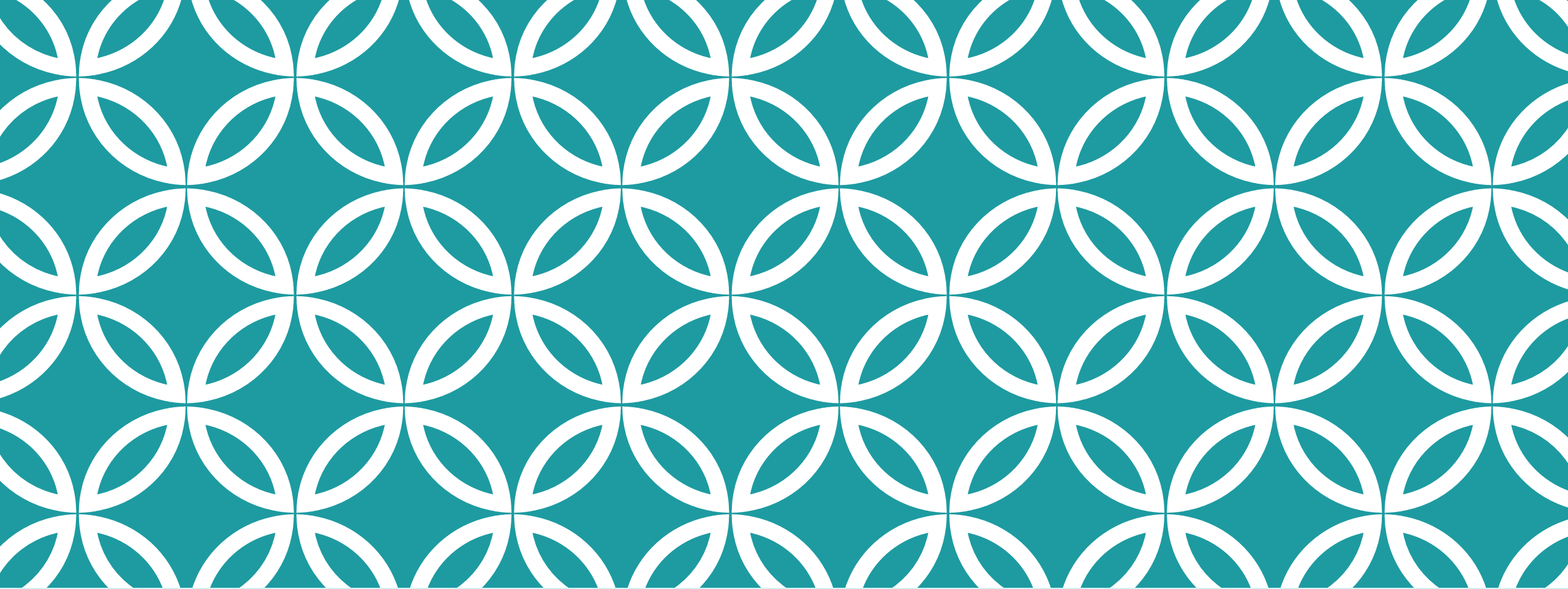


MOBILE TECHNOLOGIES TO SUPPORT DISABLED STUDENTS

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THE INITIAL PROBLEM

Defining technological
evolution

THE NATURE OF TRADITIONAL ASSISTIVE TECHNOLOGY



THE PROBLEMS WITH ASSISTIVE TECHNOLOGY

Existing assistive technology is highly immobile, clunky and restrictive

It is expensive and uneconomic in mainstream classes – it needs to be subsidised

Assistive devices often identify a person as having a special need and can be stigmatising



There is little research on m-learning and its use with assistive / inclusive devices

- those that exist mostly cover all needs

This provides a problem in research, and highlights an area in need of evaluation

THE PROBLEM IS COMING TO AHEAD IN HIGHER EDUCATION — CASE STUDY IN THE UK

The Disabled Students Allowance (DSA) is a government grant for students aged 18 years and over in UK higher education

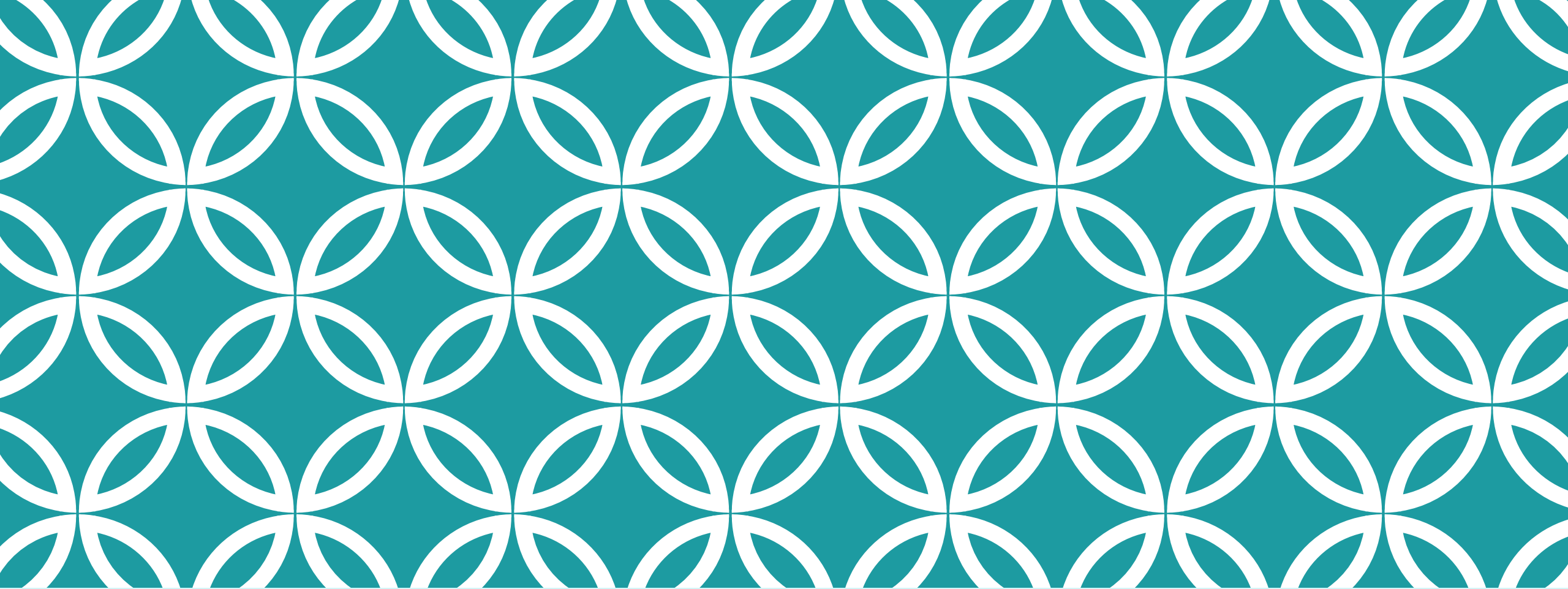
In April 2014, the British Minister for Universities and Science proposed cuts to the DSA

Although a later announcement has suggested that these cuts will be postponed until the academic year 2016-2017, a number of universities are already preparing alternative means to support disabled students in future

DSA CATEGORIES

The DSA was designed only to provide non-medical support (Stevens, 2013):

- **Specialist equipment allowance.**
- **Nonmedical helper's allowance.**
 - Examples included sign language interpreters and note takers.
- Travel costs.
- **General and other expenditure allowance**
 - Examples included photocopying notes and enlargement of materials.



THE TECHNICAL SOLUTION

Technology as a tool of
inclusion

TECHNOLOGY AS FACILITATOR

A move away from the traditional notion of teaching technologies in different settings

A move away from technology merely assisting people with

The notion that technology is not just a tool of inclusion

- Technology can be used to drive inclusion

The notion that inclusion can be driven by technology

WHAT IS TECHNOLOGICAL INCLUSION?

The notion that students should not have a separate form of technology

The philosophy that disabled technology users have social and cultural equality with mainstream users

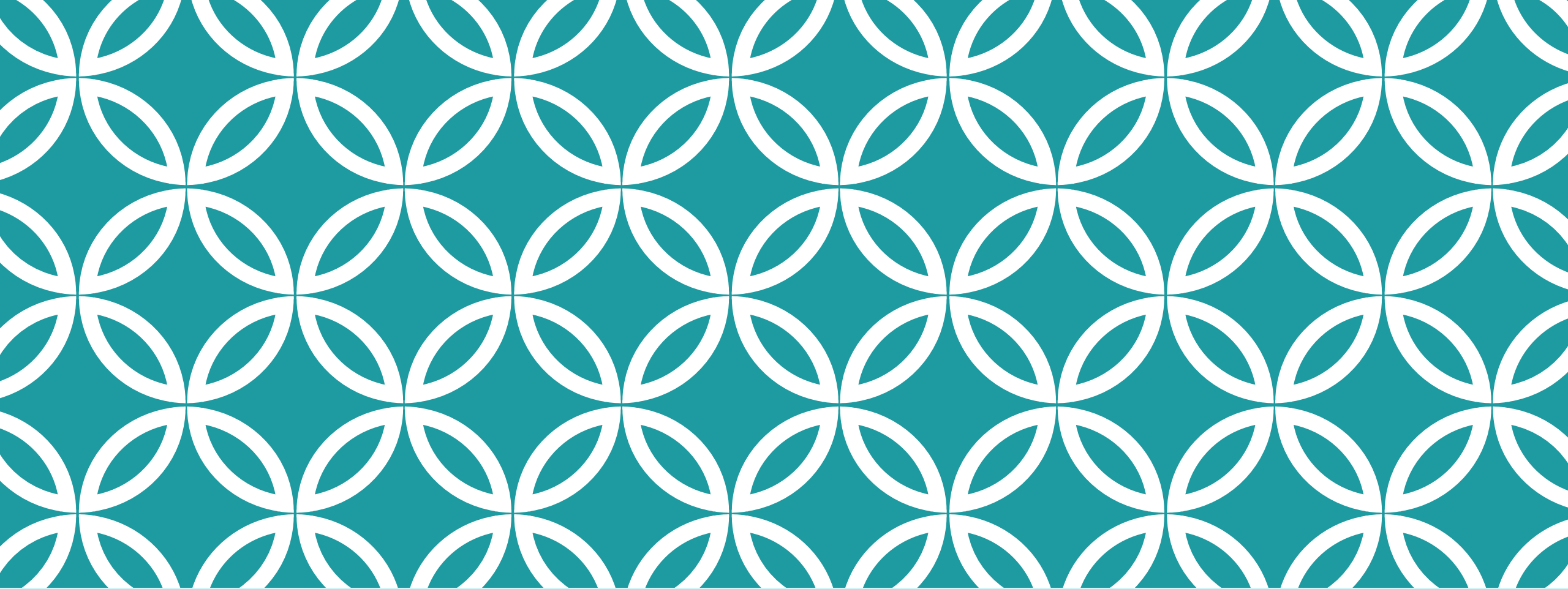
That disability should not signify inferiority, particularly of intelligence – the deficit model

That disabled people have valuable human capital that can be valuable in economic settings

Technology is a powerful tool of social inclusion

WHAT IS INCLUSIVE TECHNOLOGY?

“Inclusive technology is defined as a mainstream technology that can be used with either no or minimal adaption by a person with a disability as an accessible technology. It is also seen as technology that provides social inclusion, such as communication and interaction, for people with disabilities”
(Hayhoe, 2013)



INCLUSIVE TECHNICAL CAPITAL

The development of the
model

BOURDIEU & CAPITALS

Bourdieu (2010) argues distinction in life chances through capitals, e.g.

- Financial capital
- Social capital
- Cultural capital

Habitus is the process of developing non-financial capital:

- principles which generate and organise practices.

TECHNICAL CAPITAL MODEL

Yardi's technical capital is related to cultural capital

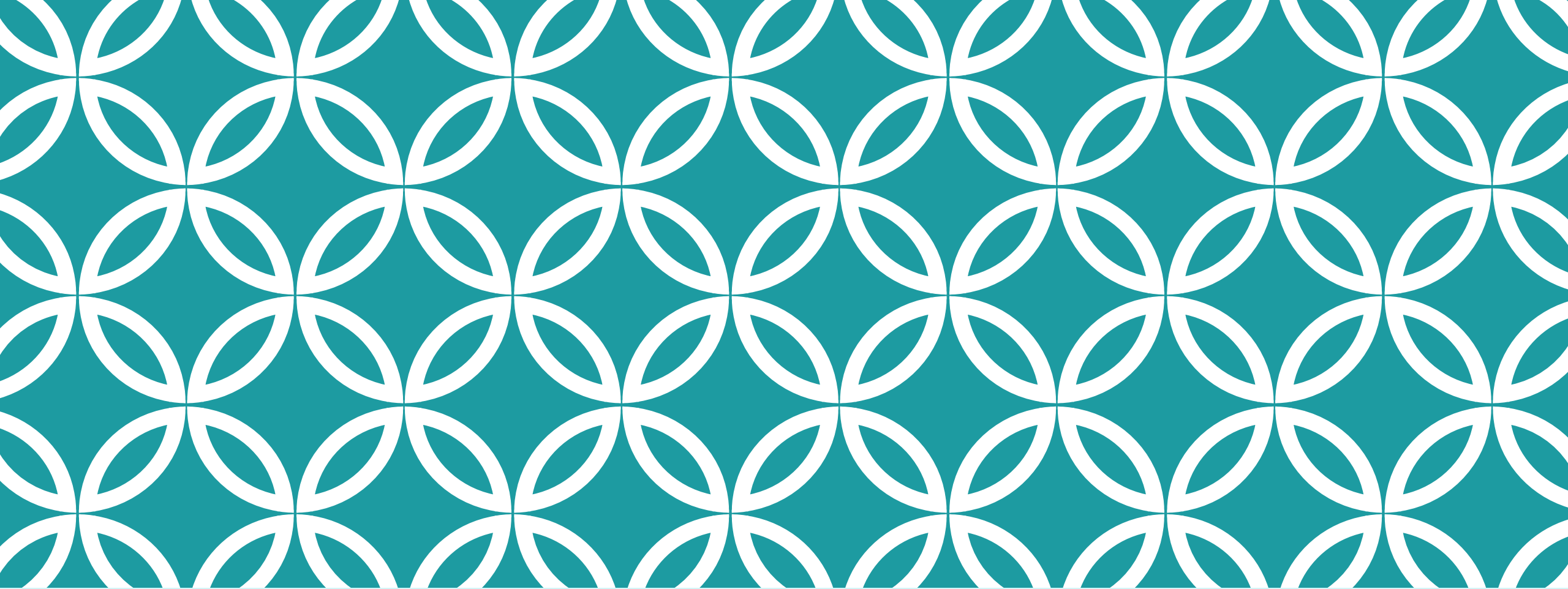
“[Technical capital is] the availability of technical resources in a network, and the mobilization of these resources in ways that can positively impact access to information and upward mobility.” (Yardi, 2010)

i.e. Technologies and the knowledge of the use of technologies

INCLUSIVE TECHNICAL CAPITAL (ITC) MODEL

“Inclusive technical capital can be defined as practice which uses inclusive mainstream technologies to promote inclusion in further forms of social, cultural and financial capitals, through enabled habitus in education and training...

It can thus be argued that inclusive technical capital appears to be more applicable to students' use of new forms of mainstream settings and apps that have been embedded in modern tablet devices and therefore, either purposely or accidentally, lend themselves to redefinition as inclusive technologies.” (Hayhoe, 2015a)



LONDON SCHOOL OF ECONOMICS MODEL ON INCLUSIVE TECHNOLOGY

Android and iOS mobile
operating system models

SUMMARY OF FINDINGS OF THE EVALUATION OF APPLE IOS AND ANDROID (HAYHOE, 2015B)

Provided a Learning Technology Innovation (LTI) grant

- examine mobile technologies as a tool of technological inclusion

Both systems have relatively similar inclusive accessible settings

Have similar potential for enhancement rather than transformation of tasks

Some settings and functions that make each operating system less useable as tools of technological inclusion

THE LONDON SCHOOL OF ECONOMICS MODEL

Developing inclusive technical capital through

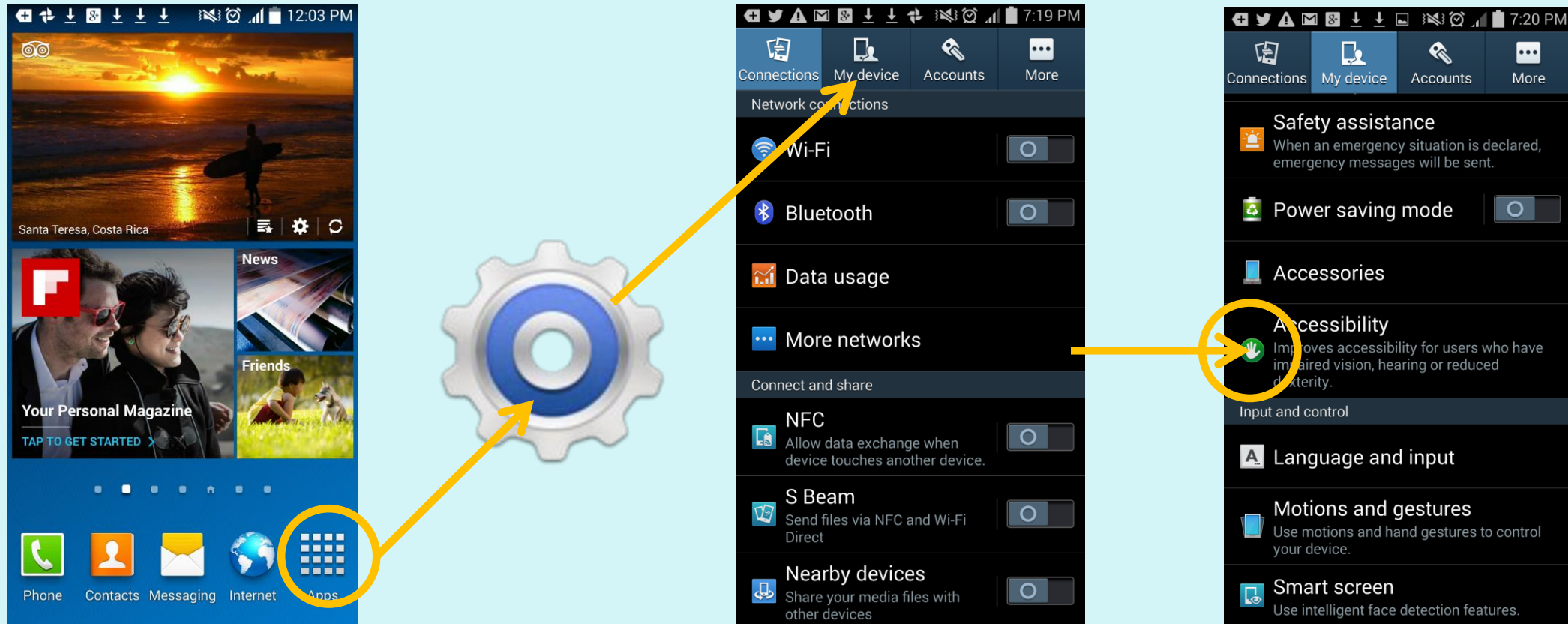
- Utilising mobile apps and settings – designed around categories of perceptual and cognitive inclusion

Developing study skills with various apps:

- Basic inclusive settings
- Note taking
- Recording and searching for information – audio and visual
- Mind mapping

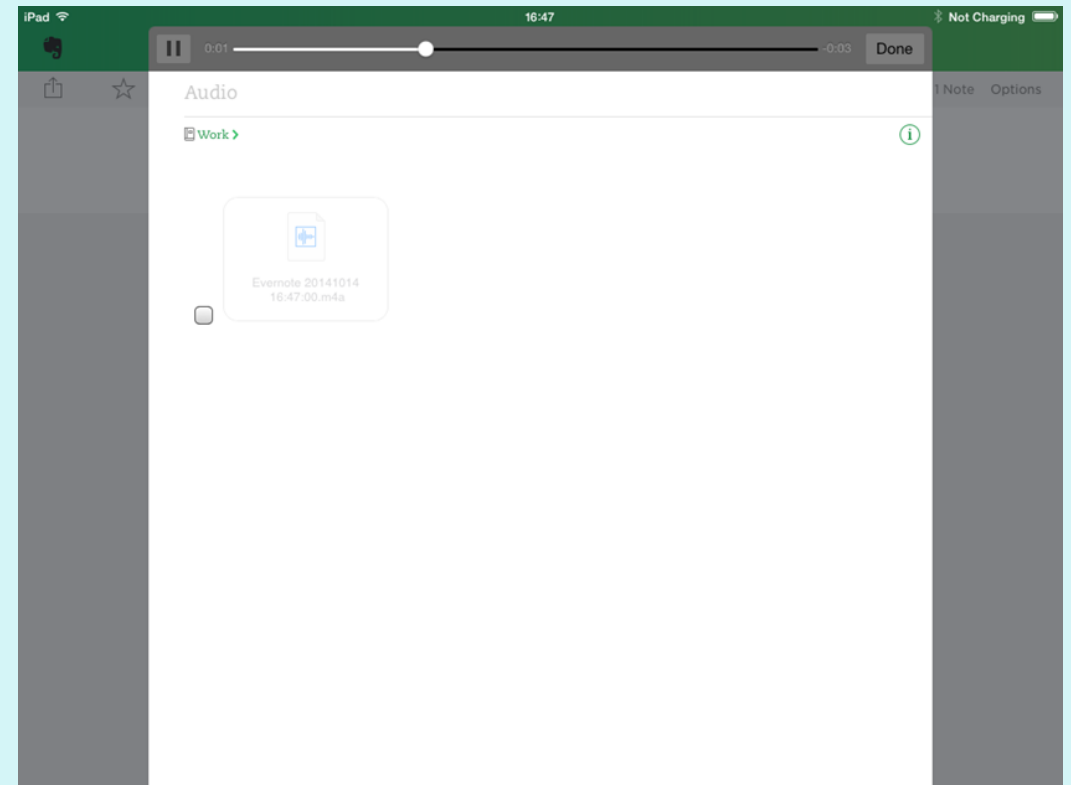
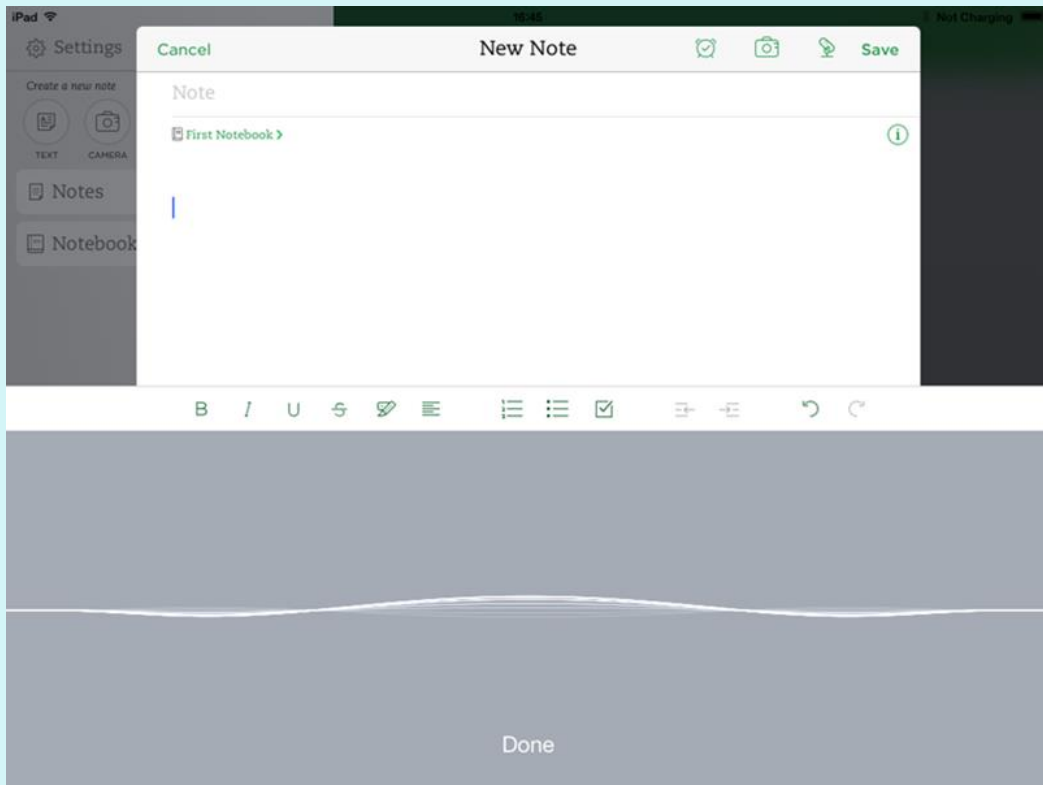
Developed through tutorials

ANDROID'S ACCESSIBILITY SETTINGS



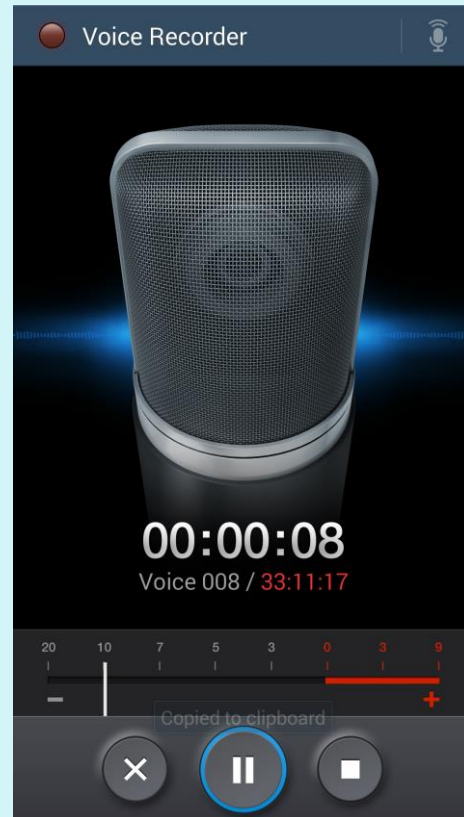
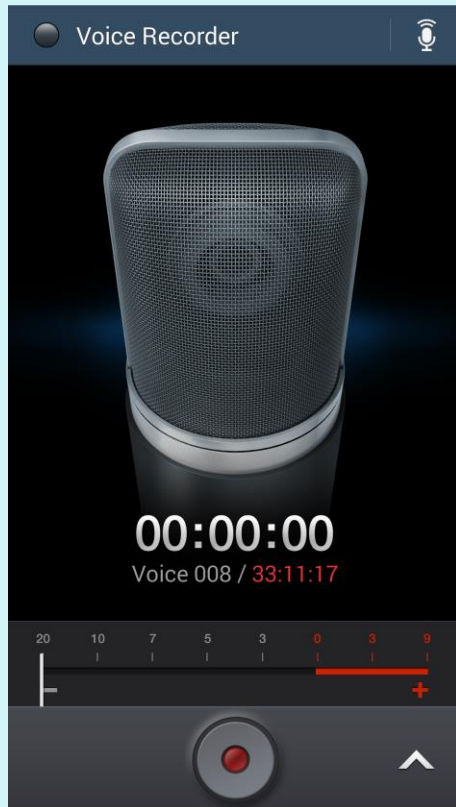
The images above describe how to access the settings in Android – example a Galaxy S4. Go to the settings icon and choose “My device”. From here scroll down to accessibility. This is shown in the diagram above.

EVERNOTE CREATING NOTES



Record the memo with the sound wave showing the recording level → Play back to sound file to check sound levels

ANDROID'S SIMPLE VOICE RECORDINGS



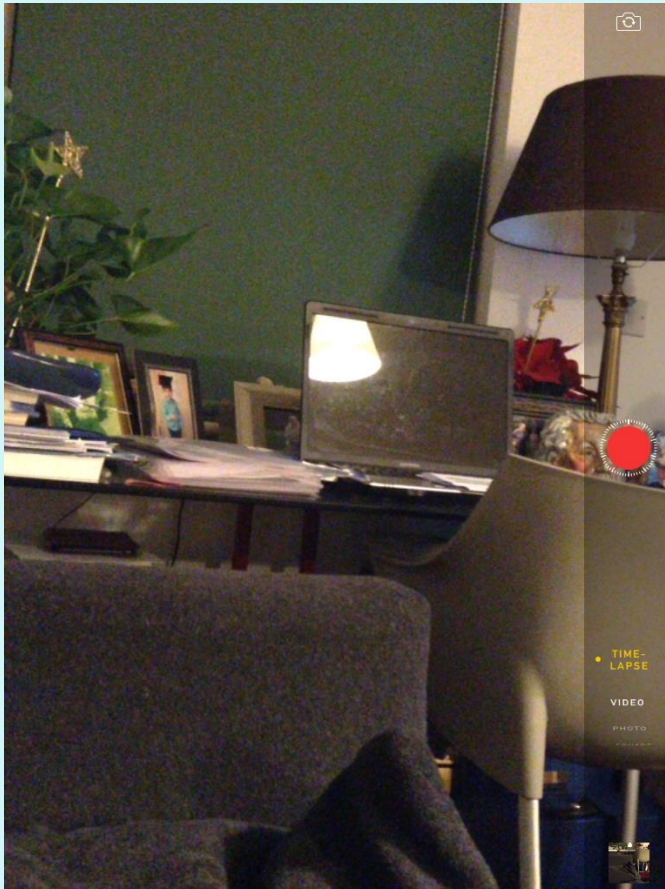
Simply press the red recording button to start and stop

The files are saved as MP3/4 files

Voice recordings can also be monitored for the level of volume and voice clarity through the visual display

Parts of the lecture can be paused

IOS' CAMERA, TIME LAPSE



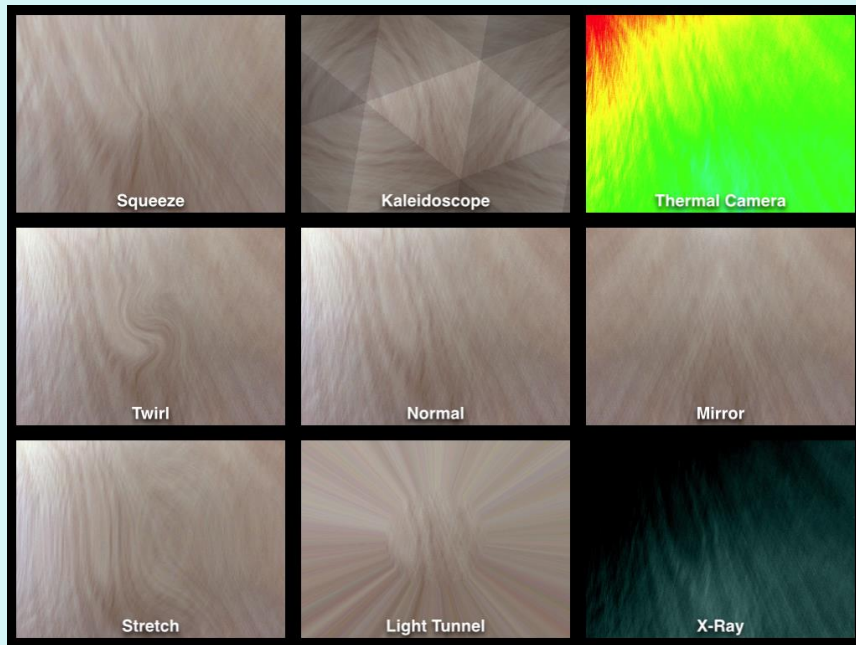
Another alternative is to have time lapse photography of the whiteboard

- This helps form an understanding of the development of notes

This can be set on the iPad's / iPhone's camera

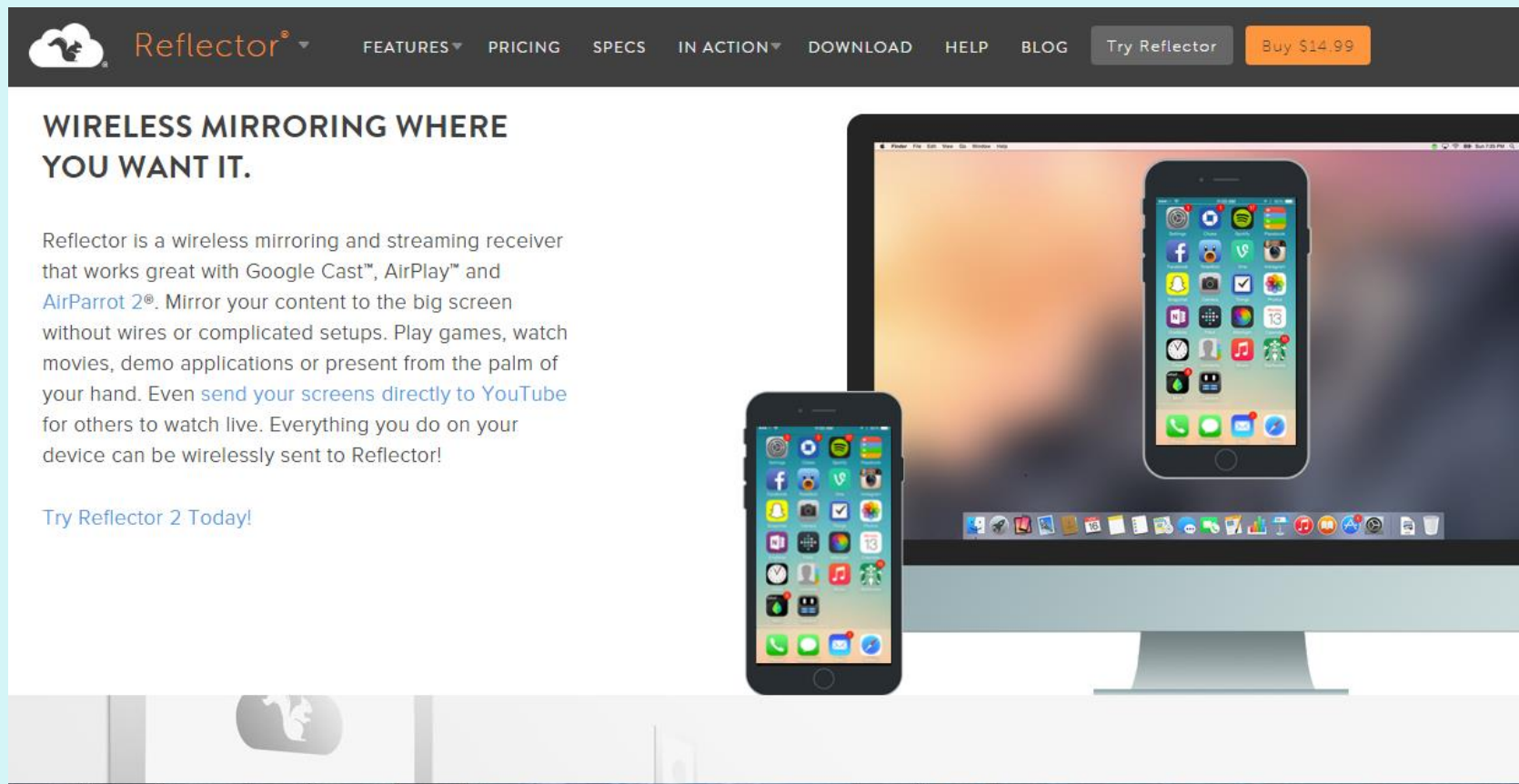
NB This will not record sound, and is therefore not the same as videoing

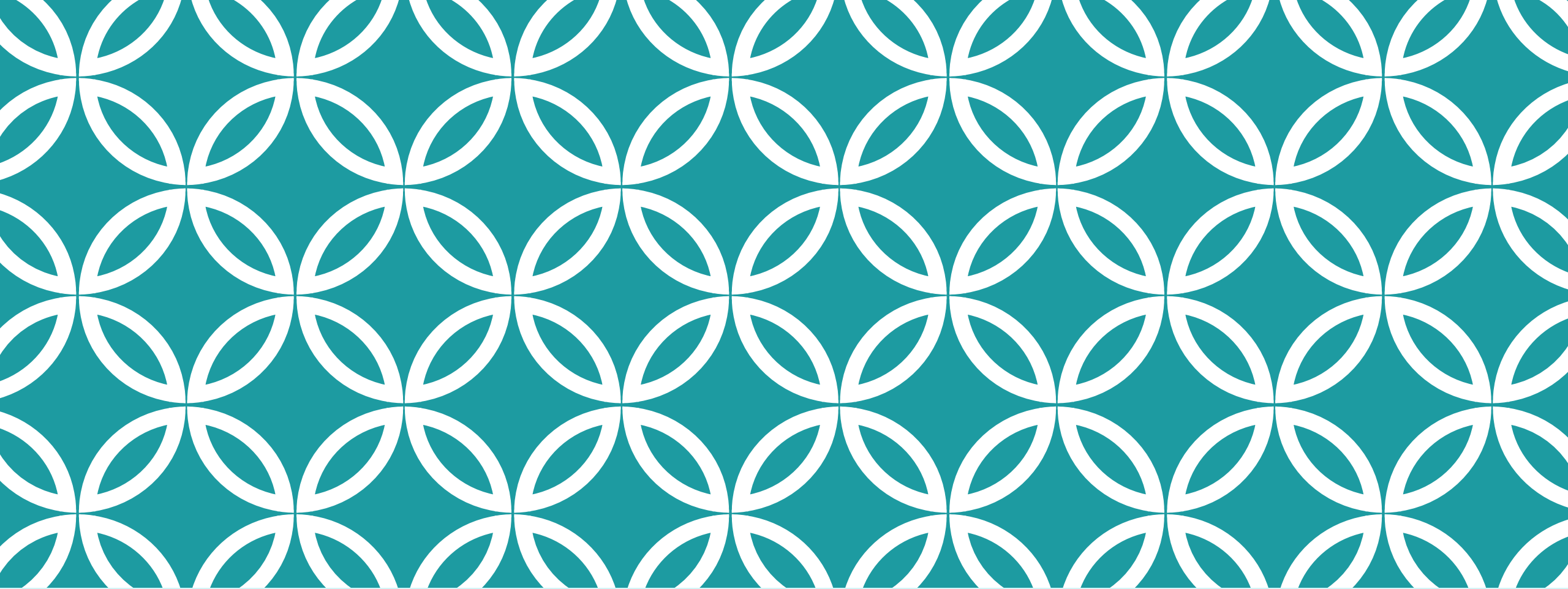
IOS' PHOTO BOOTH



On Apple devices, the app Photo Booth can also be used to invert the colours on a page, making text easier to read. The graphic on the left illustrates the x-ray option on the bottom right in Photo Booth, and the illustration on the right shows a paper page which has had its text inverted. Graphics, however, are distorted when inverted.

POSSIBLE FUTURE EXTENSION — SCREEN REFLECTING





CONCLUSION

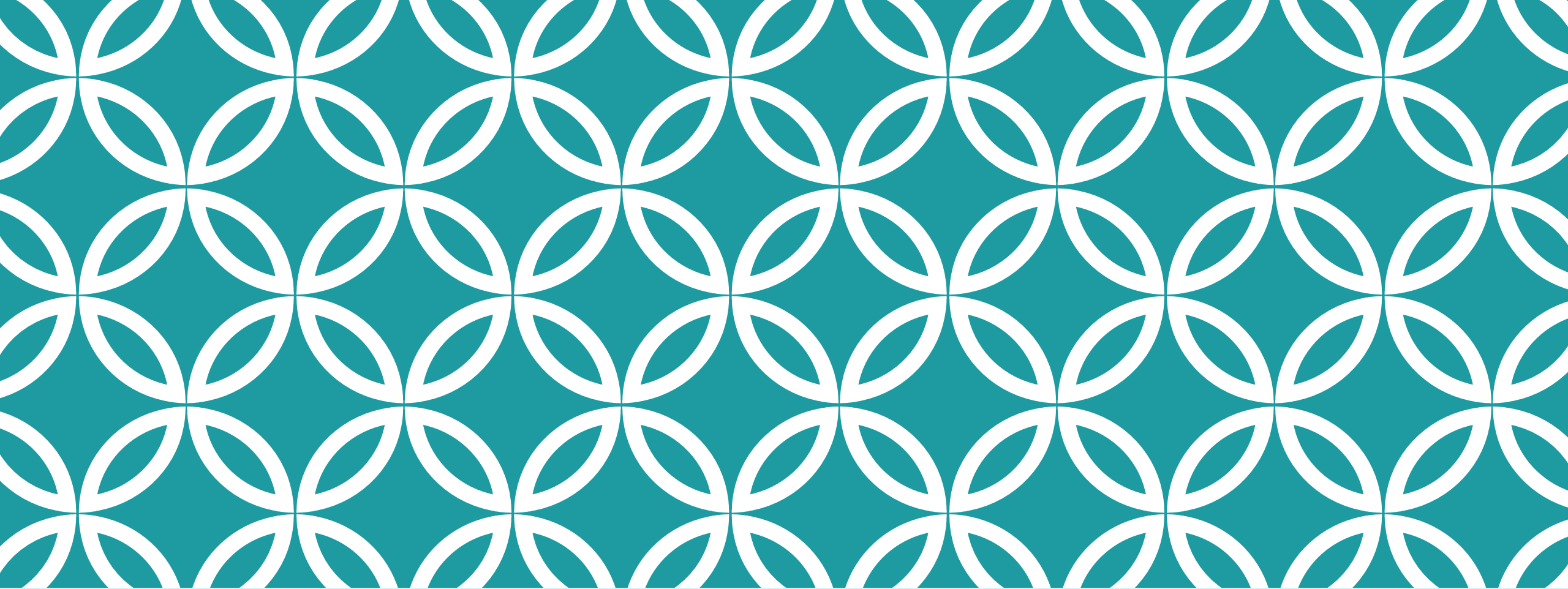
Overall findings and possible
future directions

CONCLUSION

Android and iOS have similar inclusive accessible settings

Some settings and functions that make each operating system less useable as tools of technological inclusion

Disabled students, teachers and those that support students with disabilities must evaluate systems according to their own impairments and educational needs



REFERENCES

And further reading

Bourdieu, P. (2010). *Distinction*. London: Routledge Classics.

Hayhoe, S. (2015a). Utilising mobile technologies for students with disabilities. In A. Robertson & R. JonesParry (Eds.), *Commonwealth education partnerships—2015* (Vol. 16). Cambridge: Commonwealth Secretariat & Nexus Strategic Partnerships.

Hayhoe, S. (2015b). A pedagogical evaluation of accessible settings in Google's Android and Apple's iOS mobile operating systems and native apps using the SAMR model of educational technology and an educational model of technical capital. In *Proceedings of INTED2015 9th International Technology, Education and Development conference, March 2015*. Valencia: IATED.

Stevens, T. (2013). Applying for Disabled Students' Allowances (DSAs): Disability rights U factsheet F1. Retrieved from <http://www.disabilityrightsuk.org/print/241>


Yardi, S. (2010). A Theory of technical capital. Paper delivered to the TMSP Workshop, Georgia Institute of Technology, Georgia, US, February 11-12, 2010. Retrieved from <http://tmsp.umd.edu/position%20papers/Yardi-SocialMediatingTech.pdf>

FURTHER READING

Hayhoe, S., Roger, K., Eldritch-Boersen, S & Kelland, L. (2015). Developing inclusive technical capital beyond the Disabled Students' Allowance in England. *Social Inclusion*, 3(6), 29-41.

Hayhoe, S. (2014). A philosophy of inclusive technology for people with special needs, and its application in a course using mobile computing devices for undergraduates at the London School of Economics, UK. *Proceedings of EDULEARN14: Education and New Learning Technologies*. Valencia, Spain: IATED.

Hayhoe, S. (2014). The need for inclusive accessible technologies for students with disabilities and learning difficulties, In L. Burke (Ed.). *Research, Reflections & Arguments on Teaching & Learning in a Digital Age*. Melton, Suffolk: John Catt Educational Publishing.



Hayhoe, S. (2013). A review of the literature on the use of mobile tablet computing as inclusive devices for students with disabilities. Proceedings of the Current Trends in Information Technology 2013 Conference. New Jersey: IEEE.

Hayhoe, S. (2012). Using an iPad with a blind student: A case study at Sharjah Women's College, In Dowling S. et. al. (Eds.). eLearning in action (Volume 1.): Opening up learning. Abu Dhabi: HCT Press.