**Sonification of depictions of numerical data**

**Karen Vines:**

It all started for me a few years ago during the production of Introducing statistics. That module includes a lot of graphs as part of its teaching and I was worried that figure descriptions would not be a sufficient alternative for print disabled students. So at the time I started looking around for alternative solutions and I came across one in particular which is sonification. That is turning graph in to sound.

But that stayed on a back burner until a call by eSTEeM for projects involving accessibility. And they put me together with others that were interested.

**Chris Hughes:**

I came to the project with a few years’ worth of interest in maths accessibility. I had a few ideas that I was planning to contribute but I was particularly interested to hear Karen’s sonification idea as it seemed to have wide ranging applications across all of STEM.

**Karen Vines:**

The team consisted of myself and Chris and a few others. I have a background with statistics and also in programming up sonifications. And, for example, Chris had a background in maths accessibility in general. And it’s worth noting that even though some of us were in the same department we didn’t know about our mutual interests and accessibility until eSTEeM put us together.

Sonification itself is not new but its application in the OU context is. In order for it to be considered for widespread adoption by the OU we need to know whether it works in the OU context. So we decided to try it out on a few OU students.

**Chris Hughes:**

We recruited five sighted students, five blind or visually impaired participants. We also had two blind participants from Oregon where they replicated the study at a community college. For each participant we walked them through six learning scenarios each of which contained a graph that was turned in to sound.

We asked them engagement questions along the way. We also asked them questions about their background such as their musical preferences.

**Jeff Bashton:**

What I see in my head when I hear sonification is clearly going to depend on the sound that I heard. So if it’s a scale ascending and then descending I’ll probably think of something like a, I guess it’s called a bell shaped curve. If the sound is much more random I’m probably going to put dots on paper in my head. And when I say my head I could actually, you know, have a picture of the graph or of the sheet of paper in front of me and I can feel the dots through. And then maybe a line that joins up those dots.

**Karen Vines:**

The kind of results that we got we were really pleased with. Sonification certainly seemed to be conveying the gist of the plot. But it was also very helpful working with people like Jeff who showed us how they work with figure descriptions and tactile plots as well as the sonifications.

**Jeff Bashton:**

A sonification is not going to solve all the problems. I guess I would say it’s part of a necessary blended approach by which I mean probably a combination of tactile diagrams, figure descriptions and sonification would probably be good at bringing some graphical information to life.

**Chris Hughes:**

There were a few challenges that we encountered surrounding workload in particular, building the project into our busy working lives. There was challenges surrounding the shortlisting of the graphs to be used because we had a wide pool from which to select. There was challenges surrounding the shortlisting of candidates as well.

For each of the twelve participants we video recorded each of the six learning scenarios. So one of the biggest challenges was distilling each of those videos into a concise detailed report.

**Karen Vines:**

One of the most tangible impacts has been giving a workshop at an eSTEeM Conference and also getting a report about the study up on Scholarship Exchange. But what’s been really great is seeing the reaction of my colleagues when they hear a sonification for the first time. Their face really lights up when they hear it. And it seems like even though this is just a pilot study the idea of sonification is getting a momentum all of its own at the Open University.

**Chris Hughes:**

One of the main impacts of the project is that it’s given us impetus and a small piece of evidence to pursue phase 2 of the project. Which is to get the sonifications live on a module so that we can get actual feedback from students studying the module.

**Karen Vines:**

Doing the project has given me the confidence to get involved with scholarship. And this will stand me in good stead as I work to improve modules and we’ll need to find out whether those improvements have worked.

It has also given me the chance to work with a different set of colleagues and form new collaborations. And this is all adding to my sense of job satisfaction.

**Chris Hughes:**

There are a few things that I got from the project personally in particular collaborating with Karen who’s helped to develop professional relationships which in turn helps to develop a sense of belonging to a school and to an institution. I’ve used the co-chairing experience as part of my evidence in my application for my senior fellowship application at the HEA.

Looking forward to the future we’re very excited about phase 2. It’s given us a very positive thing to focus upon and we’re very excited to see what the students think of it live on a module.