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PEDAGOGY: LEADING TECHNOLOGY

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ABSTRACT
This paper is based upon a combined 40 years of experience the authors have in working with and teaching technology in Further and Higher Education. The relationship between students, technology and educators is a complex one which has a rich tradition to draw upon. The purpose of the research - inclusive of one small case study - was to identify the overarching purpose of the relationship and to highlight the good and to consider whether potential problems may arise if there is an over reliance on technology within the context of Design Practise. The relationship has been reflected upon from an historical and practical perspective. Many of the attributes, but not all, are considered that the Designer must possess to be employed or involved in research are referred to within the text. The current cultural reference points are defined to contextualise the influences that technology has today to the different age generations. An assessment of a small group of students' drawing ability highlights some of the problems that have been encountered in recent years in the process of understanding the cognitive operations enacted in the process of drawing. This paper proposes that a closer inspection of what has been understood; needs to be re-defined so that the relationship to technology, students and academics have a consensus of understanding which ensures that pedagogy leads technology.

Keywords: Design reflection, technology, designer skills

1 INTRODUCTION

The central focus of this paper is correlating the vested interests of students, technology and academics. The paper contains one small example of assessing ability and reactions to technology. The case study involved the act of drawing is an experiment to a mixed student cohort. It is asserted, that although supportive of technology the authors suggest that the key areas of: iteration, design, studying, the act of being reflective; plus the concept of hermeneutics and phenomenology is the ability to critique should not be diluted. There seems to be a common assumption that equates new technology to the value of good, but whether this is true in relation to the education of the designer needs to be questioned in terms of the quality of education and the everyday concern of resources and financial constraints that academics have to consider.

There is always going to be the perennial debate concerning want and need aspects of technology within a university by staff and students. Too often the premise is based upon 'it will make things better for all'. As a stop gap and an introduction to technology and training that may be so, however, that is not education. There seems to be a link between: assumed capitalist economics, the production of new goods and the perpetuation of material wealth, if this is so there is a concern whether the aesthetics from Tokyo to the Europe will be the same. Historical resonances and cultural differences may not be celebrated, but be subsumed by the production of 'goods that work only'. There is a debate to be developed which rises above the superficial and recognises other areas of knowledge and the relationship to people and technology ranging from the philosophical and the practical education of the designer.

The relationship between people and technology and design education is complex and one which needs to be understood from a number of different perspectives. One thing that separates us from technology is our ability – a crucial one – to contextualise and think independently about a leitmotif. The following variables are essential part of the toolbox a designer must have: the ability to reflect, to use this concept to teach, being aware of our personal cognitive processes and realising that pedagogy must lead technology [1]. Although there are many suggestions that technology will accommodate these skills in the future in the world of Artificial Intelligence. The 'what if' scenario within AI still

needs to be resolved, people do not think in simple polarised ways. However, the development of fuzzy logic and neural networks suggest that research is aiming in this direction.
By consensus many lecturers today seem to feel that under graduates are adequate to excellent in describing their work to academics in the studios or in a literary context. However, it is the area of being able to critique that seems to be the cause of many problems. If it is accepted that managing by objectives occurs at all levels of the curriculum. Subsequently, if this is acceptable as a generalisation it is unlikely that students would be comfortable producing critical discourse. Consequently, this increases the gap to technology as at the epicentre of technology is the binary system. Many academics would prefer an end product of research to present an empiricist approach that yields something tangible. This is solid evidence of a conversion of the abstract to the concrete. This is a process that is taught across many areas of design. Academics have worked with technology for many years, but there are at least three things that technology still struggles to accommodate, these are: the significance of emotions, ownership and the diverse range of processes used in the act of designing. Technology and the associated areas from software to robotics are sometimes defined in utopian terms and the assumption that technology will make everyone feel better; the converse argument to this is the dystopian view, popular in the counter culture of science fiction that which suggest that the point of singularity is on the way and the machines are taking over from people. The selling of technology traditionally referred to objects being labour saving devices. The middle ground between these points would seem to be the sensible, in terms of education, the use of technology and the maturing of our connection to technology seems to be realistic and responsible.

1.1 Case study

A final year undergraduate student at Nottingham Trent University [12] was convinced that his drawing was not of the standard which will be needed for him to gain employment. He could not obtain a drawing assessment a method could not be found that measured proficiency related to personal skills and what he perceived as a professional level needed to gain employment. He had to construct his own assessment system to measure whether he was informed enough to the level that he required. He designed a simple drawing test and a questionnaire that was given to under and post graduate students after they had been given a lecture on drawing. The results he obtained presented information that identified a number of areas in which the students were struggling. These same students had been working on successfully on CAD systems for several years. On screen they felt they understood three dimensions and had produced work of excellent quality, but struggled with the same concepts on paper.

2 RESULTS

The assessment was experimental in character and the aim- was to gather data that evaluate the level of drawing ability design undergraduates possess at different levels.
The objectives were:

- Design an experiment that will to assess the students' range of drawing ability
- To establish a variety of skills that a three-dimensional designer must possess through drawing
- Allow each test assessment to provide only one or two solutions.
- Design the assessments so that the majority can participate in order to gather as much data as possible.
- Garner feedback from the undergraduates.

There were a number of areas that raised concern from the pilot these existed in the following areas:
Question 2 extrusion, Question 6 the oblique, Question 7 the scale factor 4 applied, Question 9 Rotate around 90 degree axis and Question 10 Select and covert into shapes into the oblique 2 views from a series of drawings.
The suggestion in Gale's work [12] presented 'areas of consistent weakness amongst (*the*) participants and as a result it has been possible to propose improvements to the content of education design and art undergraduates receive. The syllabus needs to include both more detailed lectures and tutorials on: geometry observational studies (*including the life room*) Technical drawing *(and*) Perspective'. He continues,' (*there was)* strong evidence and identified patterns in the results suggests that students were not confident in their theoretical or working knowledge of using traditional drawing techniques suggesting that there is a robust correlation between the perceived problem by the individual and the

group in their lack of understanding concerning the space between fundamental knowledge and contemporary Design practise.' At the beginning of this research, which was overseen by the author, in discussions there seemed to be a consensus that expected the outcome, based upon the many comments from students over a substantial period of time.

Naturally, there has to be caution in interpreting the datum as it is a small number, but that does not negate the potential significance, this may suggest that there is a loss of knowledge which is fundamental, whether this is because historical information is not taught or people have become over reliant on technology is something that needs reflecting upon. There could be value in extending the research to a wider group on several levels within design education, particularly considering essential understanding at all levels within the curriculum.

The relationship to technology is informed in a number of ways from the scientific to the populist perspective exemplified in the wide range of topics inclusive of design today including: biomimetics, medical design and nanotechnology. The world of fashion and textile design also research extensively in technology for innovations to become part of our everyday clothing, so the omniscience of technology cannot be ignored. It does need to be recognised that people – in the main the younger generation- feel affiliated to technology in other domain of their lives including, Facebook and the act of Tweeting. This is an important part of their social lives. The relationship to technology in this context is one of networking and communication. People in design education are diverse in character and in their responses to technology. The evangelists and the luddites will not always agree and that can cause tension where constant development and progression is demanded to resolve problems and a causal connection to resolution is linked to technology and of course the costs. There is a need to allow young designers to explore ensuring that during the early stages of their careers they are encouraged and allowed to examine a wide ranging of options to appraise the process of evolving ideas. Many of the students have grown into a technical world and the area of visceral design is not as common to them as it may be to the more experienced academics.

The relationship between designers and technology is not an easy one to characterise. The role of technology and the industrial revolution should be considered during that period of time technology was written about by Marx concerning the fetishism of the commodity. Several authors suggest this transcends barriers to combine purpose and spontaneity in the process of work and Roland Barthes several years later [2], [3]. It is important to recognise that this historical context couches some of the debate and the relationship, whereas students desire a personalisation of the curriculum today. There is a danger that the proselytising approach to technology encourages the anonymity of the designer, something that design education does not often perpetuate. Indeed, there is often the cultivation of the individual.

It would be safe to assume that many designers feel a connection to their work, this may be visceral it could be linked to emotions or materials. But there is also a connection to their work in another way which is highlighted in the way designers think and work when designing. The closest parallel to thinking about design within the context of psychology is cognition which researches the processes of how we think and uses the metaphor of computing. The act of designing involves many different processes for the traditional to the contemporary [4], [5]. Whichever process is used, from the conservative to the radical, the one thing that does unify their action is the domain of reflection, which is a necessary part to designing [6]. Design is not a passive manifestation it is a form of critical analysis which uses a different criterion from the academic context but it fulfils the same function in that the process resolves problems or creates ideas.

Throughout the process of design we use various forms of memory as reference points. We acknowledge the importance of the principles of design leaving representation and recall using intelligence and learning [7]. Apart from these there are several other areas that we use when designing these are: Decision making and the area of serendipity and user-centred design is still essential to articulate accurately by technology, but so much design is based upon the characteristics that are demanded from a designers perspective. Within recent years SMART Design has become significant in medicine because of the relationship to bio-mimetics leading to numerous innovations and a new bridge between the subject and the process [8]. It is understandable that people get caught up in the buzz of technology and the excitement of the new, but there are those who are sceptical concerning new technology and anxious at the presentation of the image rather than one of substance. The potential to forget fundamental knowledge of a subject, the possible erosion of the individuality of the designer and the blurring of cultural barriers may lead to 'beige design' following on from the

historical black box aesthetics and the suppression of localised design rather than considering a whole range of possibilities linked to design [9].
Conversley, a debate could be held that suggests efficiency aligned to shorter lead times and linked to manufacturing may reduce the cost for a product from cradle to grave and encourage more opportunities for the designer meaning shorter processes, work that can be global in seconds and greater openings for the freelance and self-contained designer. In addition, there are new makers of the industrial revolution [10]. The relationship to technology that designers have been requested to focus upon is a timely one for educators. Collectively, we are all aware of the significance of IQ, but, there is also the EQ to consider. Although, these are interesting areas to reflect upon are we now to expect the TQ (technical) or IQ (2) on innovation to become significant also.

3 CONCLUSION

This paper was written to advocate a proposed balance between the education and the training of the designer in Higher Education. Historically, there are references to those who are cautious and those who remain eager to use the technology that is available today. However, there is a relationship that needs to be sagacious in the use of Technology and an encouragement not to see it as a panacea for Design, but to facilitate the process. Within technology and design there are those who are almost addicted to being aware of developments and those who are reluctant to be engaged with the role of the new processes of design. The polarity negates and ignores the link between people plus technology and overstates an unworldly approach to contemporary developments. Whether we can predict the next 50 years in design is a moot point [11]. The relationship between people and technology will increase to some extent, whereas to some there may be fixity of their purpose towards technology. Technology has significantly contributed to design and engineering. The maturing of the knowledge and its relationship to people and the subject will continue to develop, nevertheless it is people that will enact the designing and will also endure in ensuring that pedagogy leads technology.

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