The value of emerging technologies for investigating academic practice

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The purpose of this paper is to highlight developments in digital technologies that offer access to new types of data.
The idea: that developments in digital technologies could offer access to new types of data.

The possibility of seeing something new
Do we need something new?

Data collection methods in higher education research are predominantly centred on surveys and interviews. As a result, much of our current knowledge of higher education behaviour/practice is built on perception-based data.

- 1-1 Interview: 17
- Survey: 14
- Focus Group: 7
- Reflective Writing: 5
- Grade: 2
- Video: 1
- Photograph: 1
The Problem

These methods measure perceptions not behaviour

In terms of contributing to studies focused on practice or behaviour – they offer a post-event recollection

…. What is recalled or perceived to have occurred rather than what actually occurred.
Solution - Reality Mining

To understand behaviour or practice requires approaches that can harvest naturally occurring behavioural data – ‘mining reality’.

Reality Mining is a method that employs ‘sensor-based’ systems to capture continuous naturally occurring data feeds/streams – language and/or behaviour as it occurs.
Example-1

Academic Practice: The Office

Focus: Capture & Data Analysis
The idea of seeing something new

One of the core claims is that these new methods allow us to explore patterns of behaviour over long periods of time.

In the past this has been impossible:

1. No instrument to capture naturally occurring behavioural data over extended periods.

2. Lack of analytical tools to analyse the volumes of data that would result from extended periods of data capture.
Ceiling cameras – HD motivation detection

Automated intelligent systems requiring no human interaction. Data is fed continuously to a data warehouse.
Capturing Software

Automated – email/text notification of any issues
Capture – the ‘Big Data’ issues

Five cameras operating over 6 months generated

- 5000 hours of footage

- 15TB of data (five days to copy/move)

This would take 19 months to view through once.

Solution: ‘new’ developments in data analysis.
The ‘New’ - Analysis Software
Complicated Process

AGENT Vi-Search Server
Dell PowerEdge 12G R320 rack server

Milestone X-Protect

Data transfer via Internal Ethernet Network

Cameras
AXIS P3354 6mm PoE | 12fps

Video Streams

Feature Streams

Queries

Surface Analysis

Data transfer via Internal Ethernet Network

Client PC
Dell Precision M4700

Milestone Smart Client

File Conversion

Depp Analysis

Observer XT
The benefits once in place?

- The duration the academic is in the office
- The number of times the academic enters/exits
- The number and duration of visitors
- The number | duration in zones
- Any changes to the office – objects
- Traces of movement over time periods
- Heatmaps (duration) across zones
Example-2

Mapping Stressors in Doctoral Students

Map stress patterns over extended period + Map associated stressors

Focus: Data Capture x3 streams
Stream-1: Stress Measure

Wristband Sensors

- Photoplethysmography (PPG)
  - Continuous Heart Rate (supporting Heart Rate Variability analysis for stress and relaxation)
- 3-axis Accelerometer
  - Movement data to support Activity classification
- Electrodermal Activity (EDA)
  - Skin conductance (i.e., Galvanic Skin Response, sympathetic activation, autonomic arousal, Excitement)
- Infrared thermopile
  - Peripheral skin temperature
Results generated through live feeds
Stream-2: Behaviour | Computer Activity
Computer use logged at 5min intervals
Stream-3: Location

09 am
10 am
11 am
12 pm
01 pm
02 pm
03 pm
04 pm
05 pm
06 pm
07 pm
08 pm
09 pm
10 pm
11 am
12 pm
THANK YOU