams don't have.

With Lightspeed Systems Web Filter, you can:

- Protect users from inappropriate material on the Internet while allowing them to access valuable educational resources, such as videos, blogs, and documents.
- Receive detailed reports on user activity.
- Enforce Acceptable Use Policies with flexible filtering policies and monitoring.
- Balance learning and safety with teacher override capabilities and a complete platform for collaboration and online learning.
- Prioritise web traffic to ensure access to essential services.

Features:

- Comprehensive and accurate URL database with more than 1 billion entries grouped into education-specific categories
- Real-time database updates; immediate updates for urgent categorisations
- Ability to create different policies based on user, IP, group, organisational unit, and domain
- Mobile filtering to extend policies and protection to off-network users
- Web zones to give teachers the ability to expand or contract Internet access for specific assignments or classes
- Lockouts to allow administrators to set abuse thresholds triggering an Internet lockout
- Customisable access pages
- Multiple layers of anonymous proxy detection
- Web traffic prioritisation and limiting capabilities
- Flexible filtering for thin clients. Peer-to-peer application and file-type blocking
- Integration with Student Information Systems
- Safe Search
- Ability to accommodate even the heaviest traffic loads, up to 10Gb, without hindering performance

Comprehensive, Customisable Reporting:

The Lightspeed Web Filter provides information on how your filtering policies are being used (and violated) so you can adjust policies and troubleshoot issues.

- Lockouts Overrides
- Web Authentications
- Blocked for Review

In the words of a Lightspeed Systems Customer, *"The rich functionality allows us to tailor web filtering to cope with our very diverse student population across many age groups and various subject matter."* Rob Arnold, Canterbury College.

Extend your classrooms, expand your possibilities and discover ways to REimagine education with Lightspeed Systems? Find out more.

- My Profile
- Change password
- Add article to CMS
- Moderate articles in the CMS
- Resource finder
- Advancing Education
- Computer Education
- Naace Communities
- Naace CPD
- Naace Knowledge
- Conference Networking
- ICTCPD4Free

University of Nottingham Innovation Park
Triumph Road
Nottingham
NG7 2TU
Phone: 0870 240 0480
Fax: 0870 241 4115
Email: office@naace.co.uk