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A Pilot Teaching Project, “Keeping Safe”, Exploring the Use of “Scratch 3” Computer Coding Files and Computer-Generated Music Files Created in “Sibelius”, to Support Young Adults with Language Learning Difficulties and Disabilities at Lambeth College, in South London

Lloyd Mead¹, Lawrence Williams², and Beth Mead³

¹ Lambeth College (Further Education), London, UK

² Formerly Brunel University London, UK

³ Beth Mead, Safeguarded student, London, UK

1 LMead@lambethcollege.ac.uk, 2 lawrencewilliams2060@gmail.com

Abstract. This case study outlines a continuing curriculum project, from 2009 to the present, now exploring “Scratch 3” to support the sequencing skills of young adults with learning difficulties (LLDD), at Lambeth College, south London. Student support files, in “Scratch 3” block coding, and in “Sibelius” music software, were created by a secondary school pupil, aged 12, and developed for use by the students at the Further Education College, as part of an on-going educational collaboration. While it has proved to be the most problematic and frustrating teaching and learning project of the learning series to date, nonetheless it has had very positive student outcomes.

Keywords: Curriculum innovation, “Scratch 3”, “Sibelius”, Further Education, LLDD students

1 Background

Young adults with learning difficulties and disabilities, aged 18 to 24 years, at Lambeth Further Education College in south London have a long tradition of exploring the use of ICT and Computing technologies to support their learning. This tradition has extended into cross-agency work (with Health and Education professionals); links with local secondary schools; commissions from the UK National Health Service; and to other agencies such as MirandaNet and ITTE, currently being amalgamated as the “Teaching, Pedagogy and Education Association”, TPEA, 2019. In the past, Lambeth College students used Microsoft Office tools to support their learning [Note 1]; then “Scratch 1.4” block coding program [1]; and then “Scratch 2” [Note 2], and are now starting to explore the newest program version, “Scratch 3”, together with music files developed using the

“Sibelius” music software program. The aim is for the College students to improve their sequencing and general skills (as part of their “Life Skills” course) through simple coding activities, and to keep themselves safe within the community. The most recent project, “Healthy Eating”, using “Scratch 2”, is currently posted on the MirandaNet World Ecitizens web site. To support the College students in this work, they were sent “Scratch 2” shell files created by a primary school pupil. Other cross-agency coding resources (Education and Health Care) can be found on the website [Note 3], and this project was later presented at the MirandaNet/ITTE Conference at the University of Winchester, in July 2018 [Figure 1. below].

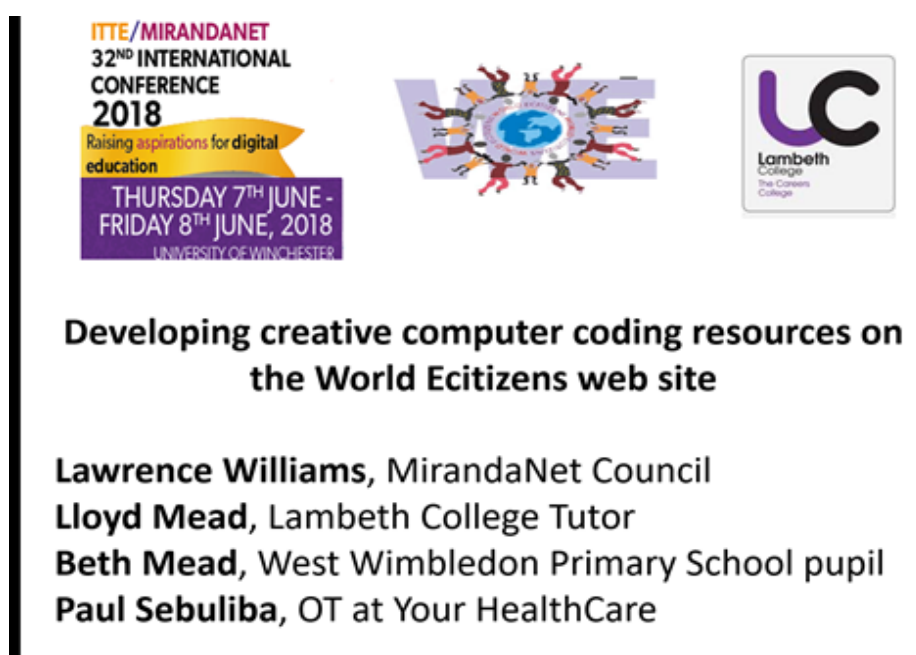


Fig. 1. ITTE / MirandaNet International Conference 2018

The new project outlined in this paper is based, like previous projects, on Piaget’s constructivist [2], and Papert’s constructionist models [3], with students planning, problem-solving, constructing, developing, and then coding their original animated phone Apps, with their own Scratch Sprites and Backgrounds, with the addition of music, and voice-over sound files. It centres on activities created to support another ongoing College theme, “Keeping Safe”. Some Lambeth LLDD students have difficulty in making the journey to College unaided, and so focussing on travel safety, and looking after their money, keys, and their mobile phones, is an important part of their “Life Skills” learning programme. Learning to sequence is also an important skill for all LLDD students.

2 Aims of the Project

The project aims to develop several aspects of the College students' learning development:

1. To help the students, by using "Scratch 3", to **organise** their thoughts, by **planning** an activity on paper, and carrying it through in a **sequenced** and methodical way.
2. To improve their **communication skills** by developing and sharing a topic of relevance to their own personal safety within the group, and with support staff.
3. To allow them **space to reflect on** and **review** what is important to them in relation to own their personal safety.
4. To develop **elementary coding skills** as part of a creative activity.

3 A Setback

When we first heard, in 2014, that "Scratch 3", written now in HTML5, would eventually run on androids, we were very excited. In September 2018, we therefore began to develop another teaching and learning project ready to start in January 2019, which would allow the Lambeth students to create "Keeping Safe" phone Apps, which they would learn to create using the new "Scratch 3". They could then, we fondly thought, run the files on their own phones when they were out and about in the community. This would have been a beautiful marriage between their College "Life Skills" studies, and practical safety support for them within the community. However, when "Scratch 3" arrived in early January 2019, it was sadly confirmed that the HTML5 Reader had been completely abandoned by MIT at only 40% completion, and offered rather vaguely to the coding community to develop. No-one seems to know how well the HTML5 Reader is progressing, if at all. So, while "Scratch 3" files can now actually be made on a phone or tablet, when used on-line, and can be saved onto a phone or tablet, as sb3 files, they cannot actually be run off-line without an HTML5 Reader, because it does not yet exist. So, we had reluctantly to revise our planned project.

"Scratch 3" has so far been poorly received by some users, [See: <https://scratch.mit.edu/discuss/topic/326977/>] with our own additional complaints about the limited sound file system, the unnecessarily complex new Paint option, and the revised (rather garish) screen appearance, which seems to direct the program towards much younger users while being, paradoxically, more complex to use. It is also unstable across a network.

At this juncture, we confess also that we are at a complete loss to understand why "Scratch 3" was developed in HTML5 (to run on android) but that the means to accomplish this in the real world (i.e. with a HTML5 Reader) was abandoned! A revised version of "Scratch 2", rewritten in HTML5 with a Reader, would have made much more sense to us. We hope that this omission will eventually be put right by

MIT, and enable us to complete our earlier planned project, perhaps in 2020? On the plus side, “Scratch 3” does have helpful Tutorials embedded into it, and this is proving to be beneficial for the College students. Voice and movement activated elements of Scratch 3” may be of later interest, when they are fully realised.

The presentation of these new resources, officially launched at the London BETT 2019 Exhibition, however, showed rather worryingly that these elements, too, are only partially successful, at present. And sb3 files, when emailed as attachments can, inexplicably, only be opened and edited in about 50% of cases. Much work still needs to be done, therefore, to make “Scratch 3” a reliable, rather than a disappointingly revamped program. MIT say they are working hard on all of these issues, but teachers will need to have more confidence if they are to adopt it.

The original learning objectives of our project (developing sequencing skills through computer programming, and keeping the students safe) were, of course, unaffected by most of these problems. And we felt that if we started to explore the music possibilities of “Scratch 3”, and developed new links with the “Sibelius” music software, we could begin moving forward again, in a more musical direction. So, while the original aim was for the Lambeth support files to be used by the Lambeth students within their projects, they became, instead, exemplar material. From seeing their files displayed on the Interactive Whiteboard at the College, the students responded by making their own Apps unaided, a pleasing progression in terms of their independent learning.

4 Method

The College students were asked to discuss which aspects of their own personal safety they would like to develop as a phone App, using “Scratch 3”. They decided, on an individual basis, to cover looking after their money, mobile phones, keys, and help with transportation to College. Building on their “Scratch 2” experience, the students were introduced to the “Scratch 3” coding program, and explored various aspects of how it could be used to sequence such personal information as photos, maps, and bus timetables, just as previous Lambeth College teaching groups had earlier done, using PowerPoint.

Parallel to this, the secondary school pupil set about creating two different sorts of support files for the College students: in “Scratch 3” the focus was on modelling possible App structures, to make the sequencing of the various elements (photos, text, maps, etc.) more straightforward. This method had proved to be extremely successful in the earlier “Healthy Eating” project, and so suggestions were sent by email to the College. Exemplar music files were also created using “Sibelius”, and dispatched accordingly. Additionally, to support one of the College students in using the Paint option to create her own Sprite, rather than just importing one from the Scratch library, the secondary pupil (aged 12) made a 4-minute instructional video on a smart phone, which was then field tested by her younger brother (aged 8), and having proved successful, was taken into the College classroom. Placed on the college desk, it proved a successful tuition method.

5 Musical Aspects of the Project

Music sound files for the project were created by the young school pupil in six different ways: three within Scratch itself, and three using “Sibelius” files.

To create phone Apps that sounded more professional, and “cool”, she set about creating a range of music jingles or fanfares, which would introduce or accompany the images within the App. The idea was to replicate the ubiquitous musical phone prompts, the bane of cinemas and theatres everywhere! The files created and sent from outside the College, acted as a catalyst for the Lambeth students to explore their own musical ideas.

This musical activity can be accomplished in a number of different ways:

1) Scratch music files

Fanfares and other music can obviously be imported directly into projects from the Scratch Sounds library, but they can also be individually created very easily within Scratch itself, by using the Sound blocks. Single-note sound files can be programmed together algorithmically from the Sounds directory, and made into short, repeatable musical patterns as shown below (Figure 2) Here the Trombone plays the sound an octave below the Trumpet, and by using Loops, it is repeated in order to make the short fanfare.

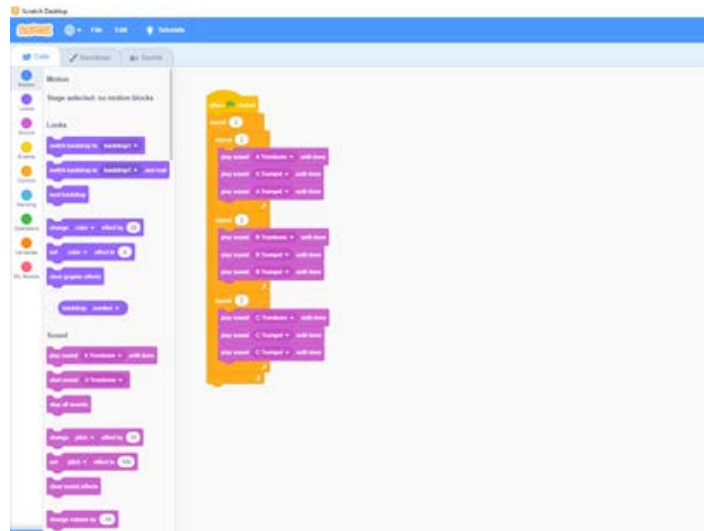


Fig. 2. Sound Loops: simple App fanfare by a student (aged 12)

2) Adjusting and developing the Scratch music files

There are several ways in which sound files can now be manipulated in Scratch 3, such as faster/slower, louder/softer, spiral, echo and reverse. The secondary student created examples, which were shown to the Lambeth students as exemplar material. [Figure 3]

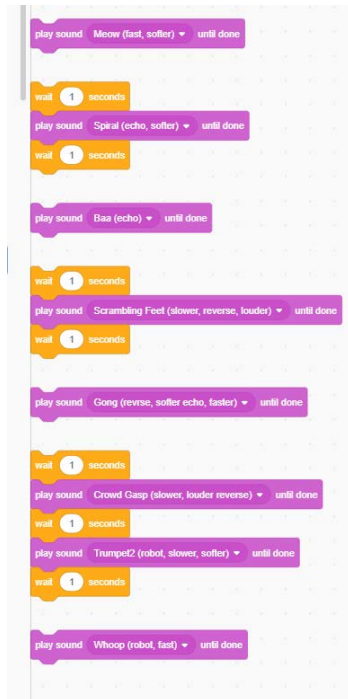


Fig. 3. “Reworked” sound files in “Scratch 3”

3) Midi music keyboard input

(i.e. Music played into the Record mode in “Scratch 3” from a piano or electronic Midi music keyboard.)

This is done by playing the music keyboard while it is placed adjacent to the “Scratch” computer. This works in just the same way as adding spoken sounds to speech bubbles. There is a short outline of how to do all of this on the “Literacy from Scratch” web site (using the earlier Scratch version 1.4 for writing bilingual Scratch stories, but the method is still relevant). See:

<https://www.literacyfromscratch.org.uk/teaching/music.htm>

Music played on an electronic keyboard can be added directly into Sibelius, through a Printer cable lead. This Midi input is converted by “Sibelius” into musical staff notation. Once the input has been played and saved, the playback can then be altered, changing the instrument’s voice, for example.

4) Music input into “Sibelius”: Option 1

Music created within “Sibelius” itself onto a musical staff (the manuscript page) in a variety of ways can also be played back live into Scratch, again through the red Record button. The music in “Sibelius” can be created in three ways, as follows:

Note by note (by hand, with mouse click and drag. Slow method.) [Figure 4]



Fig. 4. A simple music file in G created “by hand and mouse” in “Sibelius”, and showing the Keypad

5) Music input into “Sibelius”: Option 2

Music can be added to a manuscript by using the program’s “virtual keyboard” (Faster method.) See Figure 5. Here, the Virtual Keyboard is added to the screen on top of the manuscript page, and mouse clicks on the keyboard generate notes on the page.

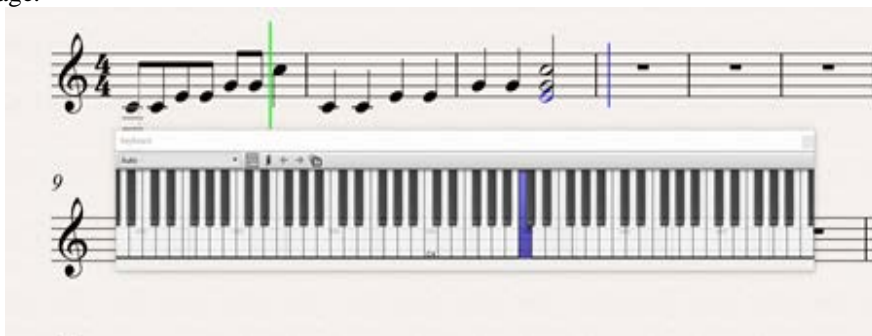


Fig. 5. The first bar of this fanfare in C was created using a mouse, and the second bar was created using the Sibelius “virtual keyboard”.

6) Music input into “Sibelius”: Option 3

Finally, music can be added onto a manuscript page by Midi music keyboard input, as mentioned above (Best method.) This is done by placing the Midi music keyboard next to the computer, and linking the two by use of a printer cable. Music played in real time on the Midi keyboard appears directly on the manuscript page, where it can be edited, developed and then played back into Scratch 3”, using the red Recording button, and in a variety of musical “voices” or instruments from within “Sibelius”.

The musical developments in the project are on-going, but the major learning outcomes were completed by the end of the Spring Term.

10. Learning Outcomes (January to April 2019)

Student A: This young man has problems in engaging with other students, partly because of some behavioural difficulties, and he generally has a limited focus on learning tasks. He has some computer skills with Office programs, but also suffers anxiety issues, possibly related to his autism. Nonetheless, during the project he has developed much greater concentration on his learning tasks, probably because the work involved his own personal interests. He related his computer learning to his journey to College as an independent traveller on a 37 bus, and loved finding suitable images on the internet, and on the Lambeth Moodle, as well as taking appropriate photos out in the community, to add into his work. He was able, through a steady development process, to step outside his “Office comfort zone” to continue his project successfully.

As well as attending his Scratch classes more frequently than some other lessons, this personal development encouraged him to start problem-solving. Disliking writing, he started to use the recording device on his mobile phone as a means of recording his thoughts, so that he could include the text in his project. We were very pleased to see him using technology in this way to support his own learning.

Student B: Planning was the main focus of this student’s learning. Starting with a hand-made drawing of herself (as an avatar/sprite), she was ably supported in developing this image as a sprite within her Scratch project by using a specially created instructional Paint video (made for her by a Year 7 school student, aged 12). She was inspired by this individually tailored support to create her own animated drawings of her avatar within her project. She was very excited by this success, and looked forward to sharing her learning achievement with others in her group. The external support for this student (by using the video) was a fundamental aspect of her success. Collaboration was the key here.

She was later able, confidently and totally independently, to adjust her avatar/sprite to reflect her own personal image in better detail. She hopes, also, to add music files created by her own keyboard skills to the finished project.

Student C: This student has difficulties in processing his own internal thinking, and the relevance of his personal development during this project is very different from that of others in the group. He is keen on drawing and story-telling, and he uses his drawing skill to externalise his thinking, which can sometimes be quite very dark and negative. Using “Scratch 3” has allowed him to **externalise** some of these sometimes violent emotions, and to create his animated characters, which allow him to discuss his thoughts with his teacher in a safe environment. He is able to draw his attention away from these dark thoughts into developing a creative, and cathartic, way of expressing himself, using computer animation and coding.

He later wanted to create further animation in “3 D”, that is with his sprite walking out towards the viewer. This activity allowed him to turn his focus away from death and killing, and towards the more positive direction of making his sprite come alive. This was an unexpected but very pleasing result.

The group: Many of these students struggle with reading, writing, and mathematics work. Remarkably, however, all students involved in the project developed their sequencing skills and other important “Life Skills”, by creating a series of correctly formulated algorithms for their “Keeping Safe” Apps. Attention span improved, as well as general behaviour. They were all very pleased with their progress towards final learning outcomes. We, too, were very pleased with some unexpected but rewarding outcomes.

6 Conclusions

We will have finished many of the learning outcomes of the project by the end of the Spring Term, April 2019. But it will not be possible for the students to use the Apps they have created at College on their phones until the HTML5 Reader is actually completed. Nonetheless, the students have once again focussed impressively on their coding work through their “Keeping Safe” project [5.]; have developed their sequencing and personal skills effectively; and have worked successfully with the support of their young secondary school partner. They are also having fun developing the musical ideas sent to them by the school pupil, rather than importing them directly (pre-formed) from Scratch into their work. We are still developing this aspect of the project. As teachers, we are nonetheless very pleased by this learning progression.

What began as a planned celebration of “Scratch 3” rapidly became a project that had constantly to be remodelled in order to cope with its many newly-added deficiencies. (And we have not addressed the network instability of the program in this paper.) Nonetheless, we felt that knowing what does not work in the classroom is just as important to teachers, as knowing what actually does work.

So, there are two possibilities for the future development of this curriculum project. The first is to see if and when the HTML5 Scratch Reader is finally, if ever, completed, at which point we hope that we will be able to create usable “Keeping Safe” Apps for download onto the College students’ phones, using a revised or more reliable version of “Scratch 3”, as MIT has promised. The second option is to revert to reliable old “Scratch 2”, (on-line and desktop) and then use rather complex conversion files to run the completed Apps onto the students’ phones. Only time will tell. But we owe it to our most vulnerable students, to pursue the best potential uses of technology to support both their learning and their personal safety, however frustrating the task may at times turn out to be.

Notes:

1. Early cross-agency work undertaken by Lambeth College students, with secondary school pupil support, and UK National Health Service commissioning can be found in the MirandaNet archives at: <https://www.mirandanet.org.uk/resources/>

2. More recent work, this time developing students' computer coding and sequencing skills, using "Scratch 2" can be found at: <http://www.worldcitizens.net/resource-materials-supporting-the-lambeth-college-projects/>
3. For other simple background coding resources, including using Python for storytelling, see: <http://www.worldcitizens.net/stories-for-children-2/> and <https://sites.google.com/view/literacyfrompython/introduction-and-teachers-notes>
4. For a brief report of the early, successful use of Sibelius 6 for classroom use, in the Times Educational Supplement, 1997, see: <https://www.tes.com/news/sibelius-scores-girlsdo-it-yourselfmultimediait-interviewlawrence-williams>

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