In Silico: Design, use and meaning of an educational app

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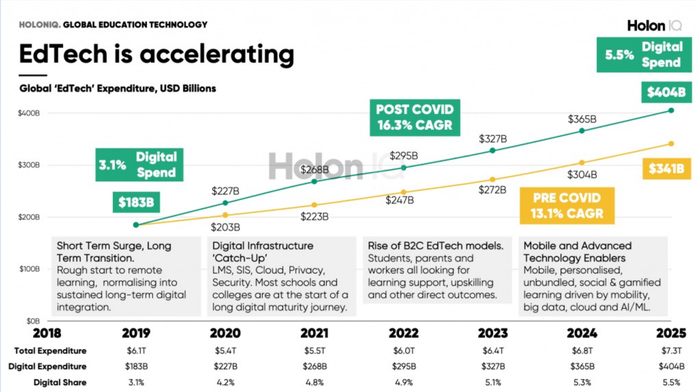
1. Societal issue addressed

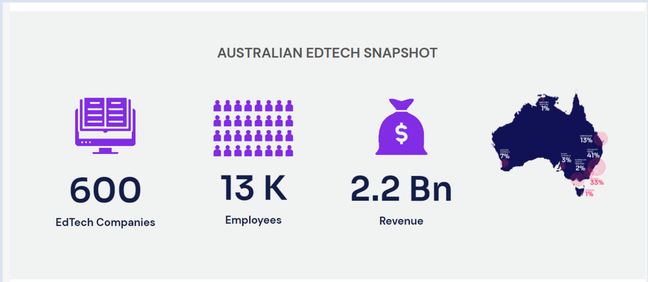
Educational technology (EdTech) is now worth over 2.2 billion AUD in Australia alone (EduGrowth, 2022). EdTech spending is predicted to reach 404 billion USD by 2025, accelerated by the COVID-19 pandemic (HolonIQ, 2021).

Cuban (2001) critiqued EdTech as *Oversold and Underused*, positioning schools as a means to benefit the economy and the individual, rather than a conception of public good and democracy.

20 years later, teachers remain stressed, anxious, and burnt out due to EdTech (Fernández-Batanero et al, 2021); while students are frustrated by a lack of transparency and utility in EdTech (Cheong & Nyaupane, 2022)

This asks the question: what do schools actually want from EdTech?

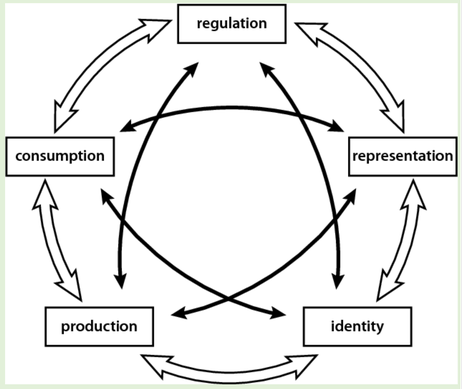




2. Research questions and theoretical framework

Three core sociological perspectives inform my research:

1. Du Gay et al's (1997) circuit of culture. This suggests shared understandings of cultural artefacts constantly shifts.
2. Latour's (2005) Actor-Network Theory. This suggests 'the social' is formed by technologies, as well as by people.
3. Goffman's (1956) presentation of self. This suggests people play roles based on a shared, expected social order. This social order will inevitably become disrupted.



This presents a central research problem:

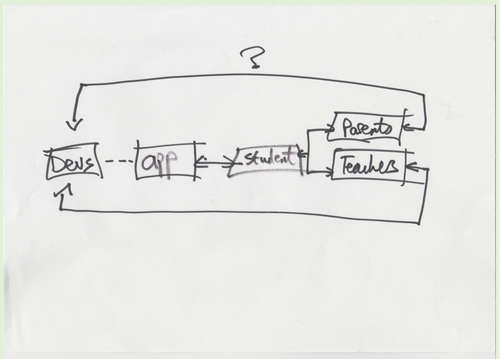
How do different people understand the same EdTech and how is this informed by their position in the app's lifecycle?

This led to three primary research questions:

i. How does each actor within the circuit of the app interpret and use the apps in my study?

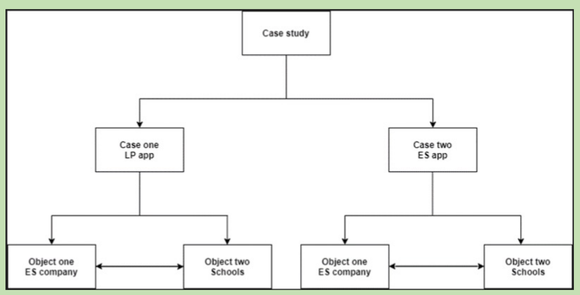
ii. How do the apps in my study shape and get shaped by the everyday routines and habits of schooling?

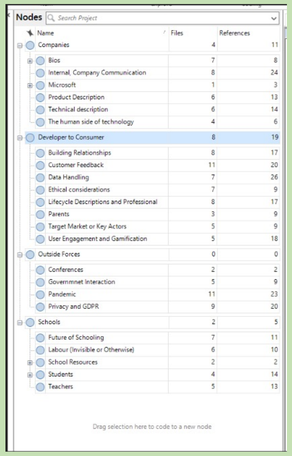
iii. What role do the apps in my study play in how schooling is administered and how learning is understood?

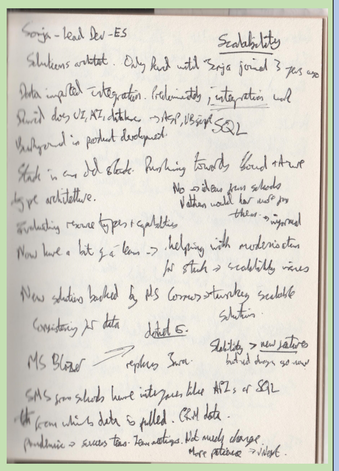


3. Methodology

- Qualitative case study – draws on audience studies (Livingstone, 2013; Das, 2017) and ethnographic methods (Geertz, 2008; Pink, 2016).
- Two cases: Learning app; Comms app.
- Interview and focus group data.
- In-situ notes; typed up; coded in Nvivo
- Larvatus prodeo (Barthes, 2010) ensures I am visible within the research and creating an audit trail.







Bibliography

Barthes, R. (2010). *Mourning diary*. Hill and Wang, NY.

Cheong, P. H., & Nyaupane, P. (2022). Smart campus communication, Internet of Things, and data governance: Understanding student tensions and imaginaries. *Big Data & Society*, *9* (1).

Cuban, L. (2001). *Oversold and Underused*. Harvard University Press, Cambridge, MA.

Das, R. (2017). Audiences: A decade of transformations--reflections from the CEDAR network on emerging directions in audience analysis. *Media, Culture & Society*, *39* (8), 1257-1267.

Du Gay, P., Hall, S., Janes, L., Madsen, A. K., Mackay, H., & Negus, K. (1997). *Doing cultural studies: The story of the Sony Walkman*. Sage, London.

Edugrowth. (2022). *Australian EdTech* . Available from: https://edugrowth.org.au/australian-edtech (Accessed 30/08/2022).

Fernández-Batanero, J. M., Román-Graván, P., Reyes-Rebollo, M. M., & Montenegro-Rueda, M. (2021). Impact of educational technology on teacher stress and anxiety: A literature review. International *Journal of Environmental Research and Public Health*, *18* (2), 548.

Geertz, C. (2008). *Thick description: Toward an interpretive theory of culture (pp. 41-51)*. Routledge, London.

Goffman, E. (1956). *The Presentation of Self in Everyday Life*. Garden City, NY.

HoloniQ. (2021). *Sizing the Global EdTech Market. Mode vs Model* . Available from: https://www.holoniq.com/notes/sizing-the-global-edtech-market (Accessed 30/08/2022)

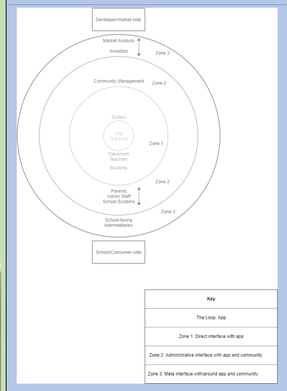
Latour, B. (2005). *Reassembling the Social: An Introduction to Actor-Network Theory*. Oxford University Press, Oxford.

Livingstone, S. (2013). The participation paradigm in audience research. *The communication review*, *16* (1-2), 21-30.

Pink, S. (2016). Digital ethnography. *Innovative methods in media and communication research*, 161-165.

4. Expected (and unexpected) results

Ideal Results



Model 1: Concentric Zone Map of actors.

Aim: chart how actors relate and how these positions can change. Combines circuit of culture and ANT.

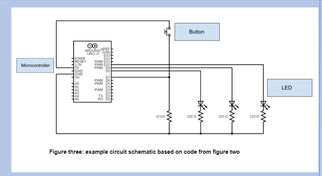


Figure three: example circuit schematic based on code from figure two

```
int switchState = 0;
void setup() {
  pinMode(8, OUTPUT); // green LED
  pinMode(9, OUTPUT); // red LED
  pinMode(10,OUTPUT); // yellow LED
  pinMode(7, INPUT); // switch
}

void loop() {
  switchState = digitalRead(7);
  if(switchState==LOW) {  //the button is not pressed
    digitalWrite(8, HIGH); //green LED
    digitalWrite(9, LOW); // red LED
    digitalWrite(10, LOW); // yellow LED
  }
  else {  //the button is pressed
    digitalWrite(8, LOW); // green LED
    digitalWrite(9, LOW); // red LED
    digitalWrite(10, HIGH); // yellow LED

    delay(1000); // wait for one second, toggle LEDs
    digitalWrite(8, HIGH); // red LED
    digitalWrite(10, LOW); // yellow LED
    delay(1000); // wait for one second, return to beginning of loop
  }
}
```

Figure two: example microcontroller code (grey text explains the preceding line)

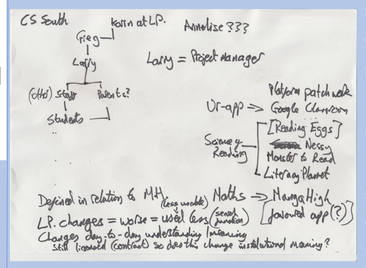
Model 2: Circuit diagram of actors (built on Arduino board).

Aim: highlight the interconnected nature of all human actors in ensuring EdTech functions and is understood. Centres the human *around* the mechanical

Intended outcome:

Highlight areas of disconnect between actors. Work with participants to chart new, shared vocabulary. Lead to more effective app use.

Actual Results



Outcome: multiple, simultaneous and conflicting circuits. A 'messy' reality of schooling and app development.

Interpersonal connection remains at the core of app use and utility

Primary themes/core examples:

Understandings of data practices:
Learning app developers:
CEO: 'We don't share data';
Community manager: 'we send data as Excel sheets in emails'

Learning app primary school:
Principal: 'Our school is now data and evidence driven'
Teacher: 'I went back to using paper sheets as it was easier'

Views on app use:
'Positive' views, comms app –
Community manager: 'people's issue with like Big Data is not the data itself. It's who has access to it'
Admin for middle school: 'it's now like, 'okay, you know, Big Brother is watching. But in my body'

Negative views, learning app primary school –
Teacher: 'everything else is missing. I can't access anything… Can you see what I've got? I don't have access to anything' from teachers.

Student: 'If you are not learning, you are not going to know what words mean, or what the teacher is trying to explain… and you won't get into university