

Abstract

Learning and teaching need to adapt more quickly, and perhaps more radically, to accommodate new and diverse sets of learners (Tate & Klein-Collins 2013, Cavanagh, 2013) making best use of any and all technology suited to the purpose of learning and teaching. By beginning to effectively utilise that which the digital information world now affords them, the needs of each individual student can be met with more flexibility (Boys & Ford, 2008), and perhaps the role of universities as custodians and disseminators of society's shared knowledge can be enhanced and even reinvented for a modern digital age (Lynch 2008, Katz & Gandel, 2008).

The Advent of new technologies has had enormous implications for higher education, with "...an extraordinary impact on teaching and learning, institutional management, administration ... (and) ...library services, research production and dissemination; and student life..." meanwhile "the actual effects of these technologies" have not always measured up to their sweeping expectations (Guri-Rosenblat 2009 in Altbach et al, 2009).

By researching predominant themes appearing in current literature and carrying out a pilot study of primary stakeholders from a variety of academic roles involved directly and indirectly in learning and teaching, this paper seeks to shed light on what those expectations and perceptions might be. Focusing particularly on 'technology enhanced learning' but also related technology practices, it will seek to establish what may most influence the adoption of technology into university life.

Attempting to categorise key themes into a 'Problems and Benefits Hierarchy', conclusions propose new ways of providing effective e-technology training support, noting the most positive and negative forces highlighted in the study, and how to move forward with that knowledge. Focus might then be brought to bear more effectively to begin the 'paradigm shift' transformation helping to create learning and teaching fit for purpose for the 21st century (Hämäläinen & Häkkinen, 2012).

Aims, Focus and Methods

Aims and Focus

The aim of the research was to ascertain influencing factors on uptake of technology in learning and teaching, and which (*driving and restraining forces*) might be at work on an individual employee in academia. These factors would then be compared with common influencing factors identified from the literature. A Problems and Benefits Hierarchy was proposed, using five rankings of 'variables': real, imagined, intermittent, persistent, legacy.

Primary stakeholder research would contribute to the Problems and Benefits hierarchy via three distinct stakeholder groups. The possibility that a variety of academic roles may exert influence was acknowledged, so respondent roles for Research Group 1 (RG1) were not limited to teaching staff, but also included support, research and administration staff who may also have influence, albeit indirectly. A small sample of staff (staff n=8) were sourced and took part. More input from a second Research Group (RG2) with other academics was also gathered using informal techniques (staff n=<20) via LinkedIn & Research Gate.

A small group of mainly undergraduate students (students n=8), from a variety of disciplines formed the third Research Group (RG3), and was used to measure key student expectations of technology utilisation in teaching and study scenarios. This was to provide some counter landscape to that which the staff would provide. Amount of input varied between each student, and students came and went in the participation, as the group was informal with no pressure to take part or not.

Focus for the literature review would be on journals and significant texts concerned with aspects of online technology use(s) in learning and teaching, but not limited only to practice in teaching scenarios.

Method

Literature Review Analysis

A decision was made to use a core selection of significant books and relevant academic papers for the literature review. Around 10 books and reports were used, plus a selection of up to 15 current papers and articles. Books, journal articles and research papers were selected in part on the basis of their currency, and nothing is used that is older than 2007 (except Hayes, 2000, on usability) by reason of the exponential growth in use of technology since then. In 2007 the world internet population was less than half what it is today, and is set to double every 5.32 years (Guo-Qing et al, 2008), and Smartphone penetration has topped 1 billion users since the advent of the iPhone in 2007, and is set to double by 2015 (Strategy Analytics, 2012).

All texts were also chosen on the basis of their focus on Web 2.0 or semantic technology, social media or other online applications. Other learning technologies such as interactive whiteboards, Second Life or uses of Learning Management Systems were not included as being deemed to be more generally thought of as Web 1.0 or 'older' technology, as "the content-centric course design approach and the standard LMS are no longer meeting the student's preferences and needs..." (Kusen & Hoic-Bozic, 2014, p 181) and are "closed-platform Web 1.0 type technologies conducive to teacher-driven pedagogical approaches and not [...] the networked and collective learning possibilities of Web 2.0" (Brown, 2011).

To begin the work of recognising and measuring popular themes and factors commonly discussed in the literature, each was noted and allocated either a problem or a benefit label, summarised by the perception of the general context and tone of the theme in the literature.

Research Groups and Methods

A variety of methods were utilised to obtain primary data. These included use of multiple online questionnaires, an informal social media Facebook ('secret', i.e. closed) group for the student research, and discussions

initiated by this research using an academic LinkedIn group or a small group in ResearchGate, both with participants who were self-selecting, i.e. taking part of their own volition, out of interest in the topic.

Stakeholder research was carried out concurrently with the writing of the review, with iterative development of questions, in part formulated with some reference to what was being established from the literature.

Research Group1: Staff*

8 members of academic staff, a sample of academics known to the researcher (though some not personally) taken from a variety of job roles, including lecturing, administration, senior management, libraries, research, student affairs, academic development and e-learning support. International universities are included: UK, USA, Australia & Canada (1 person) and China.

Research Group2: Staff*

a) Participants from the LinkedIn discussion group '*Higher Education Teaching and Learning*' who responded to questions posed for this research and took part of their own volition.

> See this link for the [LinkedIn Discussion](#)

b) Participants from the ResearchGate social network, and who responded to questions posed for this research and took part of their own volition.

> See this link for the [Research Gate Discussion](#)

Research Group 3: Students*

8 students, 7 undergraduate, 1 postgraduate, from a sample of students known to the researcher, from a possible group of around 50, with a wide variety of subject disciplines: social sciences, computer science, politics, life sciences. Multinational (many with English as second language), including Italian, Bulgarian, Polish, Bangladeshi, English.

****Further details of all groups are available to evidence that real people took part. These are recorded in the [Participants](#) page in the Appendices. This page is password protected for privacy purposes. Please contact me for further information.***

Questionnaires

For Research Group 1 (staff), a technique of using multiple short questionnaires with quick-fire questions based on a theme was used. This allowed for groups of answers to generate analytics and metrics separately, and also to focus the mind of the respondent clearly. It also is a successful way of not requiring a lot of time from the respondent, they know it won't take more than a few minutes each time they complete a set of questions. Questionnaires were based in part on iterative theme development from literature and previous questionnaire responses as well as themes discussed with the student group (RG3).

Six sets of questions were developed, all following themes to do with use of technology from the point of view of a single user. This was referred to as developing the 'Technology Profiles' of the individuals taking part. (Please refer to [Technology Profiles Questions](#).)

Questionnaires were delivered to respondents in groups of 2, that is, Sets 1 and 2, Sets 3 and 4, Sets 5 and 6. This avoids respondent 'fatigue', a syndrome which can adversely affect more detailed or prolonged questioning of participants in many circumstances.

Social Media

Social media was chosen as a suitable medium to garner informal feedback from the student group, (RG3), and

also to obtain first hand responses from staff unknown to the researcher, in an immediate and useful way (RG2). Overall it proved extremely successful, especially the **LinkedIn** group. Though the disadvantage of this was that participants were self selecting, and so do not represent any sample (even a random one), it proved that not only 'fans' of Technology Enhanced Learning took part, indeed, several respondents were sceptical about technology and any benefits they could see deriving from it.

A **Facebook** 'secret' (Facebook terminology for a private, unseen to the public group) group was used to discuss all sorts of aspects of the topic with students. Students came and went during the discussions, so every student did not consistently give comments on every question. Two or three students became the core respondents in this group, and interestingly, sometimes held very different points of view (though they were not actively discussing with each other, more responding individually to my questions and probing).

Approach to data analysis

The work has been undertaken as interpretivist research from a critical realist perspective, where systems and organisations represent the reality which is a constant, but that this reality has multiple perceptions (Krauss 2005). These perceptions are what is of most interest to this research. Thinking about the Real, the Actual and the Empirical (Baskhar, 1978), this research has interpreted the Real as being the policies, systems and organisational aspects of IT and e-learning, the events and behaviours (the Actual) as the provision of support, chosen pedagogies and learning and teaching practices, and the Empirical being the staff and student experiences (and perceptions of those), and the measurement and interpretation of those experiences from the raw data.

The Problems and Benefits Hierarchy used five ranking factors (real, imagined, intermittent, persistent, legacy) which were formulated by the researcher prior to any primary data or literature review findings. The researcher, on having some knowledge and experience of the field of TEL, has brought this experience to bear in formulating these five rankings, in an attempt to structure a 'weighting of importance'. The analysis used contextual and response categories derived from the literature review, and from the primary data gathered from RG1, RG2 and RG3 to interpret data into these rankings. Strata of context involved up to three stages of context categorisation.

The research, both through the literature review and RG primary data, was in some part to establish whether this hypothetical set of rankings was indeed an accurate or useful way of weighting the importance of themes. So, the five PBH rankings were not devised directly from literature findings, but rather were used to develop the overall structure of importance or significance from an interpretivist standpoint. By then placing each theme from the literature, based on initial overall context impression, as either a 'problem' or a 'benefit', a first categorisation was made. Developing a second scale of '*contextual categories*' for a fuller literature theme context measurement it was possible to place them into the Problems and Benefits Hierarchy (PBH) in terms of the real, imagined, intermittent, persistent, legacy ranking factors (see Table 3, [Findings](#)). The use of simple '*response categorisation*' derived from [RG 2](#) and [RG3](#) responses, was then further categorised into the existing '*contextual categories*' and used to add to the literature theme contextual category rankings. Both these sets of categories (contextual and response) were developed from interpreting primary data and literature findings.

Grounded theory and critical realism were investigated through the work of Oliver (2012), whose 'Critical Realist Grounded Theory: A New Approach for Social Work Research' offers valuable commentary on the combining of the paradigm and the methodology, which seems relevant to this project. "Constructivists have used grounded theory to make explicit the assumptions and unspoken knowledge of participants, elicit their meaning-making rather than make claims about an objective reality and develop contextualised theory for practical application", and "(a) critical realist grounded theory would draw inspiration from the hermeneutical (text interpretation) bent and fluidity of the constructivist approach" with "(c)ritical realist grounded theory would address both the event itself and the meanings made of it" (p378).

Response data from Research Group 1 was used to challenge or confirm the core placing of 'problem' or 'benefit' for each of the top six themes. Additional value and understanding was also derived from knowing individual technology profile characteristics of respondents in Research Group 1. A 'Rogers Diffusion of Innovations (RDI) Indicator' was assigned to each respondent, and this would ideally have been matched to

theme PBH contextual rankings to build further evidence for their placement interpretation in the PBH. In this study there is not enough data to achieve this effectively, however, respondent RDI is used to create a glimpse of the technical characteristics of stakeholders in university professions as all key finding responses have been coded.

The evidence was analysed in this order, to build some system of triangulation, though this is not strictly proving results, merely building possible interpretation of results. See the diagram for *data analysis architecture* below for an overview.

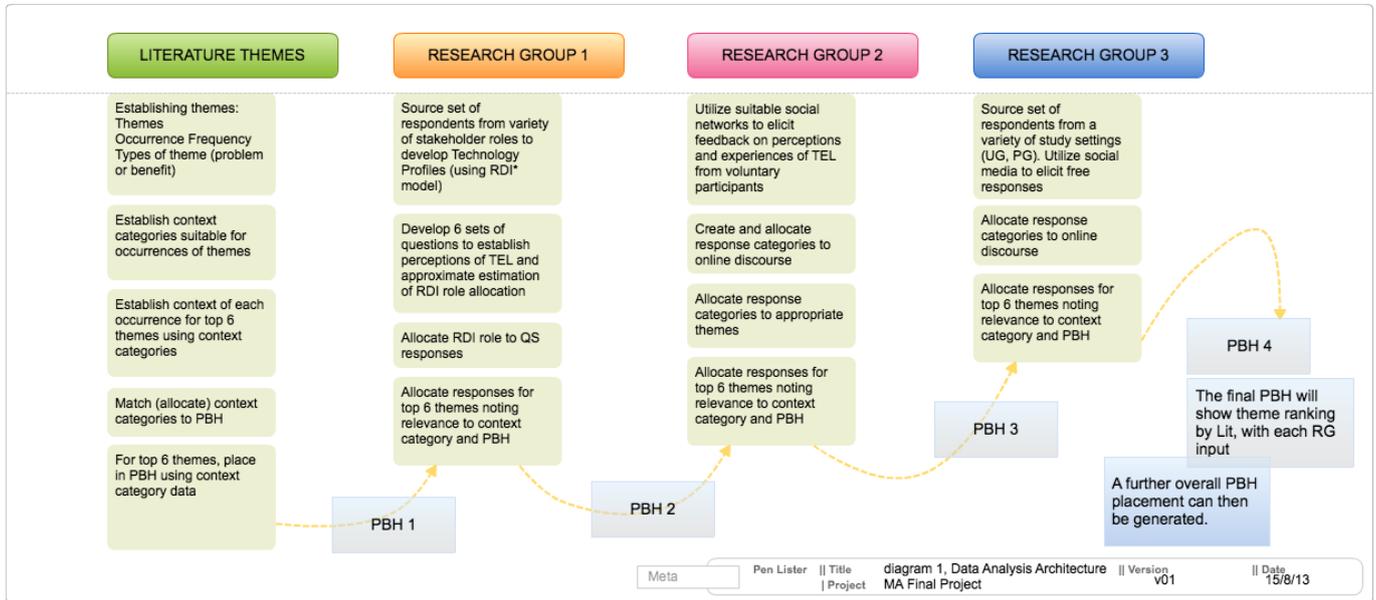


Fig 1: showing Data Analysis Architecture

To minimise interpretive scaling, categorisation was largely done by looking for simple keywords in text to match criteria. For initial problem or benefit placing, an indication of general tone of text or commentary. In contextual categories, a reference to the past, an assumption, a reference to research, an expert experience, a conjecture about data which was not evidenced, as well as the strength or weakness of each context. For response categories this was a similar technique, but matched to that data, and simpler.

Whilst it is acknowledged that the 'interpreting' of contextual categorisation which was applied to themes to create the initial PBH from the literature and beyond was not as robust as would be ideal in a larger study, it was an attempt to make a start on such a system.

Lit Review Summary

The literature review looked at a selection of papers and journal extracts, with the Internet in Higher Education being of significance in offering the most suitable research. Extracts from substantial texts sourced from JISC, Unesco or others were also reviewed. Criteria for selection was the year published, with nothing older than 2007 (by reason of the exponential growth in use of technology since then, see [Aims, Focus and Methods](#) for more), as well as an orientation towards research around use of internet and web 2.0 applications, or social media, as these were perceived as most relevant to gaining an overall picture of the future digital landscape for any university. Other learning technology studies, for example use of interactive whiteboards, second life or uses of learning management systems were not included as these were perceived as largely web 1.0 or increasingly less popular technologies (this is evident in the number of papers available, as well as some content of papers reviewed).

Themes most commonly found in the literature were often of relevance to metropolitan universities by virtue of the nature of the student body present in a metropolitan university, i.e. being diverse, with numerous other commitments and requirements. There were 16 most common themes, these were then divided into Strategy types and Learning and Teaching types, with Assumptions summarised to conclude. The top 6 themes were then analysed (compared and contrasted) further using primary data established from the other sections of this research.

The Sixteen themes:

- INSTITUTION SUPPORT
- SOCIETAL CHANGES
- ICT SUPPORT (Provision)
- ELEARNING SUPPORT (Provision)
- SKILLS AND TRAINING (All aspects, Students & Staff)
- COST (All aspects)
- DEPENDENCIES (Infrastructure & Systems)
- COMPLIANCE
- DIGITAL DIVIDE (Inc Device Divides)
- PEDAGOGY / LEARNING DESIGN
- STUDENT CENTRED LEARNING
- LEARNING QUALITY
- CONVENIENCE / WORK LIFE BALANCE
- SHARED RESOURCES (All aspects)
- ACCREDITATION
- ASSUMPTIONS (idealism)

Top themes:

- INSTITUTION SUPPORT
- SOCIETAL CHANGES
- PEDAGOGY / LEARNING DESIGN
- STUDENT CENTRED LEARNING
- LEARNING QUALITY
- CONVENIENCE / WORK LIFE BALANCE

Findings Summary

Focus in the findings is confined to the top six themes, and their significance to future uptake, support and training of TEL. These may also be most relevant to cash strapped metropolitan universities with large diverse student bodies. The findings have been divided into the following sections:

- The [Literature Data](#), with themes established from the review, including how they were established, with any statistics relevant and links to tables or graphs in the Literature Data Analysis pages.
- The [Research Group Data](#) *confining analysis to the top six themes*:
 - [Results and findings from the Research Group 1](#)
 - [Results and findings from the Research Group 2](#)
 - [Results and findings from the Research Group 3](#)
- Final results for the top six themes in the Problems and Benefits Hierarchy

Please use the links above to navigate to each section for further detail and information. Alternatively, download the Findings PDF from [the Downloads page](#), for reading offline.

Top 6 Themes

Of the sixteen themes most often occurring in the literature, the top six most frequently appearing themes were:

- *Institutional Support*
- *Societal Changes*
- *Pedagogy and Learning Design*
- *Student Centred Learning*
- *Learning Quality*
- *Convenience/Work Life Balance*

Research Group Findings brief summary

The Rogers Diffusion of Innovations Indicator for RG1 respondents were:

- *1 Innovator*
- *2 Early adopters*
- *4 Early majority*
- *1 Late majority*

Key factors highlighted by RG1 question set responses were *willingness and desire to work from home, desire for use of own devices and software, positive attitudes to technology advantages for learning quality and experiences, need for allocated time to redesign courses.*

The most common themes talked about in RG2 were *effectiveness measurement and top-down/bottom up driving factors.*

The most common themes talked about by RG3 were *lack of skills in teaching staff, and perceived lack of significance of technology in learning experience advantage.*

Final Problems and Benefits Hierarchy for top 6 themes

The final PBH was iteration 4, using aspects taken from all data sources. More research would need to be done to establish more than an overview glimpse, indicated below:

- *Institutional Support*
Problem: real, persistent
- *Societal Changes*
Problem: real, persistent
- *Pedagogy and Learning Design*

Problem and Benefit: real (strong), imagined (significant), persistent

- *Student Centred Learning*

Problem and Benefit (with ambivalence): real, imagined (significant), persistent

- *Learning Quality*

Benefit (with ambivalence): real (strong), imagined (significant), persistent

- *Convenience/Work Life Balance*

Problem: real, persistent

Discussion Summary

Discussion here has a variety of focus priorities: the results themselves and their possible implications, reasoning behind technical profiling and literature review selection criteria, and how to improve on methods used for several aspects of the research such as analysis criteria for category allocation and consequent PBH placement. It might be that attempting to combine a variety of research sources and then develop a theme hierarchy, while also attaching some interpreted value to those themes (problem/benefit) might be too wide a remit for one project, and indeed this is a conclusion and recommendation for future analysis of this type.

Discussion also centres around the relevance for metropolitan universities, the noticeable high ratio of themes present that bear close relevance to such universities and any possible implications this might have for future provision, academic role skills expectations, and pedagogical practice involving uses of technology for large, diverse urban student populations.

The Research Approach

- Discussion of how best to analyse multiple sets of data which together build a rich picture of information
- Use of mixed methods ('Integrative Logic', Mason, 2006) in the context of an interpretivist critical realism paradigm (referring also to Oliver 2012)
- The project in part became a study of what worked and how to iterate these methods of analysis to best effect

Literature selection and analysis, key points

- Literature selection criteria
- An interpretivist approach from a critical realist perspective to develop category analysis in connection with the literature review and for responses from RG2 and RG3
- Theme Occurrences
- More robust criteria for selection and analysis process in order to contribute more meaningfully to a theme hierarchy

Technology profiling, key points

- Use of the technical profile data in relation to the core interpretation of a theme as a problem or a benefit
- Rogers Diffusion of Innovations and technical profiling to create an 'RDI' indicator

Metropolitan universities, key points

- Diverse student bodies and learner differences in connection with technology enhanced learning
- Compliance: accessibility and the diverse student body
- Training provision with limited resources and a wide variety of academic staff

Conclusions Summary

The main conclusion from the findings is that institutional support together with learning design considerations are perhaps the most significant forces surrounding adoption of TEL, as drivers (when present) and restrainers (when absent). The need for centralised support for academics in terms of time and professional assistance in order to learn new skills and develop new curriculum and course design so as to most benefit from potential uses of technology appears highly significant to that technology being adopted. How this is done perhaps remains the crux of the issue.

Conclusions from the research may in part then be 'telling us what we might already know' but the research may also have highlighted a need to think much more about approaches to analysing multiple sets of data which are relevant as a whole to this field. To then be able to put that data to use in practical ways in order to help overcome the issues found to be restraining TEL adoption remains the challenge.

Recommendations are made about how the RDI indicator, along with primary stakeholder and literature data, contextually prioritised (such as in the Problems and Benefits Hierarchy developed here) might be used to deliver smart training to individual personalised requirements. The online support model used by Facebook and Google, emphasising the 'zero tolerance training' of those applications when introducing new functions or design changes whilst providing comprehensive online help information, is also part of recommended ways forward deserving further consideration in relation to providing the 'always on' specialised support that academics and literature express a need for. Smart delivery discussed elsewhere in the literature is used as a comparison of such a shared sector-wide system being a possibility.

A suggestion is made of a separate study involving only metropolitan universities (literature and primary data) to further establish if forces do have particular significance, as no definitive outcomes are clear in this respect, beyond what might be assumed of any urban institutions perceived requirements.