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ABSTRACT

It is expected that by 2035 over one billion people will be living and working as digital nomads. Moser (2014) considers “Architecture 3.0” as a new disruptive economic model for the architectural professions made possible through digital technologies. Today’s architects and interior designers need to be entrepreneurial, resourceful, innovative and resilient with the ability to simultaneously access various mobile technologies and use multimedia in non-linear ways. We therefore question: How do we prepare our students for careers in hyper-connected globalised economies?

Web 3.0 enables a space in which the machine forms part of the meaning making process. In “learning 3.0”, learning occurs increasingly between people and their hyper-connected devices. In a “limitless symbiotic relationship between human and machine” (Wheeler 2012) our mobile devices are able to connect data, applications and people through cloud computing, and therefore as we learn from our devices so too do our devices learn from us.

Using a literature review and a comparison of learner attributes, the findings are discussed and presented as catalysts for alternative approaches to design curricula. In keeping with principles of rhizomatic learning, flexible responses are sought to the challenges of student protests regarding the cost of education and the relevance of westernised curricula. Flexible models of information exchange mean that students need to be taught how to learn and curate their digital learning environments with the lecturer as facilitator and mentor.

Keywords:

Learning 3.0, Rhizomatic, 21st Century skills

INTRODUCTION

It is expected that by 2035 over one billion people will be living and working as digital nomads (2Geeks1City 2016). In this paper we consider this statement and question if the traditional design studio is no longer relevant, how do we prepare our students for careers in hyper-connected globalised economies? Based in a University of Technology in South Africa, faced with the reality of student protests regarding the cost of education and the relevance of historically westernised curricula, the implementation of a new curriculum for the Architectural Technology and Interior Design programmes offered the authors the opportunity to critically consider this question.

Architecture 3.0

Architecture as a profession emerged from a need to design buildings and historically architects were trained through apprenticeship. In the twentieth century this craft evolved into a profession, and closely aligned, the interior design profession followed suit. Governed by professional bodies as gatekeepers with codes of conduct, standards and educational requirements creating closed doors into a profession made accessible only through competency exams and membership fees. Practice and training for this practice was outcome based, centred around how to complete design and construction documents geared to deliver buildings and their interiors to those who could afford them as efficiently and profitably as possible. In the twenty first century due to the impact of digital technology, globalisation and concern for sustainability the traditional architectural studio is no longer relevant.

According to a report commissioned by the Royal Institute of British Architects it is expected that by 2025 this profession will have completely changed in response to the needs of globalised digital economies (Jamieson 2011). In future, it is anticipated that global multi-disciplinary consultancies will play a larger role in response to growth in emerging markets. Multinational teams that are able to deliver at a fast pace and low cost will increasingly carry out the work previously done by small to medium sized architectural practices. Developers will need to be able to generate, fund, realize and manage projects with little risk to the client. Due to accelerated time frames and risk aversion, sub-contractors offering highly specialized services will take on more of the specialist design and detailing within buildings thus absorbing some of the traditional roles and responsibilities of the architect. Multi disciplinary creative agencies offering problem solving services will be employed as consultants working collaboratively as part of larger teams on projects. These trends are already evident therefore it is envisaged that the role of the architect will evolve to suit these needs (Jamieson 2011).

Moser (2014) considers a new disruptive economic model for the architectural profession. "Architecture 3.0" was born out of necessity in a post 2008 economic climate and was made possible through digital technologies. In this model, fewer architects are registering with governing bodies and choosing instead to practice in alternative, more open and creative environments. Contrary to limiting their scope of work to designing solutions for buildings, architects are now "designing for solutions" which could apply to a wide variety of complex problems. This work is leveraged by collaboration and networking and facilitated by digital technologies. Trained to have a deep understanding of the tools of design, when applied to a broader context, the architect is able to maintain relevance in this millennium.

Rhizomatic learning

Literature consulted identifies trends and student attributes in response to technologically mediated globalised economies. Cormier (2010) considers that students learn in technologically mediated networks that are open and constantly growing. The metaphor of the rhizome is used to describe this model in which "the community is the curriculum" and learning occurs through sharing. This learning is also referred to as "learning 3.0" and occurs between people but also increasingly between people and their hyper-connected devices in a "limitless symbiotic relationship between human and machine" (Wheeler 2012). Our mobile devices are able to connect data, applications and people through cloud computing therefore as we learn from our devices so too do our devices learn from us. Web 3.0 enables a space in which the machine forms part of the meaning making process (Cronje 2016a).

According to Deleuze and Guattari (1987) the rhizome is a non-hierarchical system with the following characteristics:

- Connectivity: any point on the rhizome can be connected to any other.
- Heterogeneity: the rhizome is made up of diverse parts.
- Multiplicity: refers to the number of components that make up the system, when the multiple is effectively treated as "a substantive multiplicity" it ceases to have any relation to the "One".

- A-signifying rupture: a rhizome may be broken, yet it will start to grow again at another point and form a new line.
- Cartography: the rhizome's unbound ever-growing structure is best represented as a map that can spread outwards.
- Decalcomania: a rhizome is not governed by a structural or generative model (there is no pattern) and as such it is a "map and not a tracing".

The six properties of the rhizome as described by Deleuze and Guattari (1987) underpin Learning 3.0 in which endless connections between diverse learners are possible in open heterogeneous networks. The learner can access the network at any point and breakaway groups can be formed. The community of learners is thus self-organising and flexible. The learner navigates this network along self directed and individual pathways and learning occurs in the process without predicting the outcomes in advance (Mackness, Bell & Funes 2015, Cronje 2016 a).

21st Century skills in higher education

Globally, academics are considering the curriculum and how to best respond to the fast paced changing needs of the 21st century. In design education, Vrontikis (2013) refers to designers as having to be entrepreneurs conversant with new models of funding such as crowd sourcing. Designers need to be resourceful, innovative, resilient and engaged in communities. In a world where the computer screen is considered too limiting, designers are expected to switch effortlessly between numerous mobile technologies using multimedia in non-linear ways. Students as well as professionals are becoming increasingly nomadic, selecting what is of use to them from particular courses or places of employment and then moving on to customise their particular skill sets.

Table 1: Trends and skills requirements for designers (Vrontikis 2013).

Designers as Peddlers	Designers are becoming entrepreneurs and need to be able to handle the entire process from concept, crowd source funding, prototyping and marketing.
Designers as Do-gooders	Designers are getting peer recognition through work in communities by mentoring and doing pro-bono work as apposed to entering design awards.
Designers as Swiss army knives	Designers need to have "media ambidexterity", the computer screen is considered limiting and students now work across media in a non-linear way. "Toggling between media as required and unbound by fear of failure".
Designers as Storytellers	In order to find more engaging ways of interacting with clients the narrative surrounding the designed artefact becomes important.
Designers as Nomads	Designers need agility to adapt to economical and environmental shifts. Students often attend three schools not necessarily finishing courses but taking the skills they need from different programmes. Designers embrace career mobility, taking what they need and then moving on, staff rarely staying longer than 3 years.

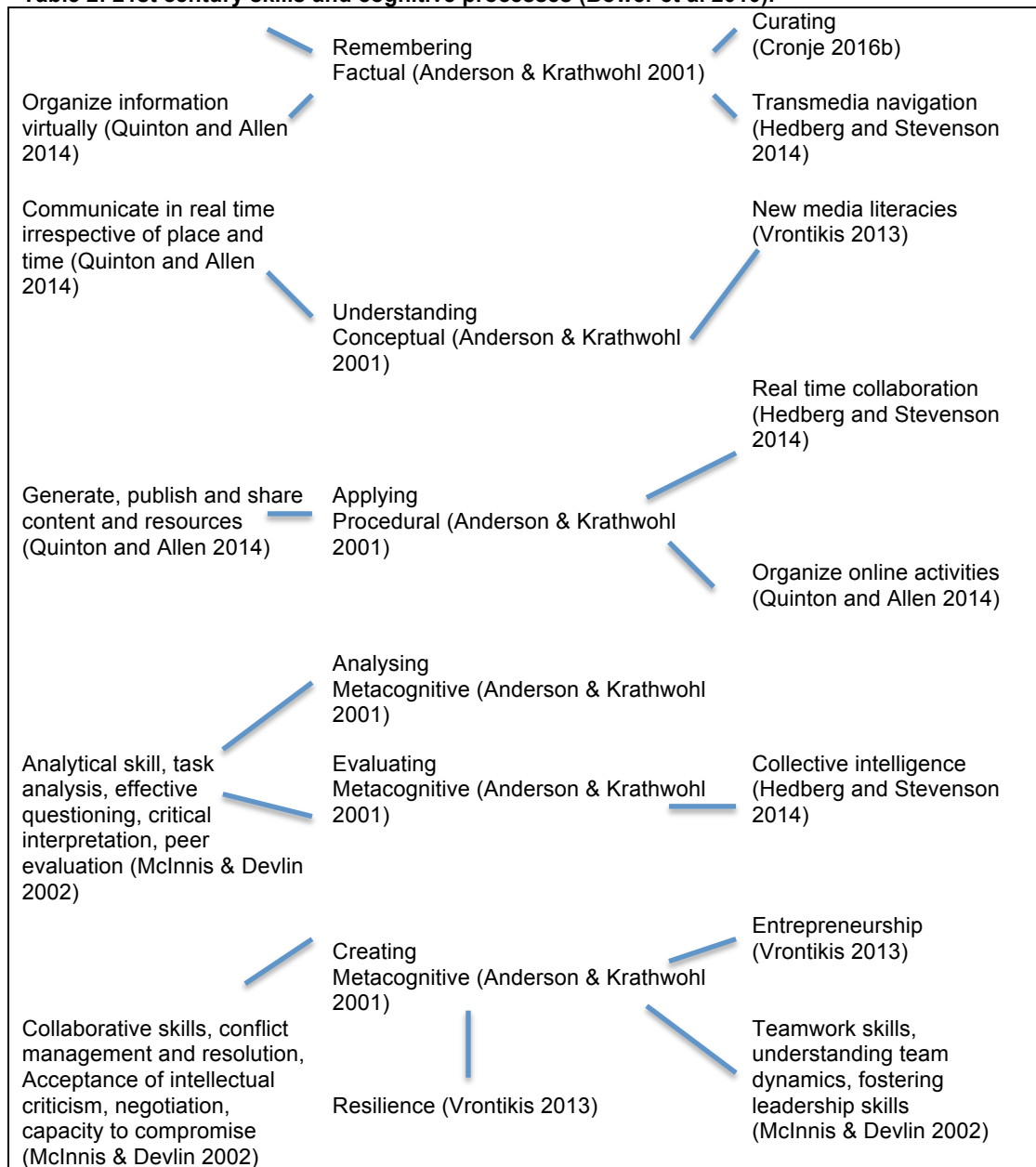
In a technologically mediated context learning is no longer linked to a to specific text, place or time (Hedberg and Stevenson 2014). Students explore new ways of accessing and generating constantly changing content through multimodal forms of representation. If technology is viewed as a "mediator of pedagogy" it is possible to keep the curriculum current, and constantly evolving. Hedberg and Stevenson (2014) recommend incorporating "flexibility, experience, generativity, and openness" in the curriculum to ensure relevance into the new millennium.

Creating "Virtual Collaborative Learning environments" which engage students, encourage participation and a sense of ownership of the learning networks in open access platforms could be a way of responding to the challenges of preparing students to enter digitally mediated working environments (Quinton and Allen 2014). Quinton and Allen recommend using open access platforms rather than traditional learner management systems as they have identified that learner management systems can be restrictive and possibly result in "online versions of traditional instructional design". Having to select suitable media and applications could also

empower lecturers and students to engage more meaningfully and take ownership of the interactions.

Various authors list 21st century skills facilitated by using the Internet and digital applications, some of these are listed in the table included below and would need to be considered when designing the curriculum.

Table 2: 21st century skills and cognitive processes (Bower et al 2010).



As global economies shift towards alternative economic models, emphasis is also shifting from artifacts to strategies, services and systems. Design education in turn needs to respond to this in order to better equip students with the skills needed to navigate these environments, such as the ability to work as part of part of cross, multi and trans-disciplinary teams facilitated by networks (Green 2014, Brass and Mazzarella 2015). The implementation of a new design curriculum in universities in the United Kingdom in 2014 was characterised by:

- Emphasis on products that solve real problems.
- Considering the needs, wants and values of users in student's tasks.

- The development of a broad range of subject knowledge, drawing on disciplines such as mathematics, science, engineering, computing and art.
- Teaching the ability to take calculated risks, becoming resourceful, innovative, enterprising and capable citizens.
- Gaining the skills needed to engage in an iterative process of designing and making, using techniques such as biomimicry and user-centred design to develop unique creative ideas (Green 2014).

The roles of the student and lecturer have thus also changed. In a world where there is limitless access to content, curatorship of this content is an important skill that should be taken into account in the 21st Century curriculum. Students are responsible to curate their own “personal learning environments” (Cronje 2016b) and are encouraged to be aware of their own thinking while lecturers need to monitor the student’s journeys, analyse the learning processes and provide feedback to the students and in so doing, facilitate the learning. The lecturer is therefore as active as the students (Quinton and Allen 2014) in a symbiotic relationship; Marshall (2014) likens this relationship with the Maori concept of ‘Ako’ meaning the “entwined synergistic experience of learning based on mutual respect and awareness of each others needs”. In our South African context this could also be described by the idea of “Ubuntu” which stems from African Philosophy and can be translated as “I am because you are”.

CONCLUSION

Leading on from the rhizome, the concept of the nomad is introduced by Deleuze and Guattari (1987) and is expanded on by Braidotti (2011). Nomadic theory embodies mobility of thought and is applicable to the constant change synonymous with the third millennium. In nomadic theory processes are more appropriate than concepts. Processes embody mobility and an affirmative transformative potential. The notion of “becoming” embodies this potential, and can be described as the path between points and represented by maps or cartographies (Deleuze and Guattari 1987). By mapping the 21st century graduate attributes from literature as catalysts for new flexible approaches to our design curricula alongside the expectations of professional bodies governing our architectural and interior design professions, we do not view these as being in opposition. We propose an open access, blended model of instruction that relies on a network of highly skilled lecturers, industry specialists, tutors and mentors to support students.

The challenges faced in our particular context with students coming from very diverse cultural backgrounds, often with very limited resources could be mitigated with rhizomatic learning. As demands for free education increase, alternative economic models for tertiary education are required. If learning is not limited to text, place or time, students could be able to work to generate income in order to progress their education incrementally.

Rhizomatic learning in open and unlimited networks offers opportunity for multiple multi-layered experiences, which embrace cultural diversity amongst students and lecturers emphasizing inclusivity and the democratisation of design education in South Africa. In a virtual space economic standing and cultural difference are less pronounced and the learning space could be seen as being a more democratic space where experimentation and creativity can be explored.

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