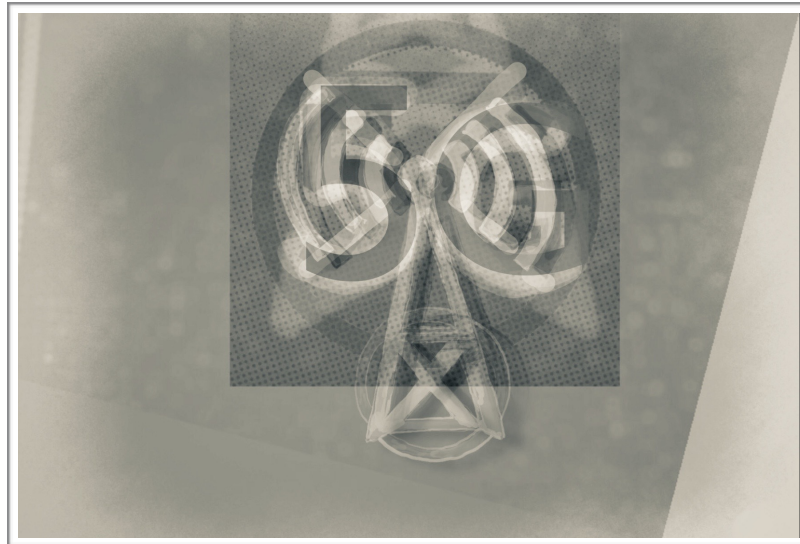


Frequency Emissions and 5G



How to pass on information on biological effects and measurement of Radio Frequency radiation

Micro-teaching assignment PCET Dec 19

Angel Garden

Introduction

This is a reflective report and analysis of the first micro-teaching assignment of the PCET course, using the Gibbs reflective model. (UK Essays)

Out of three ideas I decided on the most current, Frequency Emissions and 5G. This report will analyse planning, execution and evaluation of the teaching project in several contexts: the current level of public knowledge about frequency emissions and 5G, with regard to my first teaching experience, and with regard to professional standards and national well-being goals.

Aims and Objectives of the lesson.

Through research, I had developed a keen desire to educate about 5G and decided to use the micro-teaching to develop a lesson aiming for, not just understanding of RF emissions measurement, but the ability to pass the information on.

My teaching plan included the bare minimum information to understand the importance of measuring RF emissions, and then to do it and compare with two difference measurement scales.

The understanding needs to include context of why these levels are not being routinely measured, in line with policy and legislative frameworks.

In a world already saturated with radio frequency (RF) I wanted to help fill a need for a simple, swift and effective method of educating about the biological effects of wireless radiation.

The teaching had to take into account the context of public perception of 5G, including heavy media and Government bias in favour of promoting the International Commission on Non-ionising Radiation Protection (I.C.N.I.R.P), (GOV.UK)

The other measurement scale used was the International Guidelines on Non-Ionising Radiation. (I.G.N.I.R). (IGNIR.org)_

The lesson needed to explain that ICNIRP only accept thermal effects of RF fields and focus on average energy absorbed.” (Starkey S. J, 2016, p 495).

The teaching also had to take into account public perception of criticism of ICNIRP’s standards, with even the New York Times running a hit piece suggesting that those picking up the “network’s alarms” were “seldom if ever noting the Russian origins.” (Broad W.J. 2019)

Tech-wise I opted to include an RF meter along with my use of selected video clips and Powerpoint.

In practise

I started by asking people what they knew about 5G. All agreed it was just another level, or generation, of ordinary technology.

I went through the slides elaborating each one to explain the necessity to understand and measure radio frequency emissions in order to understand the dangers of them, due to standards which don't measure biological effects.

I gave out the "SAM" sheet and asked the learners to fill in their own phone model by the two phones strapped to "SAM's" head.

In spite of me having checked and charged the batteries a few days prior, the RF meter was completely flat when I came to measurement and my volunteer had her phone all ready. This did interfere with V2 and A4 standards - learners have opportunity to assess their own ability in tasks.

Luckily, in my enthusiasm I had already put a large cardboard measurement table on the devices backed with blu-tak, with levels already on, for example "iphone with wifi and bluetooth but not mobile wireless" and various other connective combinations. We used this instead to demonstrate RF measurement and still finished on time.

My reflection on this micro-teaching project using Gibbs has involved seeking information and sources from several different disciplines, including teaching theory, methods, FR science, media, technology, and legal frameworks

Personal reflection

We were encouraged and even exhorted to take risks, and I'm glad I listened to this as I've learned so much that's applicable to the real world.

I enjoyed delivering the lesson, even though there was a major hiccup in the middle when we got to the 'using the RF meter to measure RF emissions from someone's phone. When I turned the meter on, the battery measurement said 0%!

However, I'd previously attached an RF measurement chart borrowed from Safe Technology Swansea onto the wall, in case we had time to explore it. So even this

error helped to get the message across of the limitations of technology and to perhaps pose questions as to the wisdom of its unbridled deployment per se, as opposed to appropriate use and limits of technology, as one method of teaching among many others.

From the point of view of my passion and interest, the lesson went well, and I believe it achieved proof of concept, both of the importance of teaching the subject, in using one sheet to do it, and showing several areas of improvement that can easily be adopted which can be expected to improve the lesson.

Evaluation

Planning

Feedback on my plan included that there were too many points to cover. It was perhaps a bit ambitious, and I will consider how to simplify that, and get away from powerpoint more and onto a page that tells the story and the facts, and that can be taken away.

A suggestion was to include more detail of slides in the plan to be clear which slides cover which elements. The plan needs to include the full number of slides in the whole lesson.

The powerpoint could possibly be redesigned to teach more about the one sheet. This suggests two distinct teaching possibilities; one in a classroom with these technologies available, and the other with just the sheet, anytime anywhere.

Tech-wise I opted to include an RF meter along with my use of video and Powerpoint.

The Lesson

Time planning worked well and I did not run over in spite of technical issues.

My main mistake was in not checking equipment adequately. I should have checked the RF that day, not just two days before. The batteries were completely flat. This possibility wasn't even written down in the risk assessment, and shows the need for tech vigilance. It can be easily rectified by having a checklist.

Another main mistake was to overlook the natural depressing effect of the learning. I should have spent more time making sure people were not unduly traumatised by being given difficult information and then left alone with it, with no support.

Selection of Facts

It was difficult to select the important facts to teach in a topical and daily changing subject to show how issues need to be thought about **before**, not after, changes with potential negative effects are introduced without properly informed consent.

Moving too fast to convert everyone to electric vehicles for example, could negatively impact sustainable and well-being goals down the line in potentially colder winters due to the electric car's significant loss of power in the cold (Loveday S, 2019).

Not a scientist

I learned about simplifying a complex subject which makes people feel "I'm not a scientist", a category I'm in myself. I'm glad I had the courage to dive into a scientific subject.

The opportunity to use the wall chart instead of a meter allowed me to meet the planned standard V3, (using evidenced scientific measurement standards), which could still be measured against two different scales on the 'SAM' sheet.

This has also prompted me to change the sheet to have items similar to those that stick to the wall-chart, but this time drawn in the middle of the sheet. Learners can then draw lines to each side of the sheet to estimate where the objects land on the two scales.

All devices will still be above the modified safe levels of the International Guidelines on Non Ionising Radiation. (Environmental Health Trust 2019)

Feedback

I received positive feedback: well laid out objectives, (meeting simple learning goals standard of K1), a clear and confident delivery, passion for the subject, good engagement and encouraging participation. The videos worked well in the presentation.

Measurement could be better, not just the meter problems, but measuring whether the class was working, i.e. whether necessary facts were transferred and retained.

This reflection has led me back to the simplicity of 'SAM', the Specific Anthropomorphic Mannequin, and using visual storytelling with science. This includes finding a way to reference research which can be also incorporated into the sheet.

Although I didn't have time for a formal test, only one person later refused to sign a petition asking for the Precautionary Principle to be upheld in Swansea, which I feel can be seen as successful and also fulfils the professional standard of being assessed by others too (A3).

Additional Learning Needs

Standing up and moving directions is disorientating for me, due to uneven surfaces in my feet and moving around in even quite small spaces causes pain due to not concentrating enough on foot placement. I decided that I wanted to stand up mainly, just to have that "normal" stature. As a result I lost some awareness of my whole physicality, in concentrating on delivery and so did turn my back, as reflected in my feedback. In retrospect this is a conclusion I don't much like, because it means I shouldn't stand, at least until I'm way more familiar with the material, but I will have to work with that.

Analysis

One Sheet Teaching for "anyone anywhere".

Searching for 'one page' teaching theory after the event, revealed an array of examples in the arena of young and or Additional Learning Needs children and/or adults and sometimes used as a revision aid.

The simplified sheet for "anywhere anytime" can, however, use a combination of visual teaching, a story to listen to, and to be able to fill it in, or even colour it in, take it away to use and refer to, use as a resource, and share it.

Although some teachers consider use of cartoons as "low brow" (EduComics Feb 2019), visual imagery is certainly an efficient and universal language for a generalised lesson like this, with science to back it up as a teaching tool, (Oetting 2015).

Seeking to make a page that can be used by just about everyone and work on different levels to impart enough information through kinaesthetic, as well as visual and aural learning, and that can be tested, is a tall order, but then again so is living in a world bathed in micro-wave radiation!

The need for precaution causes depression.

A main take-away was the helpless depression caused by the information which felt like a counter-intuitive way to teach.

Misunderstanding of the Precautionary Principle

My second take-away follows on, that people can easily misunderstand the precautionary principle, viz:

"Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation" (European Commission 2017).

Emergent technology in the context of teaching about frequency emissions.

Further limitations of emergent technology were easy to demonstrate. Had I not valued the kinaesthetic, and varied approach in planning, (UMass 2019) and had the chart and cardboard cut-out phones and devices with the levels of RF radiation in them, I wouldn't have been able to complete the measurement part of the session at all. (The Learning Web). This mistake and recovery enhanced K2 and K3 standards, (using a balance of appropriate teaching methods, including Including visual, aural, and kinaesthetic learning).

Informed Consent and Professional Standards

Low initial levels of knowledge raise an important question. Should learner teachers, so clearly ignorant of the dangers of the RF emissions of much emergent tech, be told, a priori, that they should promote it?

Doesn't such a directive take for granted that effective safety regulations exist? But this lesson is all about the knowledge that *no biological effects* of RF emissions are acknowledged in the ICNIRP standards.

So was the project itself on the wrong side of emergent technology policy or did it represent enhanced appropriate use? (Standards A2 and K4)

All recent legislative instruments, the ALN Act, Wellbeing of Future Generations Act, the UNCRC, Social Care Act, stress the importance of sustainability, i.e operating in a manner that will not prejudice the futures of others.

Understanding the biological effects of RF emissions is therefore a necessity in order to comply with professional standards, of safety and responsibility for not exposing students to any known dangers.

Decisions about whether to protest or take precautionary measures against RF emissions are also “affected by understanding of exposure” (Claassen L, et al 2017).

Standards and Regulatory Context

The convergence of the Donaldson Curriculum reforms and the Well-being of Future Generations Act is useful in this exercise due to the wide age range of possible learners.

Whether or not it conflicts with industry narratives and institutional policy on emergent technology, the teaching fulfils the sustainable development principle and well-being goals as described in the Well-being of Future Generations (Wales) Act 2015.

Section 5 describes the necessity for public bodies to act “*in a manner which seeks to ensure that the needs of the present are met without compromising the ability of future generations to meet their own needs.*”

This must balance short term needs with those of the future, must examine actions in the light of well-being goals, including health, must examine conflicting needs, and consider how deploying resources to prevent or mitigate problems may contribute to meeting well-being objectives.

Conclusions

Micro-teaching is a rich learning experience. Not only was I able to 'try out' a teaching methodology on a very current globally significant subject that people know little about, but I also gained several important research insights and an understanding of how this teaching fulfils mandates in the new teaching framework: Successful Futures learning goals.

The Wellbeing of Future Generations Act also demands and supports the widest possible teaching of biological effects of wireless radiation in order to achieve the wellbeing goals in the Act, the protections of the UNCRC, the Human Rights Act, and the European recommendations.

Mistakes have encouraged me to explore the one sheet methodology further, including the use of images to teach such a broad larger audience.

Being personally motivated by a genuine desire to increase knowledge about biological effects of wireless radiation, all elements of the experience, good or bad, are useful in honing down the teaching objectives, improving the delivery, and finding settings in which to pass the learning on.

That includes the absolute failure to pass on an understanding of the precautionary principle, evident in a participant's comment that "i don't believe there's enough evidence to show it's dangerous."

It was certainly not 'disproof of concept' and I'm inspired to develop it further, encouraged by my tutor's suggestion to deliver the lesson as part of my placement, a very positive idea to create an evolving and increasingly helpful piece of teaching in its own right.

This has been an analysis of the whole exercise from beginning to end in the context of knowledge base, standards, legislative framework, and my own teaching practise.

Action Plan

- Redesign the sheet to reflect and include the basic important information without which someone would be unable to pass this on.
- Equipment check-lists.
- Upload powerpoint, including videos, in a companion online resource, elaborating on all parts of the sheet, so that those who want to teach it can get the sources for the information they will be sharing.
- Divide the teaching into two possible settings, one teaching people *about* the sheet and how to share it. The other is the self-contained micro lesson of the sheet itself, containing much of the same information and involving kinaesthetic learning in spite of being so basic.
- Include links to research and connections near the top. Lead with the numbers of people, towns and cities that are questioning the accepted narrative. (This also matters because if you don't have a positive thing to do people may assuage their distress by being more likely to chose not to believe it as it's just too difficult.)
- Simple visual explanation of the Precautionary Principle in cartoon. A bird looks from the top of an object on a lake. Across the water we can see an adult and a child who wants to swim in the lake. The bird explains that the adult has heard that there may be, or might be a crocodile in the water. Would you let the child swim in the lake before you knew there was no crocodile in there?