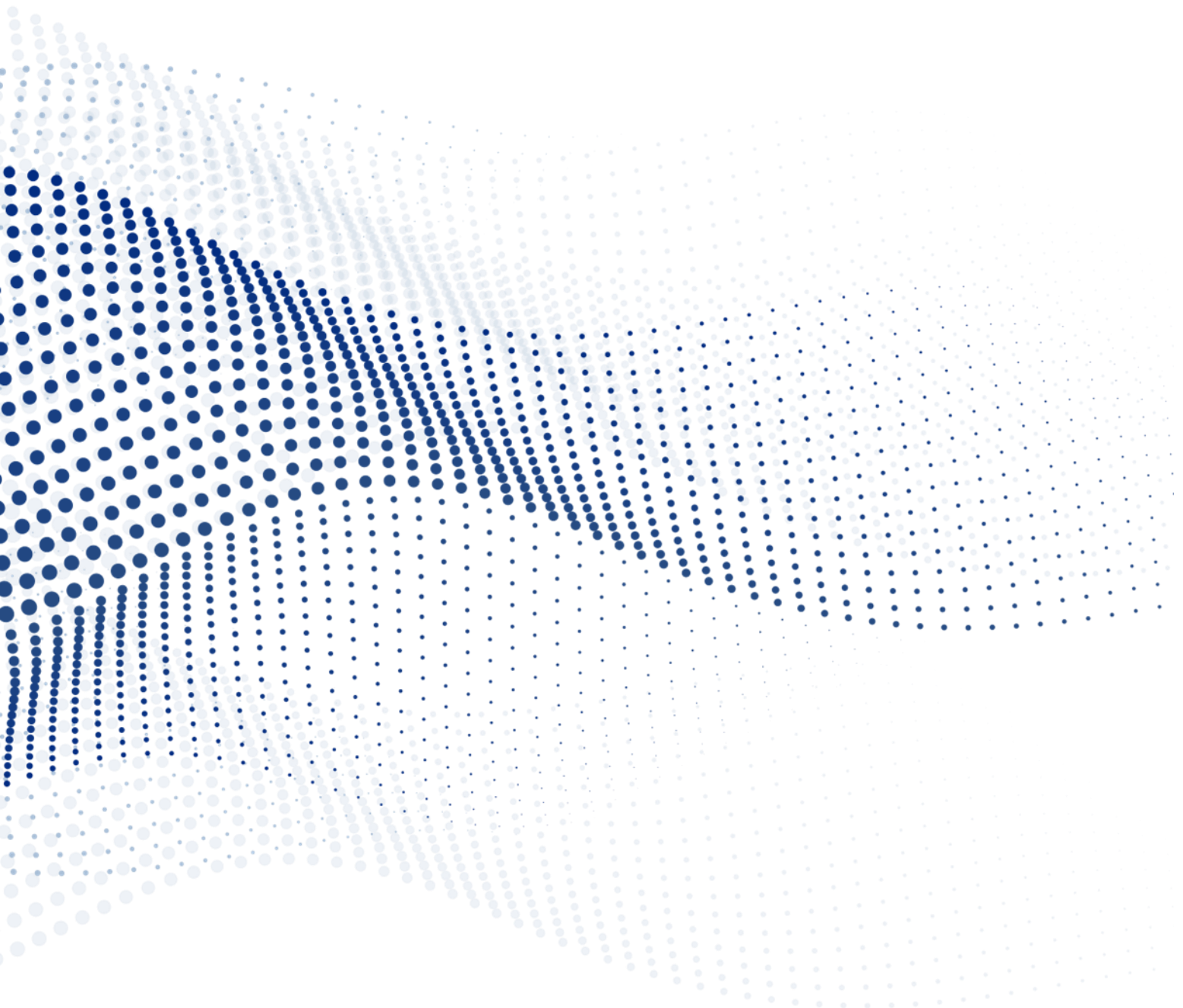


Position Paper 1: Lifelong learning and development to aid organisational innovation at GMT

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GMT research papers: Applying science to project interventions

(causal linkages targeting applied learning and development)



1. INTRODUCTION TO TOPIC AND BACKGROUND

The evolution of the work environment substantially influences the design and delivery of conventional organisational learning tools and methods (Hase, 2009). It sees the sequential nature of existing educational systems unable to align to the dynamic and non-linear characteristics of contemporary workplace settings (Hase, 2009; Moore, 2020). Such research and observations help us appreciate that both institutions and students must see learning as a continuous rather than a static process, i.e., a method to prepare for constantly changing real life environments (Abraham and Komattil, 2017). The greatest way to ensure institutions and learners are ready to cope, is to enable them to search for solutions to problems they encounter, as a function of lifelong learning. To prepare for lifelong learning, we must therefore adopt innovative learner-centered instructional approaches to understand learning as a continuous process (Ashton and Newman, 2006).

There are various systemic tools that also aid in appreciating learning as an ongoing and practical endeavor. These tools, methods and products are evolving rapidly after years of being seen as highly theoretical and distant from organisation contexts. It can be seen in prolific course offerings across the world to, develop, nurture and promote multi-dimensional problem solving capacities (Zhao et al., 2020), like for example, Santa Fe Institute in the USA; University of Cape Town (Udemans, 2013); and the University of Valencia in Spain (Barbero, 2016). These systemic research models embed its designs upon a critical science perspective, seeing both development and learning as a continuous, lifelong process containing many variables that has non-linear and cumulative effects (Krockoer and Shepardson, 1995; Udemans, 2013). Because of this context, knowledge, development and education, is seen as being a wicked-type problem, requiring specific complexity tools and practices to assist with integrating the many variables (e.g. viewing systemic problems from a multi-party perspective).

It calls for all organisations to adopt holistic modes of education (Anderson, 1992) and development (Udemans, 2013), in order to appreciate the interplay between multiple factors, across learners, teachers, curricula, instruction methods, applications, and assessments (Krockoer and Shepardson, 1995). It sees teaching, schooling, learning, and action communities as whole systems, where development and nurturing of collaborative relations are key (Barbero, 2016). In other words it sees education and development to draw from within, stressing teaching is not about inserting information into learners, but allowing them to build internal representations of new experiences (Piaget, 1972; Anderson, 1992). It calls for learning and development designs to specifically motivate learners to construct interpretations of cultural experience or context, when organising information (Piaget, 1972; Anderson, 1992). It highlights influences of broader learning processes, by harnessing knowledge that learners already know (Ausubel, et al., 1978). It sees knowledge construction coupled

to reason, understanding concepts, and then connecting these to prior conceptions or knowledge (Barbero, 2016).

Furthermore, by using and harnessing knowledge that learners already know, allow learners to build internal representations of new experiences (Piaget, 1972; Anderson, 1992). This concept is called learner agency, allowing learners to handle the complex nature of the workplace (Moore, 2020). Learners should be encouraged to integrate new scientific information with their existing knowledge, even if the new information appears to contradict what they already know. By reconciling and transforming their existing knowledge in this way, learners are able to deepen their understanding of the subject matter and explore it from different perspectives, including knowledge that crosses disciplinary boundaries. Holism sees educational tools as engaging learners cognitively and operatively, allowing them to reflect and process information using rich pictures (maps). It allows learners to relate new knowledge to their prior existing knowledge, which includes visual learning using colour, shape, location and motion (Barbero, 2016; Dhindsa, and Anderson, 2004; Ungerleider, 1995). In addition the OECD recognises 21st Century competencies to be (Ananiadou and Claro, 2009): creativity, critical thinking, collaboration, productivity, innovation, decision making, communication and leadership.

2. COUNTER ARGUMENT TO THESIS

There are a few basic models of education, by far the most entrenched flowing from traditional Pedagogy modelled upon European Monasteries (Halupa, 2014). Today, Pedagogy remains the dominant view, although originally designed to teach children; whilst Andragogy in turn is seen as transformative since it recognises adults to learn differently from children (Knowles, 1970). The third category is Heutagogy, which is a more self-determined learning model (Hase and Kenyon, 2013). All of these models form part of the overall learning, education, and development continuum.

The basic definition of pedagogy is - the art, science or profession of teaching (Smith, 2012; Webster, 2014); whilst another definition is “the art and science of teaching children” (Knowles, 1970). The basic definition of andragogy is: the art and science of teaching adults (Knowles, 1980), with modern versions embracing self-directed learning (Halupa, 2014). Heutagogy is defined as: a form of self-determined learning (Hase and Kenyon, 2013), and adopts double-loop learning (Argyris and Schon, 1974) recognising maps and other variables to impact learners. Importantly, Double-loop learning searches for underlying norms and processes of knowing, i.e., holistic understanding (Halupa, 2014; Udemans, 2013). Heutagogy describes an instructional strategy that emphasises learners' autonomy

(Hase and Kenyon, 2000). In heutagogy, teachers act as the students' compass while they are learning. Heutagogy is a learner-centered educational technique or approach rather than a learning theory like constructivism or behaviorism. In an effort to include learners' individual experiences into the learning process. Heutagogy acknowledges and values learner experiences (Carpenter and Green, 2017). This method was developed in response to the shortcomings in the educational system (Hase, 2009) outlined, particularly the necessity to offer teaching in a nonlinear manner to enable more application to the real world. Heutagogy emphasises the development of skills in addition to knowledge gain (Bhojrub, et al., 2010). It promotes learner agency as a core tenet, since they are empowered to take charge of their education by choosing what they learn, how they acquire it, and how they are evaluated (Blaschke and Hase, 2015). Through this method, students can learn how to best achieve their learning objectives, and be better equipped to handle the complexity of the workplace (Abraham and Komattil, 2017; Carpenter and Green, 2017; Blaschke and Hase, 2015).

Cognition, Learning and Development: evolving improvement views

(based upon: Knowles, 1970; Argyris and Schon, 1974; Kolb, 1984; Smith, 2012; Hase and Kenyon, 2013; Wang et al., 2013; Halupa, 2014)

	Pedagogy	Andragogy	Heutagogy
Definition:	art and science of teaching children	the art and science of helping adults learn	self-directed learning embracing holism
See learner as:	Learners are dependent	Learners are independent	Learning is integrated and inter-dependent
See teacher as:	Teacher driven control	Teacher and learner controlled	Teacher is mentor, learner chooses path
See learning as:	Prescribed and subject-centred	Specialised and task-problem-centred	Proactive and problem-centred
Motivation:	External (Parents, Law)	Internal (Career, Self)	Internal (Self-efficacy)
Platform:	Not too well suited for online or virtual	Well suited for online or virtual	Well suited for online or virtual

Figure 1: Summary of variation between learning-development models

3. DETAILS OF THE POSITION OR ARGUMENT TAKEN

Systemic learning insights makes nurturing and planning for future skills important across both content enhancements (referring to critical and systemic science); as well as delivery techniques (referring to modes of delivering education and learning experiences). The latter includes platforms that operate in difficult value chain conditions characterised by complex business models which leads to a loss of credibility and financialisation of delivery techniques (Zhao et al., 2020). The new forms of learning and development enables lifelong learning in new ways since they promote design metrics

aligned to future skills. They recognise and embrace fundamental distinctions between traditional pedagogy and andragogy. Andragogy is critical of Pedagogy, by actively promoting (Kearsley, 2010):

- *involving the learner in planning and evaluation;*
- *consider precedent experience, including mistakes of learners;*
- *discuss subjects relevant to the lives or work of learners;*
- *problem-centric learning versus content-centric.*

Andragogy design metrics are essential today, since it counters locked-in patterns arising from predictability of mechanistic worldviews (Hein, 1991; Udemans, 2008, 2013; 2020). It promotes innovations to help displace dated Cartesian linearity as contained in learning (Capra, 1996), socio-economic development, modern platforms and business models since it links to Constructivist theory (CT), which moves education toward holistic themes like (Ausubel, et al., 1978):

- *Knowledge cannot be transferred from the mind of teacher to that of learner;*
- *Shifting from teaching to facilitating learning (i.e., teaching by imposition versus negotiation);*
- *Active students learn much more than passive one's;*
- *Dialogue between learner and teacher (two-directional communication); and*
- *Learners to know that a problem exists, before they accept explanations.*

Holistic learning therefore combines learner experience, perception, cognition and behaviour (Kolb, 1984), and therefore sees learner experiences itself as a vital source of learning and development (Kolb, 1984). Likewise, Holistic Education (HE) questions the exploitative direction and values associated with learning presently. Holistic education suggests important elements (Forbes, 1994) like: valuing relationships as the primary source and subject of education; fostering a trusted community within the classroom or platform; promoting interactions based on mutual support rather than competition or hierarchy; viewing the teacher or platform as an experienced friend, mentor, facilitator, or trusted companion rather than a controlling authority; and emphasizing the development of empathy within learning relationships and platforms.

At its core, Holism or systemic sciences encourages viewing the world as an adaptive system, promoting global governance (Panarchy), and equality (Udemans, 2013). Both Constructivist theory and Holistic education emphasise the need to change our mechanical ways, by educating future generations about social and ecological issues, giving them tools to face it collaboratively – i.e. working with the community and the environment and not against it (Battistoni and Barbero, 2017). One consequence of this shift is to transition from teaching of theories to the teaching of methodologies

(Battistoni and Barbero, 2017). The teaching of methodologies is based on constant teacher-student discussion and transforms the teacher's role to one of providing methodologies for students to create something new. In addition, as a consequence of the shift, there is a recognition of the importance of trans-disciplinarity (Celaschi, 2008; Udemans, 2013), where several disciplines not only interact, but also integrates into a whole, making boundaries disappear (Celaschi, 2008; Udemans, 2013). Systemic design theory sees design as a discipline that lies midway between various knowledge areas, like humanities, engineering, economics, management (Celaschi, 2008), and sees designer as mediator, deploying trans-disciplinarity as a method (Celaschi, 2008; Celaschi, et al., 2013), having features like (Celaschi, et al., 2013):

- *Reducing bias and authority on products;*
- *Mediating integration of different types of knowledge and specialisms;*
- *Discover talents, build organisations and chains of skills;*
- *Use design tools to define strategies, study situations and analyse opportunities;and*
- *Economics, management, social sciences converge as whole knowledge;*

It is important to appreciate that systemic products are rare, but increasingly being developed and deployed (e.g. the Open Systems lab; Cognitive-Engine; etc.). These new tools and platforms deliberately adopt systemic knowledge to promote both socio-ecological (biophilic) and empathetic orientations, like for example where a tool like Systemic Design, requires production and technological systems to be based upon nature or natural systems (Bistagnino, 2011). Such empathetic and biophilic design methods prevent common design mistakes that overlook the impact of products on communities and the environment (Udemans, 2014; 2022). Modern systemic design promotes a changed focus from the design of products themselves, to the design of production process that lies behind products. From a learning perspective this statement underscores the need for a holistic understanding of the production process and the interdependencies between different stages of value chains of learning. It encourages learners to consider the broader system and its dynamics, emphasising the importance of sustainable, efficient resource use.

It results in an environment where learners are more engaged and spend more time in the learning and comprehension process (Hase and Kenyon, 2007). It integrates various non-linear processes and its many variables (e.g., capability, action, learning, reflection, and the environment), all systemically linked under systems theory that values experience and interaction (Hase and Kenyon, 2013). In Heutagogy teachers provide the material, but the students decide how to negotiate the learning process, thus empowering the learning to control their learning.

4. CONCLUDING REMARKS

The epistemologies of curricula and learning are important considerations especially considering faculty members tend to cling to pedagogy because it is known and comfortable. It ties into our dominant educational theories of (Knowles, 1970): (1) Cognitive learning theory - based upon the brain, of how learners gain information, how learners process information, and learner styles (Kolb, 1984; Gardner, 1985; Fleming and Mills, 1992). Learning styles see instructional design as based upon cognition, where the content must meet various styles of learning. In constructivism, students obtain knowledge by filtering new knowledge through their own personal experiences, as typified by theorists like Piaget, Dewey, Montessori and Vygotsky. Constructivist theories are based upon adaptation, by allowing learners to adapt to their learning experiences via: (1) assimilation - where new knowledge is learned within the context of previous knowledge and experiences; and (2) accommodation - where the judgments and assumptions of this new knowledge is based on previous knowledge and experiences (von Glasersfeld, 1989). It also supports the view that students learn long before they begin formal education (Vygotsky, 1978). In behaviorism, learning is seen to occur when learners are subjected to stimuli, and links to a psychological approach like Pavlov, Watson, Skinner (Halupa, 2014). This paper must be weighed in context of emerging educational theories and learner trends (McLoughlin and Lee, 2008), seeing all students, no matter their age, to juggle work, study and technology. From a critical science perspective, the need to infuse critical thinking in problem-based assessments across all learning and development, is vital, despite being challenging. As such, it may be best to view pedagogy, andragogy and heutagogy as a continuum whereby: pedagogy suits the youth; andragogy to suit young adults; heutagogy to suit post-graduate or mature, experienced adults. These forms and methods of learning are becoming increasingly supported by various e-learning tools (e.g., Discussion Board, Wiki, Blog), providing support for emerging learning approaches (Wang, et al., 2013; Dron, 2003; Tosh and Werdmuller, 2004; Glogoff, 2005; Parker and Chao, 2007). An example of this is Blogs which allow people to post their thoughts and opinions for others to read (Blood, 2000), allowing for peer review via comments and feedback (Dron, 2003). This interaction stimulates active learning, enabling both knowledge building and creation (Tosh and Werdmuller, 2004). Some e-learning tools allows for the generation of own content (e.g., What-I-Know-Is), where the user-groups contribute toward completing projects (Parker and Chao, 2007; Blood, 2000; Augar, et al., 2012), thus facilitating active learning.

To be a leader in mobility GMT needs to adapt to a rapidly changing environment of both informing and reframing the practice of learning (Ashton and Newman, 2006). Fostering an innovative culture by treating learning as a lifelong journey requiring critical thought and practice at all levels of the

organisation will enable GMT to remain a provider of world class mobility solutions. To support the transition in providing innovative mobility solutions, GMT will need to support learner autonomy, improving learner's cognitive engagement with content and tasks, thereby assisting in the development of attributes associated with capability (Abraham and Komattil, 2017). Harnessing such development of the officials will have a direct and lasting positive impact on the objectives of GMT's transformation initiative. This positioning paper intends to lead to a strategy that considers the key role that officials will play in responding to the challenges and bringing about the expected changes to the overall mobility experience for client institutions who, in turn, have to deliver on their service delivery mandate to the citizen.

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