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Analysing Technology Acceptance in Students and Academics

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Abstract:

This study aims to provide constructive solutions to enable both international students and academics to better understand and effectively use learning technologies.

Over a two-year period, The Technology Acceptance Model was applied using Constructivist Grounded Theory with academics and international students at a UK university to uncover the reasons why they accept and use particular technologies. Academics and students were interviewed, and focus groups were conducted with students. Lesson observations took place and focus groups with learning technologists and interviews with senior management were organised. The empirical data confirmed the view that specific learning technologies play a significant role in engaging international students.

New discoveries indicate that academics are more influenced by the perceived ease of use of learning technologies whereas students are more interested by their perceived usefulness. Students were more likely to accept learning technologies if they had a positive perceived effect on their academic performance and future employability. The findings demonstrate the level of support offered to academics needed to be improved so that they are able to develop their IT competencies and ultimately enable international students to better achieve learning outcomes.

The Student and Academic Technology Acceptance Model (SATAM) was developed as a conceptual framework which identifies specific external variables that affect technology acceptance in academics and international students which ultimately lead to positive behavioural intention and actual system use.

Keywords: TAM, international students, academics, learning technologies, constructivist grounded theory, SATAM.

1. Introduction

Higher Education (HE) plays a pivotal role in our rapidly globalised society. Graduates generally improve their standard of living and communities can benefit from more educated citizens. HE drives economic and societal advancement by creating 'high-quality graduates through high-quality teaching' (Bennett et al., 2018: 1014). However, HE institutions (HEIs) in the UK and beyond are encountering unprecedented change through globalisation, increasing numbers of students, economic uncertainty and the need to remain competitive in their offerings. The growing influence of technology is now pervasive in our personal and work lives and has caused universities to re-think their pedagogical strategies to meet the expectations of the students they teach and the academics they employ (JISC, 2015). HE possesses the capacity to enable individuals to cope with this changing world and to deal with complex problems (Ramaley, 2014) with technology playing a vital role in enhancing academic and student performance (Price and Kirkwood, 2014; Walker et al., 2017). Understanding how to maximise the influence of learning technologies in HE has never been more important.

For many years, learning technologies have been promoted as valuable tools through which to enhance learning in UK HE although current educational research has yet to demonstrate their effectiveness in achieving student learning gains (Price and Kirkwood, 2014). Several reasons have been contended for this situation, including the lack of time afforded to academics, inconsistency with pedagogical approaches and the perceived usefulness and perceived ease of use of the technologies that are available. These issues have influenced technology acceptance in academics with UCISA (2018: 1) worryingly discovering that there is a lack of academic knowledge in developing Technology Enhanced Learning (TEL).

Considering UK HEIs have made extensive investments into TEL (Sharpe, 2018), this lack of knowledge is rather surprising.

Therefore, this study will investigate how students and academics differ in their attitudes to the Perceived Usefulness and ease of use of learning technologies. The temptation to paint learning technologies as a panacea that can transform student and academic engagement will be avoided. Indeed, it is asserted that learning technologies may not work for every student in UK HE and they are not 'magical pixie dust that can cure all teaching ills' (JISC, 2017b: 1).

2. Research Strategy

The study aims to fill the gap in understanding how and why technology acceptance can improve teaching effectiveness and student performance and provide solutions for wider HE. 30 academics, 47 international postgraduate students, 5 learning technologists and 4 senior managers took part in the research over a 2-year period from 2018-2019 at a London-based university. Academics were interviewed and observed, students were interviewed and participated in two focus groups each year. Learning technologists also participated in two focus groups and senior managers were interviewed on two occasions. A Constructivist Grounded Theory methodology was employed in order to generate rich and meaningful findings through the co-construction of data with students and academics via the three qualitative strategies (interviews, focus groups and observations) discussed above. The use of a suite of qualitative methods is argued as helpful in enhancing validity and meeting the research gap via method triangulation (Carter et al., 2014).

3. Literature Review

This section will focus on issues associated with student and academic technological acceptance and justify the importance of TAM in this research.

3.1. Student Issues with Learning Technologies

Although there are a wide variety of benefits associated with learning technologies and their impact on student motivation and engagement, as Selwyn (2016) comments, there are a number of negative aspects, which are now examined in Table 1:

Theme	Description	Digital Devices/Practices Most Cited in Relation to This Factor	Percentage Citing
Distraction	Technology as a distraction and its effect on reducing concentration on the subject being studied.	Social media (such as Facebook), YouTube and Smartphones.	25%
Disruption	Technology not working as it should making it difficult for students to study.	Lecture theatre projectors not working, poor quality internet connection, systems 'going down'.	27.7%
Difficulty	Difficulties found when using technologies making it challenging to study.	Incoherent design of LMS pages making it difficult for students to engage with technology, health issues when using technology.	23.5%
Detriment	Technology issues leading to a poor student experience.	'Death by PowerPoint' (a one-way monotonous delivery in class by academics), poor quality PDFs, academics having insufficient ability and/ or time to engage with technology, a lack of engagement in online discussion forums (Selwyn, 2016: 5).	19.1%

Table 1: Student Issues Associated with Learning Technologies

Source: Selwyn (2016)

As can be seen above, learning technologies can be viewed as distracting, disruptive, difficult and sometimes detrimental to student learning. Technologies such as smartphones and YouTube can be seen by students as overly distracting and resulting in increased levels of procrastination (Selwyn, 2016). Moreover, having unrestricted access to the internet is viewed by many students as another distractor due to the temptation to relax and engage in surfing for non-studying purposes (Dolch and Zawacki-Richter, 2018). Facebook is often viewed as particularly tempting and distracting. Indeed, social media in general is regularly identified as the biggest distractor in class with some students compelled to join in after witnessing others participating (Selwyn, 2016). Students can also encounter frustrations with poor internet connections and low battery life as well as incomplete videos provided by academics and unreliable university systems at busy times such as when assignments are due to be submitted (Selwyn, 2016).

Difficulties regarding the portability of laptops are another issue observed by Selwyn (2016). Students can complain of the inconvenience of carrying around large devices to lectures and seminars. Headaches and a potential negative impact on well-being can be experienced by students who spend a lot of time using the internet (Dutta, 2017). Navigating Virtual Learning Environments (VLEs) has been cited as an additional source of frustration due to

inconsistencies with the quality and amount of information offered (Selwyn, 2016) with only 40 per cent of UK HE students satisfied with the collaborative features of VLEs (JISC, 2017a).

A further issue concerns the reduction in quality of the student experience due to weaknesses with technology. For instance, students can be unhappy with the perceived poor quality of learning materials (Selwyn, 2016). An additional issue can be the lack of engagement in PowerPoint slides. Teachers have been criticised for reading from the slides and not engaging with the class. PowerPoint sessions can be viewed as boring, repetitive and occasionally demotivating. Moreover, the use of PowerPoint has been observed as overly formulaic and lacking in personalisation. Students have also been found to be unhappy with the use of Moodle discussion forums, which can be seen as disconnected and lacking in stimulus (Selwyn, 2016; Estacio and Rizal, 2017).

Although students are generally positive about the use of technology in their learning, concerns have been made regarding several resources such as the quality of Wi-Fi access and the lack of desktop computers in universities, which a number of students rely upon (Newman and Beetham, 2017). It is clear that university leaders must effectively manage their finances and priorities so that students are able to thrive and enjoy using learning technologies (Sharpe, 2018).

3.2. Academic Issues with Learning Technologies

Despite considerable investment into learning technologies, there is a perception amongst many academics that universities do not offer a clear and robust support strategy (Lai and Smith, 2017). This issue has negatively influenced technology adoption in some academics although others are more inspired by how technology can help students develop their employability skills and engage students more deeply in the lesson content (Taylor, 2018). Adoption of new forms of technology tends to be more likely if academics perceive that they are able to enhance the student learning experience. Academics can arguably be categorised in two ways in regard to accepting and using learning technologies – those with a learning-design mind-set, with the ability ‘to harness the potential of technology to improve teaching practice’ (Persico et al., 2018: 978) and those who are positive and encourage others to experiment by passing on advice and success stories to colleagues. This definition contrasts with teachers who actively avoid using technology in their lessons. Arguably, the more positive the attitude of the teacher and the greater familiarity they have with a technology, it is more likely that they will accept technology-related research and improve the quality of TEL in the classroom. On the other hand, academics who resist collaborating with peers and who do not actively participate in discussing new ideas and who do not reflect on positive and negative experiences with technology tend to be less successful. Indeed, teachers who are pro-active with technology usually have less ‘computer anxiety’ compared to others who take less of an interest. Therefore, the decision to implement technology in the classroom can be reliant on the attitude and confidence of the teacher rather than the influence of the institution (Beetham, 2015). The decision to utilise technology as a tool to engage and motivate students can also depend on the philosophical and pedagogical beliefs of the teacher with those following a Constructivist philosophy generally being more confident and proficient in its use (Beetham, 2015).

There are further problems which restrict teachers’ experimentation with learning technologies in the classroom. These issues include the complexity of Web 2.0, the relative lack of perceived benefits accrued from implementing technology when compared to traditional methods, a lack of opportunities to observe technology being integrated into classroom activities and a lack of symmetry with current pedagogical methods.

Another argument relevant to this debate is that there is a lack of development regarding technology as an accepted pedagogical method. This problem may also stem from a lack of support with Beetham (2015) arguing the lack of time afforded to teachers by institutions may act as a deterrent to integrating technology into pedagogical strategies. Indeed, it is contended that a number of HEIs have been unsuccessful in supporting teachers with other priorities seen as more important. BETT (2018) even claim that a lack of institutional support is widespread in UK HE. Issues such as these have palpably contributed to the inability of academics to apply current and recent pedagogical research in their lessons. Furthermore, a decrease in the staff/student ratio has often led to higher workloads and more stress for many academics who are now required to be effective in the classroom, demonstrate excellence in research and to continually respond to the needs of students, often with few or limited resources. The declining staff/student ratio has led to academics needing to spend more time on administrative duties with less time available for research and self-development. This situation has perhaps reduced the opportunity for academics to more consistently embed technology into teaching and learning practices and to develop as professional educators.

3.3. The Technology Acceptance Model

The Technology Acceptance Model (TAM) is an information systems model that has been designed to understand how users accept and use a particular technology (Davis et al. 1989). As can be seen in Figure 1 underneath, TAM can be used to ascertain decision making when users are presented with a new form of technology. TAM includes several factors that influence how frequently and in what way individuals accept and use technology:

Figure 1: The Technology Acceptance Model

Source: Davis et al. (1989)

As can be seen above, TAM illustrates that Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) are particularly influential when making the decision to use a particular technology. Davis et al. (1989) defines PU as the extent to which an individual user believes using a technology will improve their job performance. PEOU is explained as the extent to which the use of a particular technology is viewed as straightforward and free from effort. These areas subsequently determine individual attitudes, behaviour and actual system use.

With reference to the acceptance of learning technologies, it is argued that if an individual student user believes that a particular technology will be beneficial for their learning, and it is seen as straightforward to use, there will be greater likelihood of more participation and ultimately greater engagement (Edmunds et al., 2012). The same argument can be applied to academics: if a technology is viewed as easy to use and useful for their jobs, there is a greater prospect it will be accepted and become part of an academic's teaching strategy.

TAM's linear structure can clearly demonstrate technology acceptance through a modified lens, such as in the examples provided above. It is argued that TAM possesses the potential and flexibility to be used more widely and in a variety of differing contexts (King and He, 2006). This particular study has taken advantage of TAM's flexibility to focus on understanding learning technology acceptance in HE students and academics.

4. Methodology

This project implements a Constructivist Grounded Theory (CGT) methodology where both the data and theory will be co-constructed as a result of lesson observations with academics and interviews with students, academics and senior management and focus groups with students and learning technologists. CGT involves the acute examination of the views, values and beliefs of both the researcher and participant(s). CGT tries to understand differences and variations in research participants and then to co-construct meanings with them (Charmaz, 2014). This was a major attraction in deciding to implement CGT in this research project as it was important to identify if there was a disconnection between academics and students regarding their attitudes and interpretations of learning technologies as an effective tool in enhancing student motivation and engagement.

Interview and focus group questions were generated by the CGT process articulated by Charmaz (2014) where possessing an understanding of the literature before commencing data collection is a key aspect. As Ramalho et al. (2015) pontificate, although inherently subjective, reflexivity is a key aspect in ensuring groundedness in CGT studies. These were both useful strategies in generating specific questions as well as the original contributions that were required.

5. Results and analysis

5.1. PU in Students

It was discovered that certain external variables do have an impact on technology acceptance in students with six in particular possessing an influence on Perceived Ease of Use and Perceived Usefulness. Four variables were associated with Perceived Usefulness in students: Effect on academic performance, Relevance to future career, Enhancement of IT literacy and Enjoyment. As is subsequently elucidated, this finding indicates that students are generally more focused on the usefulness of the technologies they utilise rather than how easy they are perceived to use.

5.2. Effect on Academic Performance

The research discovered that students were more likely to accept and use a particular technology if it had positive perceived benefits in improving grades and provided opportunities to progress, resonating with the arguments of Price and Kirkwood (2014) and Walker et al., (2017). PowerPoint was viewed to be a particularly useful technology in improving academic performance, with it seen to be valuable in facilitating cognitive recall, classroom interaction and improved classroom focus.

Students concurred that technology was useful in improving their attitude and motivation to succeed. Furthermore, it was discovered that the majority of students thought the usage of learning technologies had an indirect impact on their grades as they facilitated greater understanding in a subject. One student felt that technology was the most important tool utilised by academics and was seen as vital in improving her grades, as the technologies used were able to focus her attention.

Overall, there was a great deal of optimism evident regarding the positive impact of technology on academic performance. Students were particularly enthused about the potential of learning technologies to help them deal with complex problems (Ramaley, 2014) with technology ultimately viewed as a conduit in producing high-performing graduates (Bennett et al., 2018).

5.3. Relevance to Future Career

The research has discovered that there is an impactful correlation with technology acceptance and the perceived positive impact it had on future employability (Taylor, 2018). The majority of students interviewed remarked that they were more likely to accept and use a particular technology if it had a positive perceived influence on their future career. This discovery is arguably one of the most important results found in the research with the magnitude of this correlation not evident to the same extent in any previous studies. This study has established that students are satisfied about being able to add the IT skills they learn inside and outside of class to their CVs in order to improve their attractiveness to future employers.

The opportunity to utilise learning technologies when conducting training sessions and presentations were seen as helpful in a future role and enhanced technology acceptance. Both PowerPoint and online quizzes were viewed as particularly attractive and useful in this regard. It was clear that there was a greater likelihood of technology acceptance and subsequent use if the technology was perceived to be useful in enhancing employability.

5.4. Enhancement of IT literacy

The perceived positive effects on the enhancement of IT literacy were found to be another influential factor in facilitating technology acceptance. This finding is aligned to relevance to future career as discussed above. It was interesting that the vast majority of students stated that they were unfamiliar with a number of the technologies they were introduced to at the start of the course (some had not heard of Moodle for example) although they gained more confidence in using them as the course progressed. The study discovered that students were pleased that they were able to learn new skills and improve their inventiveness with IT in the process. The creative element of students possessing the autonomy to invent their own activity based on the content introduced in class was discovered to be popular for two reasons; focus, and improving teamwork between different nationalities. This suggests that many students prefer personalised learning and collaborative learning environments. On the other hand, certain tools (particularly smart phones) were seen to be occasionally distracting, corroborating the arguments of Dolch and Zawacki-Richter (2018).

Perhaps unsurprisingly, the study illustrated that certain academics were perceived to be more proficient and effective in teaching IT skills when compared to other colleagues. Technology was seen throughout the data collection process to be a conduit in enhancing interaction and communication between peers. It was interesting that students were able to identify that each academic had their own individual teaching style with some lecturers perceived to be more adept and confident using technologies than others. Further, it was noted that students wanted academics and learning technologists to teach them how to use and apply specific applications. This finding may also suggest that it would be useful to build time into the curriculum for students to become familiar and comfortable with these technologies. Enjoyment was found to be another factor in facilitating technology acceptance.

5.5. Enjoyment [Hedonism]

The research discovered that students enjoyed the competitive nature of quizzes and the resultant collaboration with classmates. The hedonistic nature of online quizzes was also seen as a significant factor in encouraging student technology acceptance. The students in this study all embraced the hedonistic capabilities of learning technologies. For instance, YouTube was seen by students to be useful in making classes more engaging and as an interesting interlude between imparting lecture and seminar content. Students enjoyed the variety of techniques employed by various academics and found them useful in focusing them on the subject being taught.

The research discovered that the actual enjoyment of partaking in interactive learning technologies had a significant impact on the decision to accept, correlating to the arguments of Sharpe (2018). The competitive nature of quizzes and group competitions were very popular. Students also enjoyed making their own content and being judged against others. This pedagogical strategy was able to improve collaboration and socio-cultural learning.

The discussion on Perceived Usefulness continues in the next section and focuses on specific variables that influence technology acceptance in academics.

5.6. PU in Academics

Two variables were connected to influencing Perceived Usefulness in academics - Job relevance and Technological, Pedagogical and Content Knowledge. As will be discussed below, these variables were both found to be extremely important in facilitating technology acceptance.

5.7. Job Relevance

Job relevance was discovered to be a particularly important variable affecting technology acceptance throughout the whole data collection process. For instance, several academics believed that embedding learning technologies into their delivery was a useful strategy in giving greater autonomy to students: an approach they thought was especially relevant to an academic's job as this strategy was able to support students in improving both their confidence and subject cognition.

In addition, other academics stated that the use of learning technologies was able to help students focus on a subject more effectively than if the content was solely delivered in a one-way fashion. Technology was discovered to be helpful in facilitating learning and making large lectures and seminars more interesting to teach and more motivating for students to attend. The inclusion of technology in a class was also seen to make an academic's job more enjoyable and less stressful when it succeeded, corroborating the arguments of Beetham (2015).

Furthermore, the study established that technology was perceived to be relevant to an academic's role as it simplified teaching to international students (the main student population) who spoke English as a second language. In this respect, the use of technology (such as PowerPoint) was seen as a helpful strategy to clarify information at first-hand; by offering examples and allowing students the opportunity to check on the VLE at a later juncture had they not understood on the first occasion.

Technological, Pedagogical and Content Knowledge was another factor viewed by academics as an important influencer in technology acceptance.

5.8. Technological, Pedagogical and Content Knowledge

The research confirmed that academics possessed a general lack of confidence regarding learning technologies, which negatively affected their ability to integrate them in their pedagogical practices. To some extent, this finding correlates with the arguments of UCISA (2018) who discovered that teachers often lack the ability to effectively embed technology into the curriculum. However, the academics in this study believed that they had a sufficient general level of technological knowledge to create interactive classes although there was a lack of confidence regarding their competence to deliver innovative and up-to-date techniques. This lack of innovation and experimentation was evident in the lesson observations throughout the two-year period with many academics seemingly content to use the same learning technologies and regurgitate existing pedagogical approaches. There appeared to be both a lack of confidence and knowledge in practicing and delivering new learning technologies. Most academics believed that they were competent with technology and students did not expect them to be proficient. However as discussed above, this perception was found to be incorrect. There also appeared to be a reluctance to experiment with new ideas in case unfavourable student feedback was received. There was a common agreement that although lessons should be fun in order to promote attendance and enhance learning, the most important output was the achievement of learning outcomes.

The next section focuses on PEOU.

5.9. Perceived Ease of Use (PEOU)

This section is also separated into two areas: PEOU in students and PEOU in academics.

5.9.1. PEOU in Students

Two variables (Nationality and Familiarity with technology) were particularly associated with Perceived Ease of Use (PEOU).

The impact of nationality on technology acceptance is analysed in the next section.

5.9.2. Nationality

The research demonstrated that nationality does have an influence on technology acceptance although the relationship is not as impactful when compared to other variables. Due to the vast numbers of Chinese and Nigerian students, these nationalities were discussed most prominently in both the interviews and focus groups. The research uncovered that certain nationalities were perceived to be more proficient than others although there was a disagreement regarding the IT literacy of Chinese students. For instance, several respondents commented that Chinese students tended to be weaker with technology when compared to other nationalities and were less likely to use technology as a result. A further claim was made by other interviewees who remarked that language difficulties and a reluctance to mix with other nationalities contributed to Chinese students not participating in technology-based activities. They also tended to lack initiative when compared to other nationalities and were content to observe and not question the relevance and validity of the technology being used. However, it can also be asserted that this issue may be more complicated and perhaps more connected to the working preferences of Chinese students rather than their acceptance or non-acceptance of technology.

5.10. Familiarity with Technology

The results demonstrated that students saw popular technologies (such as PowerPoint) as comforting due to their familiarity. This variable is arguably linked to the nationality section above with the majority of students stating that they had not been introduced to most of the learning technologies implemented on their programme until coming to the UK. It appeared that student expectations were based upon their previous learning experiences. The lack of familiarity with new applications made certain students apprehensive, at least initially, about accepting and using technology. Furthermore, students from Vietnam and India were used to relatively basic technologies before coming to the UK. These students found the amount of technology and sophistication to be initially overwhelming, especially in Term 1 of their course. On the other hand, other students stated that they were familiar with several of the technologies they were introduced to as they had similar experiences in their home countries. However, they were not exposed to technology to the same extent. Indeed, it was surprising that one student had not experienced PowerPoint before coming to the UK. Interestingly, the students interviewed in this study agreed with the findings of JISC (2017a) when contending that they were unlikely to contact their teacher if they needed support with an IT issue. Instead, they had greater confidence in the learning technology team to help them.

5.11. PEOU in Academics

Academics were more influenced by Perceived Ease of Use with four variables associated (Priorities, University support, Anxiety and Past experience). This discovery suggests that academics are more focused on how straightforward a technology is to use rather than how useful it is to themselves or their students. Priorities and their relation to technology acceptance are evaluated below.

5.11.1. Priorities

The study found that academics had difficulties prioritising the use of technology with other duties taking precedence. For example, one academic stated that lesson preparation time was most important with the acquisition of new technological skills seen as onerous and time-consuming, particularly without a recognised support system being in place. This finding correlates with Beetham's (2015) study which discovered the lack of time provided to teachers by institutions often acts as a deterrent in integrating technology into pedagogical strategies.

In addition, other academics believed that the time needed to set-up technology in class was often unnecessarily long due to challenges with the stability of the university's Wi-Fi connection in line with Selwyn's (2016) study on issues associated with internet connectivity. This compelled one academic to prioritise imparting content, using a more traditional 'one-way', instructionist form of delivery. Similarly, another academic recognised the usefulness of technology in engaging students although remarked that it was often difficult to prioritise the time to research and practice new technologies with other tasks (particularly lesson preparation) being more of a priority. Another academic stated that she was unable to implement technology as frequently as she wished due to the need to complete other duties such as marking and curriculum design first. These issues all suggest that academics were generally unable to effectively prioritise the use of learning technologies in their teaching toolkits. It was also discovered that some academics had researched into implementing learning technologies into their lessons (such as attending learning technology conferences on their own volition) although they had not been able to practice what they discovered due to the busy nature of their positions.

The lack of academic expertise with learning technologies stemmed from the ineffectiveness of standalone teaching technology courses offered by the university with workshops viewed to be particularly ineffective. These negative experiences were transmitted to other academics which subsequently impacted on attendance at future events.

Although not the most impactful external variable, priorities such as those discussed above nevertheless negatively influenced technology acceptance in academics and resulted from a lack of confidence in the university support that was provided.

5.11.2. University Support

It was revealed that there was an expectation by the university for its academics to implement learning technologies inside and outside the classroom in order to provide clear communication and engage students. However, as discussed by Sharpe (2018), it was evident that there was no clear strategy and it was left up to individual academics in what way they would embed TEL into the curriculum. As mentioned above, there were no formal training sessions organised and the sharing of ideas tended to take place on an informal and ad-hoc basis. The lack of clarity regarding the university's strategy on the use of technology as well as the ad-hoc nature of the information that was shared, negatively affected technology acceptance in academics who saw this as a lack of targeted support. The study confirmed the arguments of Lai and Smith (2017) who suggest that, despite considerable investment, there is a perception amongst many academics that universities do not offer a clear and robust support strategy. For example, one academic acknowledged that she needed to use technology as that was what the university expected, although she was unsure what to use and how frequently. Another academic was particularly critical of the university's support and thought that there was no real strategy in place.

Confirming the arguments of Beetham (2015), the lack of specific university support regarding training and having enough time to research about technology's impact as part of an integrated pedagogical approach was instrumental in influencing academic acceptance. The pressure to achieve high levels of student satisfaction created greater anxiety in the academics interviewed. Although they were aware of the need to produce high quality lessons as professionals and to help the university progress, the lack of guidance and understanding about how to create an effective technology-infused pedagogical strategy was viewed as generally demotivating.

The impact of anxiety on technology acceptance is now examined below.

5.11.3. Anxiety

Although not the most influential variable in influencing technology acceptance, computer anxiety was moderated by experience when using a particular learning technology, meaning it was more related to Perceived Ease of Use. For instance, one academic was compelled to implement technologies in class (despite not always having confidence in how to utilise them properly) as the institution had made it clear that they had made a great deal of investment into their use. This situation induced anxiety as this academic had to spend a considerable amount of time modifying her lesson plan by building in further TEL activities (UCISA, 2018).

It was also stated that nationalities with limited experience with technology could create greater anxiety in academics. For instance, one academic commented that certain nationalities gave him more anxiety than others with African students seen as particularly stressful to teach due to their perceived lack of technological awareness. Another academic made similar comments regarding Nigerian students and remarked that their lack of prior experience with technology could often make classroom teaching problematic due to the amount of explanations and demonstrations that

were sometimes required. Academics had difficulties in keeping the rest of the class engaged whilst these students received extra support. This situation added to academic anxiety.

In addition, it was discovered that TEL did not work at all with certain nationalities. For example, Chinese students occasionally increased anxiety and stress in academics due to their perceived lack of responsiveness and interaction in class. The use of technology in this instance was seen as unhelpful in facilitating greater interaction. It was also noted that academics who used technology and subsequently struggled to engage certain nationalities would hesitate to persevere or experiment with new technologies in the future. Previous negative experiences were seen to have an influence on current technological engagement (Beetham, 2015). More traditional teaching approaches (such as delivering one-way lectures and using case studies in seminars) were seen as less adventurous although at the same time potentially more effective (and less time-consuming to organise). Academics tended to fall back on less interactive techniques as they were perceived to be easier to use and less onerous to prepare and implement. This strategy reduced the possibility of anxiety occurring. However, the study found that all academics felt anxiety (and in some cases embarrassment) when the technology did not work and they had to improvise with spontaneous solutions in front of students.

It was also observed, at least to an extent, that computer anxiety on Perceived Ease of Use lessened after positive experiences of technology usage were accrued. These experiences tended to occur with the same technologies although when academics used unfamiliar packages, computer anxiety increased. The lack of an intervention mechanism by the university (such as the absence of a formal training programme or evaluation of the technologies that were used) often exacerbated computer anxiety in academics. However, it should be acknowledged that the majority of academics interviewed were generally confident with more established technologies (such as PowerPoint and Moodle) although when faced with the prospect of embedding new technologies for which they were not familiar, anxiety tended to rise leading to lessened technology acceptance. This finding was common in most academics although a small majority were quite open to experimenting, providing they had the time to research how an application worked in practice as well as having an understanding of its perceived pedagogical benefits.

There was also a fear that experimenting without receiving sufficient training may lead to reprisals from line managers if students gave negative feedback. This perception tended to dissuade academics from trying out new techniques and to persevere with less innovative and more established teaching strategies. The final external variable influencing PEOU – Past experience – will now be discussed.

5.11.4. Past Experience

Past experience was also discovered to have an influence on technology acceptance in academics. For example, PowerPoint was seen by academics to be an integral tool that can be used in classes to enhance delivery, contradicting the arguments of Selwyn (2016) who criticises this form of technology as unadventurous and uninteresting. Furthermore, online quizzes were seen by teachers to be an engaging platform that could be used to create a better and more interactive atmosphere for students. Successful past experiences with online applications gave greater confidence that they would produce similarly positive results in the future. VLEs were viewed as generally useful in improving communication and organisation. On the other hand, if a negative experience occurred, academics tended to have less confidence about applying the same techniques in the future. The findings for online simulations demonstrated the same opinions with the decision to continue using a particular technology dependent on the past experience being positive or negative. The interviews confirmed that academics who enjoyed previous successes with technology were also more likely to repeat the same strategy with different cohorts, resonating with Persico et al.'s (2018) research. Conversely, those academics who had struggled with technology or found it difficult to achieve expected results were more hesitant to accept technology and engage with new applications or software.

However, there was some evidence of Selwyn's (2016) findings, which discovered that students had an overall negative perspective regarding their teacher's ability to use technology appropriately and effectively and were unhappy with distractions caused by teacher incompetence.

5.12. Introduction to the Student and Academic Technology Acceptance Model

As has been previously discussed and justified, TAM's structure has been applied in this research in order to ascertain what influences technology acceptance in students and academics. The Student and Academic Technology Acceptance Model (SATAM) has emerged from this research and focuses on specific external variables that influence Perceived Ease of Use and Perceived Usefulness. This conceptual framework has been developed as a result of the Constructivist Grounded Theory process. As will be subsequently discussed, SATAM is argued as a more up-to-date and integrated version of TAM that specifically focuses on technology acceptance in students and academics. It was discovered, as the literature suggests, that TAM is a flexible framework which is able to be redesigned and modified to suit a particular subject such as the topic under investigation in this study. Six variables were selected for both academics and students based upon the depth of responses that were recorded. Six variables were deemed to be appropriate for both parties in order for the framework to be feasible as a working model. Although other interesting areas were mentioned and considered, the six areas for students were all articulated in depth and linked to established academic discussions. In order to maintain consistency, six areas for academics were selected with the same rationale.

Figure 2: The Student and Academic Technology Acceptance Model

The framework focuses on PU and PEOU as the major determinants in influencing technological adoption in students and academics. Following an extensive and exhaustive data collection and analysis process, the final framework integrates relevant external variables that influence technology acceptance, attitudes, behavioural intention to use and actual system use. The conceptual framework incorporates these aspects in order to create a robust theory that can be used to ascertain the reasons behind technology acceptance in students and academics.

Many models such as this which attempt to explain the use of technology in teaching and learning tend to be from a Constructivist or conversational standpoint. This study has adopted such a strategy and has created a workable and flexible model that can be used to determine technology acceptance in students and academics.

5.12.1. SATAM Explained

The colour of the variable in relation to PU and PEOU determines the strength of the relationship and the level of theoretical saturation that took place in the form of a 'heat map'. For instance, if the colour is red (as in 'job relevance' for academics and 'effect on academic performance' for students) the relationship has impact. Furthermore, if the colour is green (such as 'priorities' for academics and 'enhancement of IT literacy' for students) the relationship between the variable and either PU or PEOU is strong although not as impactful as in the red category. On the other hand, if the colour is blue (as in 'anxiety' for academics and 'nationality' for students) the relationship is less impactful. 'Impact' and 'Strong' were selected due to their associations with qualitative research. Unlike the original TAM, SATAM can mix PU and PEOU in each variable. For instance, the 'Effect on academic performance' variable is divided into three segments with two-thirds allocated to PU and one-third allocated to PEOU. Overall, this construct is seen as more connected to PU and arguably demonstrates the flexibility of SATAM.

5.12.2. SATAM Limitations

Although this framework is proposed as useful and relevant in understanding the process of technology acceptance in both students and academics, there are nevertheless a number of limitations, which must be examined. First, it can be stated that the twelve constructs identified as external variables in this framework are very specific to the institution that was investigated. 'Nationality' is a case in point with the vast majority of responses focusing on Chinese and Nigerian students due to these being the two most dominant student populations on campus.

Indeed, the framework may not be entirely relevant to other dissimilar institutions with fewer international students (and perhaps with fewer international academics) than the institution investigated. Nonetheless, SATAM can be applied by comparable institutions as well as universities of a similar size and profile. It is arguably also relevant to universities that aspire to become 'global places of learning'.

Moreover, it is acknowledged that the framework is very much influenced by the temporal context in which the data was collected.

6. Conclusion

Although both students and academics are influenced by the PU and PEOU of technologies, there were differences noted regarding the degree of these influences. The study demonstrated that students were more accepting of technologies if they perceived them to be useful for their studying and future employability.

On the other hand, academics were more persuaded by the PEOU of technologies and were much more likely to accept and use them as part of their pedagogical strategy if they were seen as easy to understand and use. By applying SATAM, six different external variables were discovered, demonstrating that there were different connections made between PU and PEOU, illustrating a clear dichotomy between students and academics. For example, four variables were associated for PU in students (Effect on academic performance, Relevance to future career, Enhancement of IT literacy and Enjoyment).

These results indicate that students are generally more focused on the usefulness of the technologies they use rather than how easy they are to use.

Academics were more influenced by PEOU with four variables connected (Priorities, University support, Anxiety and Past Experience). Two variables were connected to PU (Job relevance and Technological, Pedagogical and Content Knowledge). This discovery suggests that academics are more focused on how straightforward a technology is to use. These findings are particularly interesting as they contradict to an extent the results of previous studies. This research has uncovered that academics are generally more influenced by PEOU with PU seen as a less influential construct in influencing attitudes, facilitating behavioural intention to use a particular technology and in ultimate technology acceptance.

However, it appears that the lack of clarity in the institution's overall pedagogical strategy has had a negative effect with the learning technologists and academics having no specific strategy or guidance to follow. This may have contributed to academics being more influenced by PEOU than PU. If academics had been exposed to a more lucid pedagogical strategy, it is quite possible that the PU of learning technologies may have been more influential.

Ultimately, the lack of a coherent strategy has resulted in academics tending to do as they please, leaving the rhetoric behind the institution's TEL strategy to be inaccurate. Students as the recipients of this approach tend to receive very different experiences, which are often dependent on the inclination and motivation of the individual academic to engage in CPD on their own initiative.

It is hoped that this study will enhance understanding of student and academic technology acceptance. As discussed at the start of this study - understanding how to maximise the effect of learning technologies in UK HE has never been more important.

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