Through a design education lens:
Are we reinventing the wheel for entrepreneurial education?

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DECLARATION

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

Signed

Date 10 May 2021

STATEMENT 1

This thesis is the result of my own investigations, except where otherwise stated. Correction services have not been used. A bibliography is appended.

Signed   (candidate)

Date 10 May 2021

STATEMENT 2

I hereby give consent for my thesis, if accepted, to be available for deposit in the University's digital repository.

Signed

 Date 10 May 2021

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Abstract

Entrepreneurial education is the fastest growing field of education, but the academic discourses have remained firmly planted in the business and management school literature, and miss insights from other disciplines. This thesis discusses a portfolio of 14 papers that were published during the period 2011 – 2020. These provided insights that would advance teaching, learning and assessment within enterprise and entrepreneurship education (entrepreneurial education), by drawing on experiences and discoveries made from working within design education. The portfolio demonstrates how the researcher's personal academic and practitioner interests at a local level became of interest to international policy makers and researchers, and maps the progression of scholarly work against insights gained.

The papers are all jointly written, and the contributions developed from the almost unique perspective of a business educator who become immersed in design education theory and practice. This positioning enabled the researcher to act as a translator between disciplines, and placed her in a position to clarify alignments between design-led and business-led educational goals.

The thesis is a reflexive overview of the theoretical and empirical understandings in the published works, and provides insights and observations that led to a central tenet that entrepreneurial education can be advanced with understandings from the field of design education. The portfolio's distinct contribution is a new lens through which to view and understand emerging trends in education, specifically when the goal is to develop 21st Century skills that embrace creativity and innovation.

Table of Contents

List of Figures

Section 1: Presenting the published work.

1.1 Summary list of published works and researcher contribution.
1.2 Summary of the status of published works, including a summary of academic and applied contribution.

1.1 Summary list of published works and researcher contribution.

1. Penaluna, K., Penaluna, A., Usei, C. and Griffiths, D. (2015), 'Enterprise education needs enterprising educators', *Education + Training*, **57** (8/9): 948-963. https://doi.org/10.1108/ET-03-2015-0016 *Researcher contribution 75%*

2. Penaluna, K., Penaluna, A. and Jones, C. (2012), 'The Context of Enterprise Education: Insights into Current Practices', *Industry and Higher Education*, **26** (3): 163-175. *Researcher contribution 70%*

3. Penaluna, A. and Penaluna, K. (2015), 'Entrepreneurial Education in Practice, Part, 2 – Building Motivations and Competencies', *Entrepreneurship 360 Thematic Paper*, Organisation for Economic Co-operation and Development (OECD, LEED Programme) and the European Commission (DG Education and Culture). *Researcher contribution 50%*

4. David, K., Penaluna, K., McCallum, E, and Usei, C (2017), 'Embedding Entrepreneurial Skills development in Teacher Education', in J. James, R. Valdes-Cotera, and J, Preece (Eds) *Entrepreneurial Learning City Regions: Delivering on the UNESCO 2013, Beijing Declaration on Building Learning Cities,* Springer, Switzerland, pp. 319- 339. *Researcher contribution 75%*

5. Jones, C., Penaluna, K. and Penaluna, A (2020), 'Value creation in entrepreneurial education: towards a unified approach', *Education + Training*, **63** (1): 101-113. https://doi.org/10.1108/ET-06-2020-0165 *Researchers contribution 30%*

6. Jones, C., Penaluna, K., Penaluna, A., and Matlay, H. (2018), 'The changing nature of enterprise: Addressing the challenge of Vesper and Gartner', *Industry and Higher Education*, **32**(6): 430–437 *Researcher contribution 30%*

7. Penaluna, A. and Penaluna, K. (2020), 'In search of entrepreneurial competencies: Peripheral vision and multidisciplinary inspiration', *Industry and Higher Education*. doi:10.1177/0950422220963796 *Researcher contribution 50%*

8. Jones, C., Matlay, H., Penaluna, K. and Penaluna, A (2014), 'Claiming the future of enterprise education', *Education + Training*, **56** (8/9): 764 – 775. *Researcher contribution 30%*

9. Jones, C., Penaluna, K. and Penaluna, A. (2019), 'The promise of andragogy, heutagogy and academagogy to enterprise and entrepreneurship pedagogy', *Education + Training,* **61** (9): 1170-1186. *Researcher contribution 30%*

10. Penaluna, A. and Penaluna, K (2011), 'The evidence so far: calling for creative industries engagement with entrepreneurship education policy and development', in C. Henry and A. de Bruin (Eds), *Entrepreneurship and the Creative Economy*, Cheltenham UK and Northampton, MA, USA: Edward Elgar Publishing. pp. 50-78. *Researcher contribution 50%*

11. Penaluna, A., Penaluna, K. and Polenakovikj, R. (2020) 'Developing entrepreneurial education in national school curricula: lessons from North Macedonia and Wales', *Entrepreneurship Education,* **3,** 245–263 *Researcher contribution 45%*

12. Penaluna, A, Penaluna, K. and Diego, I. (2014), 'The role of creativity in entrepreneurship education', in R. Sternberg and G Krauss (Eds) *Handbook of Research on Entrepreneurship and Creativity*, Edward Elgar, Glos, pp. 360 – 397. *Researcher contribution 35%*

13. Penaluna, K., Penaluna, A., Jones, C. and Matlay, H. (2014), 'When did you last predict a good idea?: Exploring the case of assessing creativity through learning outcomes', *Industry and Higher Education*, **28** (6): 1-12. *Researcher contribution 60%*

14. Penaluna, A and Penaluna, K. (2019), 'I'm a designer, get me out of here: can entrepreneurial education advance through learning from design education?', in A. Fayolle, D. Kariv, and H. Matlay, (Eds) (2019), *The Role and Impact of Entrepreneurship Education: Methods, Teachers and Innovative Programmes*, Cheltenham UK and Northampton, MA, USA: Edward Elgar Publishing, pp. 13-34 *Researcher contribution 50%*

The researcher contribution within this portfolio is the equivalent to 6.8 papers.

1.2. Summary of the status of published works, including a summary of academic and applied contribution.

The portfolio of research, as in Appendix 2, has been used to challenge previously dominant paradigms, through the incorporation of designerly-led investigation and insights. Specifically, the research has been used to:

- Springboard a PhD and new educator programmes at the University of Wales Trinity Saint David (UWTSD) up to doctoral level.

- Develop a university wide approach to teaching and learning for enterprise and entrepreneurship.

- Support Welsh Government initiatives on entrepreneurial education in Universities.

- Inform United Kingdom (UK) Government review into enterprise education within Further Education (FE) and Higher Education (HE).

- Inform new models of schooling in Wales and North Macedonia, to incorporate entrepreneurial learning.

- Inform European 'de facto' guidance in entrepreneurial learning – at all levels of education.

- Develop and lead new models of educator development across Europe

- Inform European Union (EU) and Organisation for Economic Co-operation and Development (OECD) level policy and practice guidance on entrepreneurial learning.

- Inform United Nations research into entrepreneurial learning.

- Through a range of international keynotes that include the European Parliament, present the case for more educator development associated with entrepreneurial learning.

Section 2. Reflective analysis

1. Introduction to entrepreneurial education and the portfolio.

1.1 A central tenet: entrepreneurial education can be advanced with understandings from the field of design education. Introductory insights and observations.

Entrepreneurial education is the fastest growing field of education, but the academic discourses remain firmly planted in our business schools, and potential contributions from other disciplines are rarely considered. This thesis responds to one opportunity to look further afield, it suggests that design education has much to offer.

The papers included within this submission are all jointly written, and the primary contribution is made from the almost unique perspective of a business educator, who has become increasingly immersed in design education theory and practice. This positioning enabled the researcher to act as a translator between disciplines, and placed her in a position to clarify alignments between design led and business led education and their associated goals. The portfolio offers a new lens through which to view and understand the trends that are happening in education, specifically when the goal is to develop 21st Century skills that embrace creativity and innovation.

The researcher's evolving expertise, has resulted in engagement with national and international policy and practice developments in entrepreneurial education, and each invitation to engage has afforded opportunities to enhance understandings. Rich insights from working with those engaged in policy and implementation have therefore driven the academic contributions.

Importantly, during her learning journey the researcher has had to take on board many alternative views, and discovering alignment with experience of existing design education practice has been a common outcome. Whilst Design Thinking has introduced the value of Design to entrepreneurial educators, it has yet to embrace the more nuanced theories and practices used in design education. This is the research space in that the researcher has developed, and in which her expertise has been acknowledged.

Specifically, the thesis discusses a portfolio of 14 papers that were published during the period 2011 – 2020, as presented in Appendix 2. These aimed to provide insights that would advance teaching, learning and assessment within enterprise and entrepreneurship education (entrepreneurial education), by drawing on experiences and discoveries made whilst working within design education. Based on a series of critical reviews of theories and practices evolving in entrepreneurial education, the portfolio explores perceived parallels that pre-exist within design disciplines. From first introducing 'designerly' thinking into the enterprise discourse over 15 years ago, a chronological journey of practice and research and its contribution to the multifaceted field of entrepreneurial education is discussed, which in turn, maps progression in terms of insights gained.   As an integral part of this journey, it also demonstrates how the researcher's personal academic and practitioner interests at a local level became of interest to international policy makers, research-based institutions and individual academic researchers.

In order to initiate the discussion, the global drivers for entrepreneurial education are firstly considered, and the terminologies and definitional stances of enterprise, entrepreneurship and entrepreneurial education clarified.   The scene is then set through contextualisation of the entrepreneurial landscape and the researcher's ontological position and engagement within it. A discussion of the methods employed in this practitioner enquiry follows, preceding a synthesis of the publications, where a range of observations and insights from the portfolio's cohesive body of work are presented. Finally, the researcher's contributions at regional, national, European and International level are demonstrated, and the resulting impact discussed. Whilst the portfolio provides insights and observations that have led to impactful contributions, it does not claim best practice. Therefore, to conclude the thesis, reflections and observations that provide opportunities for further explorations are presented.

2. Research Context

2.1 Situational context: locating the working environment.

2.1.1 Global drivers for entrepreneurial education

In 2005, at the start of the researcher's journey, Kuratko (2005, 577) observed that in the previous two decades entrepreneurship and business start-ups had developed as 'arguably the most potent economic force the world has ever experienced'. Entrepreneurship is now viewed as a substantial contributor to economic sustainability (Perényi and Losoncz (2018), with small and medium sized businesses observed to be key in ensuing economic growth (Eurostat, 2015). Political engagement has increased and it is now a high priority in public policy throughout the world (Katz, 2003, Volkmann et al., 2009, United Nations, 2012, Bacigalupo, et al., 2016, British Council, 2017, Doran et al., 2018, Bosna et al., 2020, Neumann, 2020).

The most comprehensive report undertaken into entrepreneurship is the annual Global Entrepreneurship Monitor (GEM), which was introduced in 1999. When examining 21 years of data gathered since its inception, the 2019/2020 report demonstrated a rise in entrepreneurial activity. The measurement being based on the percentage of the population aged between 18- 64 engaged in either early stage start-up activity or those owning businesses established for 42 months or more (Bosna et al, 2020). Fifty economies contributed to the 2019/20 report, leading the authors to assert that,

> entrepreneurship is in the spotlight as never before, with multiple governments
> increasingly focused on putting into place policy frameworks and mechanisms to
> drive and promote entrepreneurship (Bosma et al., 2020, 13).

Education is a vital driver, and in consequence entrepreneurial education is one of the fastest growing fields of education (Nabi et al., 2017). However, the World Economic Forum (2020a) in its COVID Action Platform, observed concerns over a 'slowdown in entrepreneurial activity at the world's universities'. This observation presents a number of questions, not least, what definitions are being employed to gather data, and where are they looking?

The orientation of educational programs range from a narrow business start-up focus to a broad competency approach that encompasses; opportunity recognition, problem solving, creativity, team work, communication (Valero, 2014, Lackéus, 2015, World Economic Forum, 2020b). In turn, developing the abilities to become an entrepreneur (Welsh et al., 2016), and or, become more entrepreneurial in behaviour (Bacigalupo, et al, 2016) have become international goals, and metrics that move beyond the limitation of narrow start-up towards understanding the holistic capabilities required continue to develop. This broader competency-based approach responds to acknowledged skills gaps for the 4th industrial revolution (Bacigalupo, 2016, OECD, 2018, Weicht, 2018, World Economic Forum, 2020b).

To address the needs of its multiple stakeholders, the research and practice agenda for entrepreneurial education is multifaceted, and includes; women's entrepreneurship (Wieland et al., 2019, Cardella et al., 2020), entrepreneurship in developing countries (United Nations, 2012, Marcotte, 2014), family entrepreneurship (Shen et al., 2017), regional development (Ferreira, et al., 2017), rural entrepreneurship (Martin et al., 2013, Mariet Ocasio and Mariet Ocasio, 2016), social entrepreneurship (Gandhi and Raina, 2018), necessity entrepreneurship (Fuentelsaz et al., 2015) and diaspora entrepreneurship (Elo et al., 2015). The most recent addition being harmonious entrepreneurship (Kirby and Healey-Benson, 2021). Within each is a subset exploring aspects such as; behaviour (Ansah et al., 2019), mindset (Kaffka and Krueger, 2018), ethics (Vallaster et al., 2019), and access to funding (Alsos and Ljunggren, 2017).

Much work has focussed on the role of the University sector, but there is an increasing awareness that a pipeline from schooling needs to be established (Draycott and Rae, 2011). European funding directed towards this requirement includes projects such as the South-East Europe Centre for Entrepreneurial Learning (SEECEL, 2016, SEECEL, 2018), where a comprehensive set of learning outcomes for different levels of education were developed. It also includes Thematic Working Groups (European Thematic Working Group on Entrepreneurship Education, 2014) reviews that look at the nature of adoption within Europe (Eurydice, 2016).

Whilst there is a global imperative for entrepreneurial learning, a recurring theme in the discourse is the diversity of programs, definitional confusion (between narrow and broad approaches) and, due to the heterogeneity of programs, a lack of rigorous evaluation (Valero et al., 2014, Sirelkhatim et al., 2015, Moberg et al., 2020). As a consequence, there are limited understandings of the impact of educational interventions on learners and their respective stakeholders (Penaluna et al., 2012, Blenker et al., 2014, Valero et al., 2014, Eurydice, 2016, Kuratko and Morris, 2017). There is also an emerging discourse on the dark side of entrepreneurship, where unprepared students learn the theory but have little practice or experience (Shepherd, 2019, Bandera et al., 2020). Thus, a multi-disciplinary approach has been called for and arguably sets the scene for broader competency considerations over knowledge acquisition. Many calls were designed to advance the broad competency perspective, and in 2009 Klaus Schwab, Founder and Executive Chairman of the World Economic Forum asserted that,

> Entrepreneurship is the engine fuelling innovation, employment generation and economic growth', and refers to, 'the power that education has in developing the skills that generate an entrepreneurial mindset and in preparing future leaders for solving more complex, interlinked and fast changing problems (Volkmann et al., 2009, 6).

Moreover,

> Now more than ever we need innovation, new solutions, creative approaches and new ways of operating.   We are in uncharted territory and need people in all sectors and at all ages who can "think out of the box" to identify and pursue opportunities in new and paradigm thinking ways (Volkmann et al., 2009, 12).

To bring us to 2020, in its report for Schools for the Future, the Forum continues its calls, observing,

> Skills that enable innovation include curiosity, creativity, critical thinking, problem solving and systems analysis – all of which are set to be high in demand in the labour market in coming years (World Economic Forum, 2020b, 8).

Evidence that the broad competency perspective has gained increasing momentum during the development of this portfolio is exemplified in the foreword to the 19/20 GEM:

> Until recently, (policy) recognition for entrepreneurship worldwide had been quite prominent mainly for its asserted contribution to economic growth. For this reason, it has, in many economies, only appealed to some parts of society. Currently, however, we see more and more societies appreciating and embracing the overall benefit of entrepreneurial behaviour, and reorganizing their institutions in such a way that entrepreneurial activity is recognized and rewarded when it adds value to society, both to overall welfare and its distribution across particular groups (Bosma, 2020, 1).

To hone the study to the devolved government of Wales, the domain of the researcher, is that in an ambition to transform its economy the Welsh Government issued their strategy 'A Winning Wales' in 2004 (Welsh Government, 2010). One action being a Youth Entrepreneurship Strategy (YES). The YES aimed:

> to equip young people aged 5-25 with entrepreneurial skills and attitudes to raise their potential whatever choices they make in their working life (Welsh Government, 2010).

The underlying premise is echoed in their Economic Action plan 'Prosperity for All' (Welsh Government, 2019), and it should be noted that UWTSD is the case study selected to showcase University engagement (page 27).

Wales is also in the midst of a comprehensive reform in schooling, prompted by a review of Welsh provision in 2014 (Furlong, 2015), a new curriculum has been designed to work around the purposes of school education (Donaldson, 2015). Although arguably all purposes align, one of the four purposes specifically state the need to develop;

'Enterprising, creative contributors who are ready to play a full part in life and work' (Donaldson, 2015).

2.1.2 The E's of 'Enterprise', 'Entrepreneurship', 'Employability' and 'Entrepreneurial Education'.

Definitional stances – moving from interchangeable convoluted terminology towards clarity.

In 2005, when the researcher's investigation began, the terms 'enterprise', 'entrepreneurship', 'employability' and 'entrepreneurial' were convoluted, and often used interchangeably, which made conceptual understandings challenging (Westhead et al, 2011). At a micro-level, this often remains the case in scholarly articles where the definition will impact greatly on the findings. Thus, in order to address the broader context of this portfolio, we need to consider where definitional consensus has been gained, not only by HE level educators, but by the broader entrepreneurial community.

When the researcher joined the academic discussions in the early 2000s, the Welsh Government's ACRO Model of Attitude, Creativity, Relationships and Organisation was dominant, especially in schooling. However, despite being based on research undertaken by the ministry responsible for business, academic colleagues were critical, and the model did not become known beyond Wales. ACRO is still being used in Welsh Schooling (See: Business Wales, 2020), though may well be superseded by new curricular reforms.

The Higher Education Academy at the time of the researcher's engagement had a range of Subject Centres, one being the Business, Management, Accounting and Finance (HEA-BMAF), who overviewed and advised the sector. Another was the Art, Design and Media (ADM-HEA), who were taking an active interest in entrepreneurship, due to the nature of employment in the creative industries (See Clews and Boddington, 2007). The researcher's work was selected as one of 5 in-depth case studies for dissemination by ADM-HEA (Kellet, 2006) and as a direct result, the researcher also co-authored a paper for HEA-BMAF. The net result being that she was invited to manage a UK Special Interest Group in Entrepreneurial Learning (HEA-BMAF EL-SIG). In 2010, and following a meeting at Broadcast House at Leeds Metropolitan University (now Leeds Becket) where the Quality Assurance Agency for Higher Education were invited to the SIG meeting, the seeds were planted for the development of national guidance.

It wasn't until the UK's Quality Assurance Agency for Higher Education (QAA), following this work by the Higher Education Academy (now Advance HE), developed guidelines through consensus gathering, further supported by the wide-ranging research of Gibb, that definitional clarity started to emerge for the UK HE sector (QAA, 2012). During the writing of the papers in this portfolio, a further national consultation took place, which not only supported the clarity of QAA's definitions, but also called for them to be strengthened (QAA, 2018). Moreover, bodies such as Enterprise Educators UK, a UK HEI membership body of

over 100 HE providers have formally adopted QAA's work, establishing a baseline of definitional understanding in the UK, one that was only just emerging when this portfolio commenced.

In terms of usefulness in this research and its policy environment, consensus now includes senior policy makers such as the UK Government's Department for Business Energy and Industrial Strategy (BEIS) under their Chief Scientific Officer for Entrepreneurship, Professor Tim Dafforn, prompted in part by correspondence between the Council for Science Technology's Sir Mark Walport and the Prime Minister (May, 2017). To provide further impetus in terms of policymaking, the All Party Parliamentary Group for Entrepreneurship, called for independent evidence of development in the University Sector (APPG Entrepreneurship, 2018). Their report concluded that:

> Given the calibre of the UK's higher education sector, it is perhaps to be expected that we punch our weight when it comes to expertise on enterprise education. Many responses to the Call for Evidence specifically lauded the QAA 2012 guidance on Enterprise and Entrepreneurship (updated in 2018) as the culmination of years of thinking, which built on previous reports, including, but not exclusively, the APPG for Microbusinesses 2014 Report: An Education System Fit for an Entrepreneur and the Government's Enterprise for All report, led by Lord Young (APPG Entrepreneurship, 2018, 5).

Of note, is that the original (QAA, 2012) guidance documents were only intended for the UK, but had subsequently found favour internationally. For example, in Thailand, they were used to develop a new strategy in Further Education (British Council 2016) and in China the National Centre for Entrepreneurship in Education developed a translation that was used with support of the British Council. As will be discussed in this portfolio review, European policy makers and the United Nations also drew on the QAA's definitional guidance, but adapted their language to suit contexts beyond UK Higher Education. Most pertinently, the EU Joint Research Centre's EntreComp Framework (Bacigalupo et al., 2016) used both the Welsh ACRO Model (Business Wales, 2020) and QAA (2012) to springboard their work. As will become evident in the thesis, insights into these developments helped to ensure the relevance and timeliness of the researcher's interventions.

This broader contextual environment is important to consider, as the portfolio and its influence are not limited to UK Higher Education environments. Perhaps pertinently, in recent months the QAA definitions have also been acknowledged by a joint OECD / EU

literature review as an influential taxonomy, partially because they address 'the concerns of the decennial reviews regarding the field's lack of conceptual clarity' (Moberg, 2020, 10) and partially because of the clarity offered in the progression model, 'One key guidance tool in the QAA is the "gateway triangle" which identifies different assessment approaches for enterprise/entrepreneurship education' (Moberg, 2020, 14). Hence, we see the two dimensions of policy and practice evolving together with definitional clarity of both the broad and narrow perspectives, which will help to situate the portfolio's developmental environment.

In UK Higher Education quality terminology, Enterprise is now defined as:

> the generation and application of ideas, which are set within practical situations during a project or undertaking. This is a generic concept that can be applied across all areas of education and professional life.

> It combines creativity, originality, initiative, idea generation, design thinking, adaptability and reflexivity with problem identification, problem solving, innovation, expression, communication and practical action *(*QAA 2018, 7).

Whereas, Entrepreneurship education is defined as;

> the application of enterprise behaviours, attributes and competencies into the creation of cultural, social or economic value. This can, but does not exclusively, lead to venture creation *(*QAA 2018, 7).

With regards **entrepreneurial learning** Advance HE, the British professional membership scheme aimed at promoting excellence in higher education, launched its enterprise and entrepreneurship framework in November 2019. The Welsh launch was hosted in the researcher's university. Advance HE make specific reference to the QAA definitions and observe that:

> Approaches to teaching and learning, by their very nature, often encompass entrepreneurial learning. Regardless of whether these are labelled as enterprise and entrepreneurship education, the enhancement of appropriate skills, knowledge, attributes and behaviours necessary for transforming creative ideas into actions are of ever increasing importance *(*Advance HE, 2019, 2*)*.

This, in turn, calls for educators who can develop innovative curriculum; teaching, learning and assessment strategies that develop the associated knowledge, skills and behaviours (competencies) in their learners, based on the QAA's definitional stances. Thus, given such consensus, the level of clarity required when discussing the terms enterprise and

entrepreneurship has been found, and will be referenced throughout this thesis, but what of the other E of Employability?

In writing on behalf of the Higher Education Academy Owens and Tibby (2014, 2) observed that 'Enterprise education clearly links to employability and as such, should be at the core of employability strategies'. Within a Welsh context the Higher Education Funding Council for Wales (HEFCW, 2020), incorporated entrepreneurial interventions within its report on Skills and Employability. Enterprise competencies are well aligned with what are often referenced as the 'soft skills' that employers call for; critical thinking, problem solving, innovation and creativity, ability to deal with complexity and ambiguity and communication. It is these 'soft skills' that employers are seeking but not finding, and consequently there is an acknowledged 'skills gap' (World Economic Forum, 2020b). The World Economic Forum (2016) takes the view that as the world of work is becoming increasingly complex and changes quickly, the new tasks of harvesting knowledge and recognising and solving complex problems becomes the imperative.

Of note, is that in naming the creative industries a priority sector in the UK's industrial strategy in 2018, it was observed that creativity was now needed right across the labour market (Easton, and Djumalieva, 2018), not least, that with automation replacing many jobs, it can rarely replace creative ones (National Endowment for Science Technology and the Arts, 2018). Our shift to an innovation driven economy, has also seen the imperative for managers to learn how to move away from managing creativity to managing *for* creativity (Amabile and Khaire, 2008a, b). Whilst it is beyond the scope of this brief introduction to provide further evidence, it helps to set the scene as to why enterprise and employability are well aligned, and provides initial hints that the creative industries educational experiences could provide useful insights.

The definitional interconnectivity that has emerged during the development of this portfolio is modelled in figure 1. This is taken from the researcher's most recent publication in the portfolio (paper 7) and illustrates the discussion presented here.
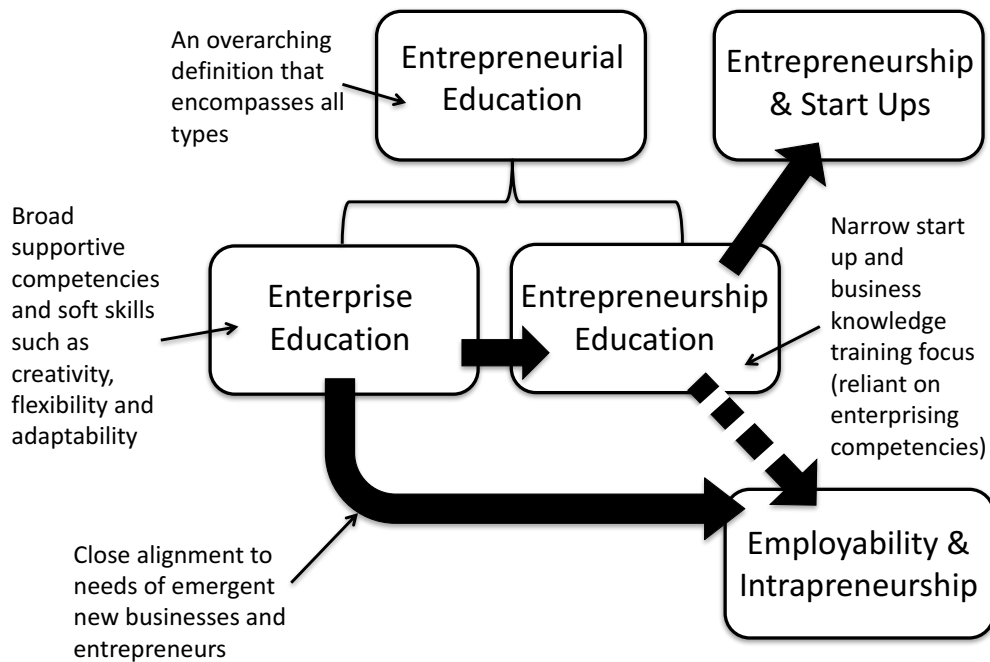
Figure 1 **Definitional** stances based on UK Quality Assurance Agency's Enterprise and Entrepreneurship Education Guidance. *Source* Penaluna and Penaluna (2020, 3/Paper 7).

The model illustrates that being an enterprising individual is not only a pre-requisite to successful entrepreneurship, but is increasingly called upon by entrepreneurs and micro businesses who seek employees with similar competencies. This mirrors the findings of the 2014 All Party Parliamentary Group for Microbusinesses' observation that, 'The Government should bring clarity and definition to what enterprise education and entrepreneurship education are; they are equally important, but different' (Anderson et al., 2014, 103).

As the central tenet for this study, is that entrepreneurial education, a catch all term for all types of education within the field of enterprise and entrepreneurship, can be advanced through understandings from the field of design education, these distinctions help locate where and when contributions can be made. However, before we proceed and as so much work has been rooted in a business education context, this requires further contextual investigation.

2.1.3 Business Schools: origins and trajectories

There is a long-standing debate in the academic discourse over the origins and first programs of entrepreneurial education. Scholarly works range from observations that it commenced in 1945 in Harvard Business School, as a response to the needs of students who were returning from military service from the Second World War (Vesper and Gartner, 1997), to the identification of programs in Japan during the 1930's (Solomon, 2007). A chronology provided by Katz (2003) asserts its integration into economic and agricultural literature in 1886. Where consensus is found in the literature, is that entrepreneurship as a discipline only became a force within business schools in the early 1970's (Kuratko, 2005). Katz (2008) observed that entrepreneurship education in American business schools had reached maturity, as the demand in other markets increased. Activity silo's missed developments from within other disciplines such as; agriculture, engineering, art and science and the learned professions (Fretschner and Weber, 2013).

Viewed as an emerging enquiry, in 2010 within the US, the field of entrepreneurship had grown to exceed US$440 million, with an average of US$1 million for each of the 277 chair and professional endowments (Urban, 2010). Research, remains anchored in US business and management schools, with a venture creation focus, and dominates the agenda (Katz, 2003, 2008, Jones and Matlay, 2011, Landstöm and Perrson, 2010, Valero et al., 2014, Azanza et al., 2017). Neck from Babson College, an institution recognised as a Global Leader in Entrepreneurship Education and sponsor of the GEM, in co-authored research with Corbett asserts the position that in accelerating business start-up, the primary goal of their education is 'developing the mindset skillset, and practice necessary for starting new ventures … (where) The context of new venture creation differentiates us as a teaching discipline' (Neck and Corbett, 2018, 5).

Much of the earlier literature, especially from the US, derives from this perspective and has scant support in terms of the scholarship of teaching and learning entrepreneurship. This is widely acknowledged 'Most of us are not professional educators, instead we either are clinical professors or trained as entrepreneurship researchers with a sociology, psychology, or management discipline as our base of training' (Neck and Corbett, 2018, 37).

Noting that mindset development has been a recent addition to the advocated skillset, the venture creation focus and what are referenced as 'traditional' business school's pedagogies have been critiqued since the 2000's. Academics within the business schools have called for changes to its paradigm, values and ways of doing things (Gibb, 2002) and for the development of both the art and science of entrepreneurship (Henry et al., 2005a, b). Such calls for the development of creative skills in addition to analytical skills, are considered integral to encouraging an entrepreneurial mindset (Kuratko, 2005, Krueger, 2007, Higgins and Galloway, 2014, Krueger and Welpe, 2014, Bandera et al., 2019), yet appears to remain as an unsolved challenge within the business school discourse (Neck, Green and Brush, 2014, Azanza et al., 2017, Kuratko and Morris, 2017, Kariv et al., 2019, Allahar, 2021). Here we see first moves towards the adoption of education developed within design disciplines, as was advocated by the researcher when she led the HEA-BMAF EL-SIG.

2.1.4 Business Schools: design thinking for innovation

In addition to critiques from academia, industry also levied criticisms of university business schools, observing that due to their over reliance on analytical pedagogies, with an overuse of lectures and case approaches, they were not adequately equipping their graduates with the skills to adapt and respond to the challenges of complex ever changing business environments (Pffeffer and Fong, 2002, Mintzberg, 2004, Urban, 2010, Waddock and Lazano, 2013, Parker, 2018a, b).

Design thinking was seen to offer a potential solution to the criticisms, but has frequently been criticised by the design education community, so requires further discussion. The design thinking concept, articulated by an Architect (Rowe, 1991), was constructed at the beginning of the 21st century by practicing designers, including Kelley (2001) and Brown (2008), with a view to enabling the design processes and methods from design agency IDEO to be used by people without a background in design. First taught in 2005 in Stanford, the approach was adopted by many business and management schools, as a way to respond to its critics, in facilitating innovation and creativity within both individuals and organisations (Brown, 2009, Martin, 2009, Johansson-Sköldberg et al., 2013, Hardin et al, 2014, Lewis and

Elaver, 2014). It has subsequently been gaining momentum in the entrepreneurial literature (Neck and Green, 2011, Goldsby and Nelson, 2012, Hug and Gilbert, 2014, Glen, et al., 2014, Neilsen and Stovant, 2015, Basadur and Goldsby, 2016, Liedtka et al., 2017, Val et al., 2017, Kickul et al., 2018, Linton and Klinton, 2019, Sarooghi et al., 2019). Moreover, scholars have commenced researching design thinking as a management theory in itself (Boland and Collopy, 2004, Johansson-Sköldberg, 2013, Laursen and Haase, 2019).

Design thinking has been presented as an iterative process, and is generally accepted to be five stages, as proposed by the Hasso-Plattner Institute of Design at Stanford (d School):
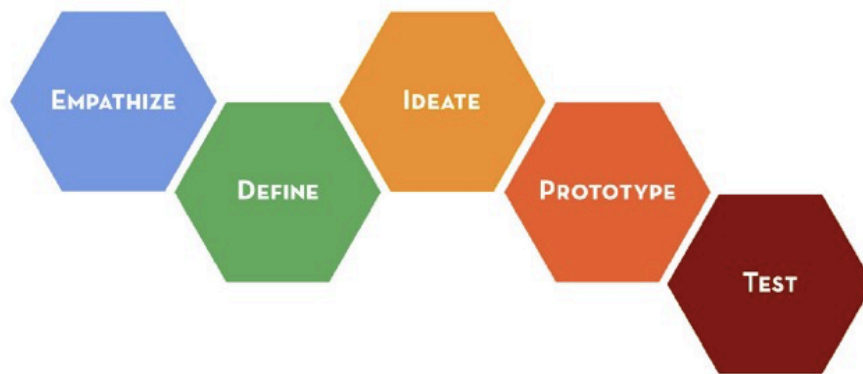
Figure 2. 5 Stage Design Thinking model (Hoffman, 2016).

The process commences with possible ideas, and the creation of prototypes that are developed in accordance with continuous stakeholder feedback. It is considered human centred, as core to its philosophy is achieving deep understandings of the user experience (Dunne and Martin, 2006, Sanders, 2008, Martin, 2009). It is this user experience that is observed to mimic a designer's approach, in their ways of observing, listening, engaging and having empathy with users during the design process (Leavy, 2012). Design thinking is subsequently viewed as being participatory, where the collaboration elicits multiple perspectives and ideas for exploration and development which in turn, lead to innovation (Brown and Katz, 2019).

However, whilst design thinking is asserted as a 'panacea' for modern business as a problem-solving approach (Badke-Schaub et al., 2010, Rose, 2014, Keeley, 2015), studies have shown that implementing design thinking within organisations is very challenging for those who are unfamiliar with the underlying principles and assumptions, causing management scholars to question its value (Carlgren et al., 2016, Kupp et., 2017, Dunne, 2018). This contextual concern is important, as it suggests a lack of understanding and potentially, an opportunity for further work.

This is echoed in the criticisms that are raised within the design community, who consider that design thinking models redefine established principles of design and misrepresent its core assumptions (Badke-Schaub et al., 2010, Dorst, 2011, Johansson-Sköldberg et al., 2013, Laursen Haase, 2019). The human empathy and user-centric approaches from design were clearly recognised as being advantageous, yet, more engaged and robust research that considered what designer educators do within an educational environment to develop and evaluate such competencies did not, and have not followed (Tynan, 2017). Johansson-Sköldberg (2013) observes that business and entrepreneurship educators have been discussing music with no musician present and in turn that design thinking models are so diluted that they are meaningless (Badke-Schaub et al., 2010). In consequence, design scholars make clear a distinction between 'design thinking' as practiced by those not trained in the discipline of design and the original term of 'designerly thinking' for those trained in the discipline (Cross, 1982, 1989).

2.1.5 Teacher education – design thinking for teacher educators

Teacher educators have also started to implement graduate-level teacher courses utilising the Stanford Design Thinking Model (Henriksen et al., 2020) as a framework to engage with problems of practice. There are observations that teachers are designers (Carlgren 1999, Kirchner, 2015, Norton and Hathaway, 2015) as they encounter complex problems which are open-ended, with no single correct answer (Bullough, 2012) and moreover that 'when teachers view themselves as designers, it can empower their ability to address problems, at a time in which challenges abound in educational system' (Henriksen et al., 2020, 1). However, just as with the business and management utilisation, teachers are often uncertain about what it means and how to apply in practice (Lahey, 2017, Goldman and Zielezinski, 2021) and the underlying principles of becoming a designer are superseded by a model that determines actions, not what it means to challenge and change a way of thinking.

2.1.6 Design education and designerly thinking

Designerly thinking and its education practice (Cross, 1982) encourages learners to respond to the needs of others within their lived experiences. Design education is defined as: 'working out a solution for any specific problem in diverse contexts' (and intends to) 'establish (in their students) reservoirs of experience (…) fostering creative thinking processes for originality and novelty' (Simon, 1981, in Lau, 2009, 154, 155). Scholars observe that design practice differs significantly to rational problem solving, since it involves the solving of a 'wicked problem', a problem for which many interdependent factors make them appear impossible to solve (Rittel and Webber, 1973, Buchanan, 1992, Dorst 2011).   It is this perspective that led to observations of design being 'reflective practice' (Schon, 1983), whereby problem solving is built, not on deduction or induction, but on abduction (Cross, 2006, Lawson, 2006), the logic of possibility (Boland and Collopy, 2004, Martin, 2009). In addressing wicked problems, explorative learning is a key methodological approach, as the knowledge required to generate appropriate solutions is not defined at the outset of the process, nor can it ever be considered complete (Laursen and Haase, 2019). As is explained in the portfolio, radical innovation is rarely developed incrementally, which places it at considerable odds with design thinking models.

Design educators develop divergent thinking strategies and ways of assisting enlightenment through the production of as many alternative solutions as possible. This enhances the capacity to make new connections and associations (Gardner, 1982, 1987) which in turn develops skills in opportunity recognition and innovation (Schumpeter, 1934, Tynan, 2017). Designerly thinking can thus be viewed as a practice-based approach to; solving problems, sense making and the development of new knowledge (Buchanon, 1992, Krippendorff, 2006, Lawson, 2006, Laursen and Hasse, 2019).

This insight provides another contextualisation to consider, because unlike many other disciplines, there is less of a call for restricted definition, and more of a call for open interpretation (Lawson, 2006). This may cause some confusion to those who ontologically are definitional dependant as opposed to definitionally flexible. Not unlike the concept of 'art', practitioners are more concerned about expanding its value rather than restricting it, hence they draw upon and place great value on more divergent interpretations, ideally ones that challenge norms and expectations. As Lawson (2006, 17) explains, 'the changing role of the designer is more about expansion than constriction, as it is an evolving variable. Design is a "conversation and perception"' (Lawson, 2006, 265), that embraces a typology of thinking, not a linear process. Brown (2008, 4) observes that it can; 'best be described metaphorically as a system of spaces rather than a predefined series of orderly steps (design's) architecture differs from the linear, milestone processes typical of other kinds of business activities'. It is therefore often misperceived by those unfamiliar with it as seemingly chaotic and without patterns. The level of complexity brings significant challenge, which is compounded by the fact that designers learn in studio environments where experience and curiosity lead to theory engagement, and designers are not taught theory first through lecture-based activities that emphasise incremental development, such as that found in design thinking models. As explained by Bandera et al., (2019, 1) when suggesting that the arts have much to offer business and management education,

> Specifically, the studio model is proposed as a vehicle that integrates creativity, integrative thinking, critical analysis and social interaction to reshape how knowledge is generated and applied. The anticipated outcome is a reframing of knowledge acquisition in business schools such that learning is an iterative, socially governed, dynamic process (Bandera et al., 20019, 1).

2.1.7 Design education and business acumen

Design graduates are reliant on having an ability to develop creative ideas. Contextually 89 % of the market will be engaged in businesses employing less than five people (Kelly, 2019), freelance, self-employment and start-ups have been the norm and portfolio careers are common (Kellet, 2006, Arts and Humanities Entrepreneurship Hub, 2020). These graduates need to be entrepreneurial, whereby enterprising skills and the entrepreneurship understandings of business are prerequisites for both themselves and the organisations they work with.

It is the introduction of business acumen into the studies that historically has presented pedagogical challenges, especially when educators from the business school have been engaged in its delivery (Kellet, 2006, Bridgstock, 2013, Arts and Humanities Entrepreneurship Hub, 2020). Yet, there are continued calls for its inclusion in the design curriculum, as asserted by Komenić et al., (2016) in their European based research:

> There is a need for finding a more effective way of transferring economic knowledge to design students and that the business sector and other interested parties need to better learn each other's languages in order to achieve more productive communication. Design educational institutions should present their students the importance of business management and raise awareness of the business sector about the value of design (Komenić et al., 2016, 5).

It is at this intersection the researcher found herself and where the papers in the portfolio can be situated. Therefore, a more personal contextual discussion is now required. 'It is here where influences from art and design drive a process that deviates significantly from current business practices.' (Bandera et al. 2019, 6). The experience made her very aware of what has recently been questioned in terms of what the curriculum doesn't cover, and what unintended consequences might result? (Parker, 2018a, b, Bandera et al, 2020).

2.2 Personal context and influences

2.2.1 From banker and business owner to educator

The researcher's relationship with enterprise education is grounded in their banking career, where informal and formal studies were undertaken within UK business school environments. Following 20 years of banking, and gaining considerable insights into business and entrepreneurs from companies spanning all sectors and size, the researcher first worked as an associate lecturer in Art and Design in 1997 and undertook an MBA in 2004/5.

An experience that ran parallel to banking was the co-ownership and management of a graphic design studio. This launched in 1983, and has morphed into iterations that reflected technological advances and understandings of neuroscience for advertising (advertising being a subset of design). The co-partner, their husband, was the lead designer and an experienced higher education educator within the design discipline. He had no formal education in business, yet had conceptualised and led many successful businesses at both local and international levels.

Whilst working within the bank the researcher regularly provided talks on business planning for the local community, schools and colleges and judged business plan competitions. Working collaboratively with their partner, the researcher would support design students and graduates who wished to start a design based business, taking forward the business acumen that had formed part of their studies, in the form of a module entitled 'professional practice'. A natural progression from this was for the researcher to have a more formal role within the University environment, to support the delivery of this component of the curriculum, by providing feedback on the business plan presentations that culminated the studies for the design students.

a. Influences from professional studies – Art and Design

This process was formalised in 1997, when the researcher left banking and was invited by the Dean of the Faculty of Art and Design to deliver the level 5 core module 'professional studies' across the art and design disciplines.

The compilation of a team business plan was the assessment vehicle, which aimed to help students gain an understanding of the business aspects of exploiting their creativity, such as pricing their work and how to market their services and products. The researcher was engaged 20 years ago to deliver business acumen to design students, as is being called for within the contemporary design education discourse (Komenić et al., 2016). It is of note, that topics such as; costing and estimating, legal constraints, intellectual property rights, marketing and aligning competencies to the marketplace had been introduced into the design curriculum by the design educator, based on needs identified by alumni feedback and design studio practice.

As a learning environment, the researcher was allocated a lecture theatre accommodating 150+ students seated in rows, facing the researcher as 'lecturer' in its true form. The researcher thus delivered knowledge, placing acetate slides on a projector to reinforce the transmission style education experienced during her own learning. The researcher used to the relative silence prevalent from business school students, unless they were specifically questioned, or when it was their turn to read from the selected text, was surprised at how vocal the students were with the sounds of 'why?' echoing. The researcher endeavoured to continue the sessions, concerned with ensuring she delivered the content within the limited time frame. In particular the students questioned the relevance of the studies, and, as an illustrator confirmed 'I came here to learn to draw and paint, not for business studies', a fine artist pronounced 'I am not prostituting my art'. Whilst the challenges of educators from the business school entering this realm are well recognised in contemporary literature (Kellet, 2006, Bridgstock, 2013, Komenić et al., 2016, Arts and Humanities Entrepreneurship Hub, 2020), the level of dissatisfaction and disengagement was a shock.

Prior to week 5, of the 2 hourly 8-week program, there were complaints from students that can be generalised into a) the art disciplines considered the studies too difficult and conversely, b) that the design students wanted more depth. The researcher, who was not used

to such challenges, knew she had a lot of experience to offer these students, but soon realised that she needed to identify alternative methods of delivery. In other words, to be more creative in the delivery approaches themselves, so as to engage and motivate the students to learn what they needed, based on the researcher's experience with both entrepreneurs from the creative sectors, and their understanding from co-managing the graphic design business. Thus, she sought insights and guidance from their design partner, in order to implement alternative learning and teaching approaches to those that she was familiar.

As presented by the EU's Art and Humanities Entrepreneurship Hub's (2020) literature review, to which the researcher has contributed, it is important at this juncture to clarify that educating for art and educating for design is quite a different experience, primarily due to the motivational constructs that sit behind them. Whilst there is no black or white distinction, an extended continuum can be seen by those who wish to be creative as they are motivated by a personal desire (the arts), to those who are motivated to use their creative talent to solve other people's problems (the designer). This can be readily aligned with the entrepreneurial goals of creating value for others (Bacigalupo et al, 2016).
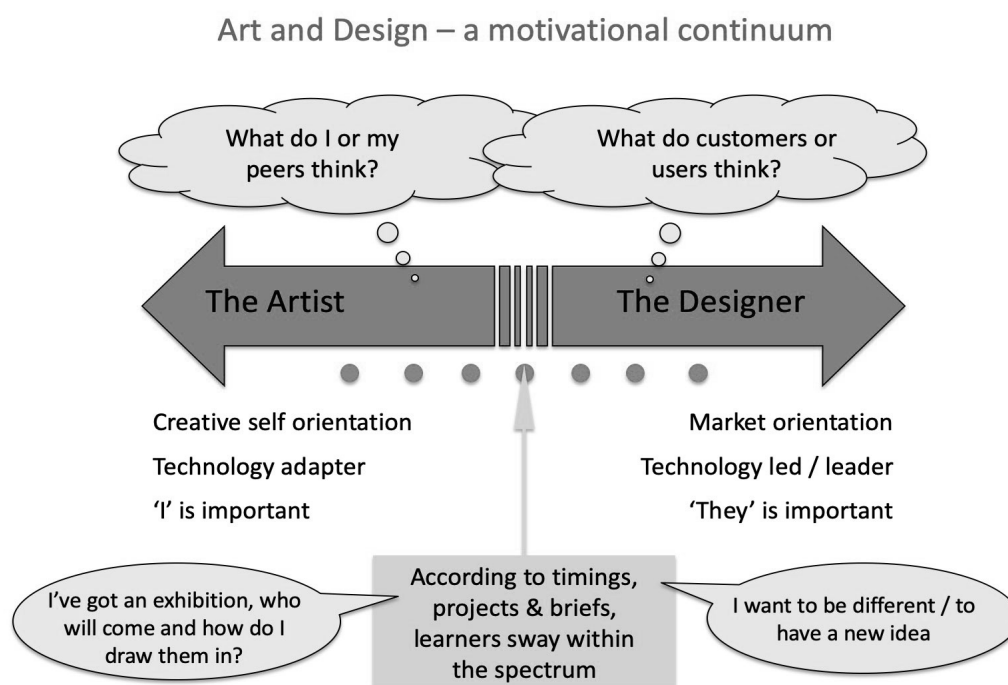
Figure 3. Art and Design – A motivational continuum (researchers model in Arts and Humanities Entrepreneurship Hub, 2020,12)

The researcher continued to deliver the module in subsequent years, steadily implementing more educational strategies from the design field. This led to increased engagement by students and was reflected in higher levels of achievement, in terms of academic attainment, student and alumni feedback on the studies and the number of ventures being taken forward. As recently suggested by Bandera et al. (2019, 10), this reinforced the perspective that, 'a pedagogy that emphasises ideation and creation rather than standardisation of existing knowledge offers a promising new direction for management education.'

b. Lessons from an MBA

The researcher had enjoyed a successful banking career, with promotional opportunities from branch to area management. However, the high-pressured environment, necessitated considerable travel and being away from home, which was not conducive to bringing up her young family. Hence, the researcher left banking for what was initially planned as a temporary career break. The transition into education was not an anticipated one, and when the researcher first delivered the studies she had no academic aspirations.   However, the successes that followed the initial challenges fuelled a passion to secure a permanent position and with funding support from the Dean of Art and Design, the researcher undertook an MBA in order to advance her scholarly understandings.

However, during the MBA study, she soon discovered the texts that formally supported studies were often at odds with her recent practical first-hand experiences. The researcher's lack of eloquence in verbalising these observations, also perceived by fellow students, led to significant frustration and dissatisfaction. This was further exacerbated within the assessment instruments, where essays and examinations that tested recall 'about' a topic and not the capability of application within the 'real world'. Most specifically, the traditional business school teaching, learning and assessment approaches did not appear to enhance capacity for creativity or innovation, nor identify opportunities for problem solving, a viewpoint articulated at the time by Henry Mintzberg in his 2004 publication 'Managers not MBA's'. Critiques that continued to be levied in more contemporary literature (Ruben and Dierdorff, 2013, Parker, 2018, a.b).

Although it was not as well received as she had hoped in terms of grading, the final MBA dissertation (Penaluna, 2005), on reflection, was a turning point, as it enabled the researcher to question alumni from the design area as to why they had become successful business owners over time, a method that mirrored the Continuous Conceptual Review Model employed on the courses that she had engaged with (Penaluna and Penaluna, 2008b). The researcher became acutely aware that the assessment method within her studies was almost wholly reliant on past texts and theoretical stances from the business and management literature, whereas the design education that she had been learning was future orientated and celebrated newness.

2.2.2 From educator to University Enterprise Manager and Welsh Government Entrepreneurship Champion

Following the institutionally acknowledged successes of the researcher's teaching and support for student and graduate entrepreneurs (start-ups) that resulted, in 2005 the researcher was engaged as the University Enterprise Manager and subsequently as a Welsh Government Enterprise Champion. The remit was to take forward the concept of the entrepreneurial University (Mautner, 2005, Etzkowitz, 2014, Foss and Gibson, 2015, Ratten, 2017) in terms of curriculum development and the infrastructure of support for start-ups, in collaboration with and responding to the needs of multiple stakeholders (Etzkowitz and Zhou, 2018).

The Welsh Government provide funding to Higher and Further Education institutions in Wales, to appoint a member of staff as a single point of contact, with responsibility for entrepreneurship within the institution and, in turn, to contribute to the work of the Welsh Government in delivering their Entrepreneurship Strategy (Business Wales, 2020). This includes developmental opportunities in the sharing of 'best practice'. The researcher was initially appointed to the role in 2005, because of her banking experience and consequent understanding of business models, for start-up and growth.

In turn, the researcher maintained her teaching within Art and Design and delivered the entrepreneurship module on the MBA in 2005 (the same year she was awarded her own MBA).   Taking an MBA entrepreneurship pathway forward in 2007, informed by the design practices, was co-delivered with the designer, who she now drew into her first scholarly works. Results in terms of student engagement and their grades, combined with their feedback during and post studies demonstrated the value of the designer educator's influence on approaches that the researcher evolved. Requests for the researcher to deliver enterprise to more disciplines followed. So, whilst within other Universities there was considerable dissatisfaction with the entrepreneurship modules that were being embedded across the disciplines (Hannon, 2006), the researcher's context relevant approaches were gaining traction.   The researcher's design influences, were deemed successful on many levels, both within and beyond their own University, yet had received scant attention in the literature she sought out to support her approaches.

Over time, the researcher observed many apparent synergies between the pedagogic approaches she learned from design education, with what was being advocated as good practice for entrepreneurial learning and business start-up and growth. From her limited experience, it appeared to her that business and management education would benefit greatly from enhanced engagement with the design-based pedagogies that she was becoming familiar with, and the idea emerged that rather than engage, business based educationalists were attempting to reinvent a wheel that was proven to be successful, but was outside of their academic silo.

The views were reinforced by evolving research and practice debates in the HEA-BMAF EL-SIG, especially during the annual HEA-BMAF conferences where a separate SIG track had emerged. Face to face conversations with acknowledged researchers such as Richard Beresford, Harry Matlay, Luke Pittaway, David Rae and Paul Jones, led her to realize that generic criticisms levelled at Business Schools were already being challenged, and that as a researcher, she had a role to play. As has been noted by Michels et al., (2018), in their research with the Enterprise Educators UK network, many educators in the domain feel self-isolated, and in the researcher's case, she considered herself more as a manager than a contributor.

In 2009 the researchers HEA-BMAF National Conference paper entitled 'Crossing the Bridge: Insights into enabling strategies for creative business development' (Penaluna and Penaluna, 2009), caught the attention of Welsh Government's Enterprise team and contributed to a leading role in creating the UK's first formally validated teacher training module (See Paper 1).

An area of emerging interest, especially amongst colleagues engaged in teaching marketing, was neuro-marketing, which the researcher first contributed to in 2009, at the Institute for Small Business and Entrepreneurship's (ISBE) annual conference with 'Seeing Outside the Box: Creativity Based Assessment and Neural Understandings' (Penaluna, et al., 2009). A research goal was emerging, and despite the fact that her role as manager of her university enterprise team didn't require it, her role as an Enterprise Champion for Welsh Government encouraged her to leverage her contributions in order to more fully understand the potential for further research contributions.

2.2.3. Educator and Manager to researcher

Drawing upon the observations as a business practitioner immersed in entrepreneurship education, at undergraduate and post graduate level within Art and Design and a Business School, combined with a University wide remit to develop provision, the researcher sought to further engage in academic debates and add to the discourse. Specifically, she wished to explore the enhancement of creativity within entrepreneurship education and add a new dimension to the literature in entrepreneurship and entrepreneurial learning. Where the focus had been almost solely on business knowledge, theory and skills, she wished to more effectively consider innovative capacity. In essence, the view emerged that Business Schools concentrated on theories and models for analysing business success, as opposed to creating learning environments that enhance a learner's propensity for ideas generation, problem solving and opportunity recognition. Studying for an MA in enterprise and entrepreneurship education, awarded in 2013, provided additional networks and expertise to further enhance understandings.

Thus, an exploration that was led by design understandings and insights into design education that the researcher had engaged with, from the perspective of an experienced business student and educator, had begun. As will be clarified when impact is discussed in Chapter 5, the researcher has now published 60+ journal and conferences papers and is a regular contributor to scholarly conferences and panel discussions with policy makers concerned with the advancement of entrepreneurial education. As the researcher is now networked with, and has become friends with many influential stakeholders within the enterprise eco-system, within and beyond the UK, she is constantly engaged in informal but relevant opportunities that have resulted in invitations to engage in European projects supporting learning across all levels of education. Whilst this external perspective is a major contribution to the development of the portfolio of publications in this submission, and has had significant influence on her writing, it is closely aligned to impact, and thus will be elaborated upon in Chapters 4 and 5.

3. Methodology

This thesis and its portfolio of publications, in Appendix 2, represents a learning journey that has taken place through a process of abductive reasoning, where the researcher is not looking to map best practice, but to propose new practice through the development of theoretical constructs that support changes called for in current policy. The approach includes notions of objectivity and subjectivity and aims to develop new understandings that provide alternative rational perspectives based on the researcher's own learning experiences, thus a phenomenological methodology is considered appropriate, as it encapsulates the overall aim of the portfolio presented.

Due to both the historical journey of the researcher and the nature of her publication opportunities, authorship has been for a predominantly business school audience. In this context, the researcher has systematically brought design approaches into the debates that she has engaged in. This necessitated translating teaching and learning approaches from the design education community into more readily accessible business education terminologies, thus making them more easily understood by the community they were designed to influence. By moving between design and entrepreneurial education, the researcher's role required increasing levels of epistemic fluency (Gaither et al., 2015, Markauskaite and Goodyear, 2016), as can be observed to be deliberate practice in design education. The portfolio is a sample taken from a range of papers that have culminated in research that enabled more overt discussions, including making design more explicit within titles when the opportunities arose.

The portfolio is acknowledged by academics and policy makers to have provided a contribution to an ongoing debate in a developing research field (Fayolle et al., 2016), providing insights into charges that entrepreneurship education 'appears to have raced far ahead of the theory, pedagogy and research needed to justify and explain it' (Rideout and Grey, 2013, 346). The insights and observations presented here have responded to the growing tension amongst stakeholders, who argue between research objectives relating to scientific rigour and practical relevance within educational environments. The portfolio responds to the need for applicability rather than technical, normative or theoretical

knowledge, to address real problems in the field, in addition to addressing theoretical gaps (Faylolle et al., 2016, Frank and Landstöm, 2016, Ratten and Usmanij, 2021).

Values in design relate to employing ingenuity through empathy and a concern for appropriateness for others, so that specific value is created for the client or target audience. The method requires hermeneutic engagement through a process of continuous creativity, interpretation and sense making, where iterative development results in a solution to a perceived problem (Fallman, 2003).

Design ability is focussed on providing satisfactory solutions that may not be perfect and may not be wholly correct, but hold an intermediate position where they achieve a result within a given time and context. Simply put, designers accept that what is right today may not be right tomorrow, and that new learning might impact on later solution finding. Unlike design thinking models, designers also think beyond iterative developmental stages, the most obvious example being radical innovation, where deconstructing a problem and connecting observations and insights in unusual ways leads to new ideas.

The study of remote compound associations is based on this ability, whether it be through visual association or linguistic association (Olteteanu, 2014) and are based on the seminal works of Mednick and Mednick (1971). As part of this associative methodology, designers don't merely look at the obvious problem, but what might be its source or what might lie behind the recognition of a problem. As expressed by Norman and Verganti (2014) they don't just seek the nearest hill, they ask what is behind the hill, and is it higher? This mode of thinking uses synthesis to arrive at a range of solutions, and is defined by abductive thinking (Garcia, 2012). Research from a neuroscience perspective confirms this ability - through observations based on neurological activity (Salvi et al., 2014).

Within design and design education, the outlining of a given problem and the solution become an iterative subject of discussion and sets the scene for the development of this portfolio of work.

3.1 The researcher's notions of methodological advantage

3.1.1. Ontological perspective

The researcher has an ontological perspective/advantage through gaining insights from multiple domains, specifically:

- areas of business, management and finance through 20 years of banking
- higher education educator across disciplines (Art and Design, Business School and Education) for 20 years,
- higher education management for entrepreneurship for 15 years
- as an entrepreneur for 40 years.

This review of 'prolonged engagement' (Lincoln and Guba, 1985, Erlandson et al. 1993, Korstjens and Moser, 2018), responds to the calls for longitudinal studies within enterprise education (Valero, 2014), as it combines to create new and unique understandings of enterprise, and entrepreneurship. The portfolio of articles demonstrates practitioner research from the perspective of an educator actively engaged in research and development, not solely research and publication. This is advocated for the field by Gibb (2005), when the aim is for papers on enterprise that they can be utilised in practical educational contexts (Berglund, 2007, 2015), and is a central construct of their ontological pluralism; a sense of becoming and perceiving distinction between true reality and illusion (Turner, 2011).

As observed by Vyakarnam and Barakaat, (2016), development can be considered in three layers,

- at macro level, with supportive policies,
- at meso level, thematic programs that provide funding
- micro level, projects, incubation services, and education that develops the skills required for both the meso and macro environments

At the macro-level the researcher engaged with Welsh Government and the United Nations examining the policy landscape that support a climate for entrepreneurship. At meso-level she has worked at a strategic level to effect cultural change to develop UWTSD as an entrepreneurial university, by incorporating entrepreneurship within the curriculum and allocating resources to support start-ups. At the micro-level, they have translated the meso-level considerations into activities and a pedagogic framework. Thus, the researcher used their own experience of working at these levels as data (Colaizzi, 1978), that provides unique insights within the field of entrepreneurship (Berglund, 2007, Neck and Green, 2011). Subsequently, the research is aligned with the existential phenomenology of Sartre, inspired by Heidegger's (1927) publication 'Being and Time', an inquiry into the being that we ourselves are (Crowell, 2001). Thus, the concept of 'engaged theory' emerges and a double hermeneutic position is possible, because engaged theory is required to facilitate change (Chevalier and Buckles, 2019).

More specifically, and in relation to the portfolio of published works, as the researcher increased their understandings of the field of design, so they renegotiated their research position from information-based research to inspiration-based design research (Sanders, 2017), whereby the traditions of building upon results of investigation, analysis and planning have been replaced with experimentation, ambiguity and surprise. Moreover, rather than relying on past events to move into the future, they have drawn primarily from thinking related to future-led orientations, using imagination as the basis for expression (Sanders, 2017).

3.1.2 Epistemological understandings

Practitioner based, epistemologically relevant questions are explored through systematic investigation of practice (Levy, 2003, Briggs, et al., 2012), 'congruent with professionals' authentic experiences of learning, yet cognisant of the realities of the workplace with respect to professional responsibilities' (Webster-Wright, 2009, 727). Thus, insights are from 'within' (Lave and Wenger, 1991, Fuller and Unwin, 1998, Sikes and Potts, 2008, Green, 2014) and informed from multi-disciplinary perspectives responding to concerns that 'each

discipline views entrepreneurship from its own perspective without taking cognisance of approaches in other disciplines' (Henry, Hill and Leith, 2005a, 99). Moreover, that 'Entrepreneurship as a discipline is fragmented amongst specialists who make little use of each other's work' (Ucbasaran, et al., 2001, 59). Observations still prevalent in the literature (Fayolle, 2013, Dino, 2015, Ferreira et al., 2015, Fayolle et al., 2015). The research has been strategically interdisciplinary, and required epistemic fluency (Gaitheret al., 2015, Markauskaite and Goodyear, 2016), so as to consider multiple points of view. It has also been co-authored to enhance understandings and mitigate for the subjective nature and bias of an interpretive paradigm (Carter and Little, 2007, Gordon, 2009).

The research focuses upon human experience of the 'life-world', as opposed to culture and the use of sites, making it distinguishable from ethnography (Gray, 2017). In hermeneutic tradition, interpretation has been given priority over explanation and description, the researcher has interpreted findings to achieve deep levels of knowledge and self-understanding (Crotty, 1996, 1998, Gray, 2017), corresponding to Husserl's free imaginative variation (Giorgi, 1985, Giorgi and Giorgi, 2003, Husserl, 1982).

The thesis has been developed through an interpretive paradigm, using a relative ontology (Hudson and Ozzanne, 1988) and associated transactional or subjectivist epistemologies. Both inductive reasoning and deductive reasoning inform the thinking process, as combined they develop abductive reasoning (Given, 2008) which emulates the 'designerly' (Cross, 2006, Bonsiepe, 2007) approaches that the researcher has learned throughout their educational journey. This strategy engenders a sophisticated and timely understanding of the situations and contexts, and acts as a means to interpret potentially disparate educational environments, in order to consider their propensity for inter-related enhancement.

The researcher's background of business and management education that was preceded by over 20 years' experience in banking and finance all relate to environments where pragmatism is popular for its insights into management and organisations, which also provides epistemological justification for mixed methods and approaches (Onwuegbuzie et al., 2009).

3.1.3 Epistemological Foundation

Greenwood and Levin's (2007) Co-generative Action Research Model is useful when positioning the researcher's role throughout the portfolio. Her primary contributions relate to moving from being a business educator who was initially an outsider to design education, to developing insider knowledge that enabled her to:

a) Recognise a problem exists (through prior research activities with HEA-BMAF) and frame an opportunity.
b) Listen and learn from design education and link to identified entrepreneurial education needs.
c) Question and provoke discussion in her domain of business education community, indicating unseen links and potential avenues of exploration.
d) Act as an interpreter during mutual reflection and learning
e) Act as interpreter when solving problems in activities and research related to enterprise and entrepreneurship education.

Thus, as can be seen, her research context requires the development of critical synthesis as well as critical analysis.
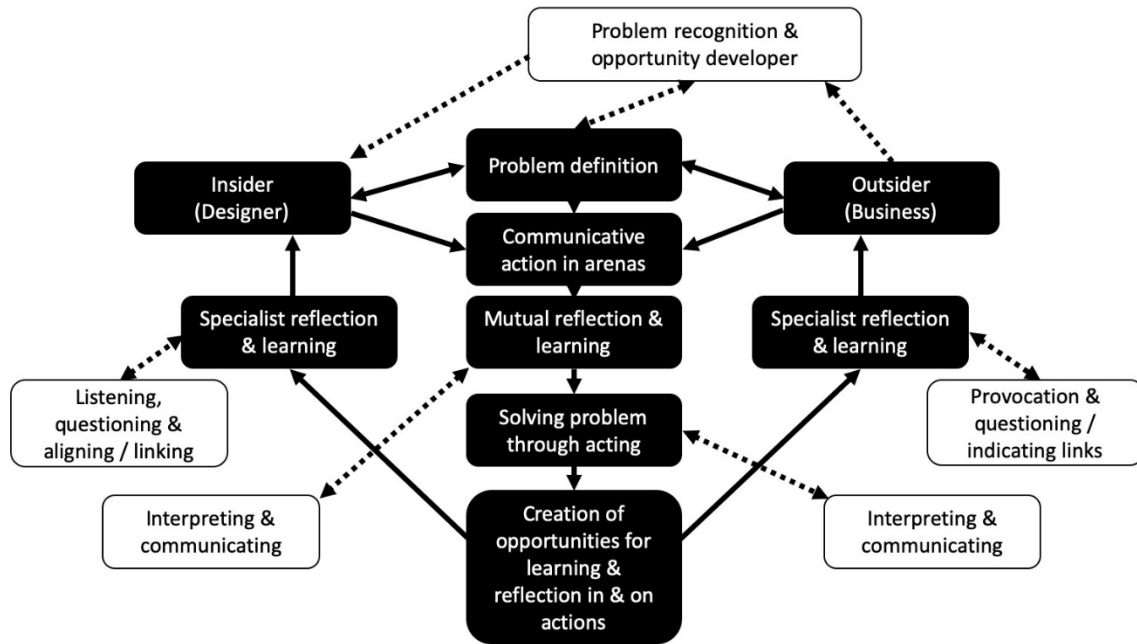
Figure 4. X. Greenwood and Levin's (2007) Co-generative Action Research Model is represented in black, with the researcher's contributions and actions highlighted in white, with dotted arrows to assist in locating her working context.

It should be noted that in earlier work an attempt was made to make connections overt, whereas the interpreter roles grew more important when it became apparent that many of the research concepts and associated language were unfamiliar to her business school colleagues. Over time, as the portfolio demonstrates, it was once again possible to become more overt, as the connective links were now better understood. This remains an emerging field where connections are continuously being discovered. Recent events such as Enterprise Educators UK's 'Design and Enterprise Education: A marriage made in …' (EEUK, March, 2021) typify this emergence. Design's contribution to the economy are beyond the scope of this investigation, but provide evidence that policies and strategies emanating from UK Innovate and the Design Council are cognisant of the alignments under discussion.

3.1.4 Epistemic Fallacy

Whilst referenced independently within the preceding sections, the researcher's immersion in the research leads them to concur with the observations of Crotty (1998), in conflating ontology with epistemology, viewing them as mutually dependent and is challenged to distinguish them conceptually, 'to talk about the construction of meaning (epistemology) is to talk of the construction of meaningful reality (ontology)' (Crotty, 1998, 10). Moreover, that the conventional distinctions between epistemological and ontological viewpoints disappear in constructivist research (Varaki and Earl, 2005) as the 'findings and the object of investigation (are) interactively linked so that the 'findings' are literally created as the investigation proceeds' (Lincoln and Guba, 1985, 207).

The researcher initially viewed phenomenology and critical realism as being complementary (Carr, 2014) not variations of the same method, but in combination a valid tool to aid the research. However, she took what might be described as a fork in the road in arriving at Bhaskar's (1979, 1989) 'epistemic fallacy'. The critical realism path wasn't rejected purely on the basis of this stance, but for its theory that reality is shaped over time rather than constructed (Guba and Lincoln, 1994, Huberman and Miles, 2002).

3.1.5 Constructivism advantage

The research design for the portfolio is constructivist (Piaget, 1995, Burr, 2003, Raskin, 2008, Ramey and Grubb 2009), with a transactional or subjectivist stance (epistemology), with a post positivism or interpretivism / naturalistic (Guba and Lincoln (1985) theoretical perspective, with ethical considerations a 'logical outcome of the paradigm' (Erlandson et al, 1993, 132). Constructivism (Mir and Watson, 2000) has afforded explanatory power though engagement within the enterprise education community (Piaget, 1995, Burr, 2003) with a methodology that has afforded 'interpretations, multiplicity, context, depth and local knowledge' (Ramey and Grubb, 2009, 80). The meanings are 'constructed frameworks, rather than direct reflections of the real' (Raskin, 2008, 16).

Knowledge was constructed by pro-active and purposeful engagement and interaction with stakeholders of enterprise education (Morcöl, 2001). As the papers within the portfolio are co-authored, the researcher is consciously attempting to mitigate Carr's (2006, 429) observation that; 'human understanding is never simply 'given' in any perception or observation but is always 'prejudiced' by an interpretive element that determines how perceptions and observations are understood'.

The researcher and informants are interdependent yet mutually interactive (Hudson and Ozanne, 1988). The researcher commenced with prior insights of the research context but anticipated insufficient knowledge to develop a fixed research design due to the complex, multiple and unpredictable nature of the domains being explored in the portfolio and other complimentary works. The researcher remained open to new knowledge throughout the thesis development, and through continued engagement with stakeholders, the works evolved as socially constructed rather than objectively determined and perceived (Hirschman, 1985, Berger and Luckman, 1967). In this context, meanings have been interpreted rather than generalised with predicted causes and effects (Newman, 2000), and cognisant of motives, meanings, reasons and other subjective experiences which are time and context bound (Hudson and Ozanne, 1988, Neuman 2000).

It is acknowledged that the various forms of constructivism such as social, cognitive and critical, exposes it to criticisms of 'anything goes' of ultra-relativism and radical interpretations (Gordon, 2009) and in this sense the researcher would place themselves amongst the 'moderate constructivists, pragmatic pragmatists' (Edwards et al., 1995, 26).

3.1.6 The limited value of positivistic approaches for research into enterprise education

As enterprise research is an emerging field, with 'a content area (that is) focussed on innovation, change and dynamism. A positivist approach has limited value in the theory building desires of researchers in this realm' (Hine and Carson, 2007, 2), echoing the considerations of Phan (2004, 619) that 'to develop a catechism founded on positivist empiricism may hide the very grail we seek'. Moreover, that research that focusses on individual and decontextualized factors should be complemented with investigations of

emergence, interpretation and intersections of all various kinds (Busenitz et al, 2003, Steyaert, 2003, Phan, 2004, Bergland, (2007).

This leaves the research subject to the challenges of trustworthiness posed by positivists, whose concepts of validity and reliability are not addressed in the same way in this naturalistic work. Whilst subjective in nature, interpretivism provides a high level of validity because the study is trustworthy, honest and authentic (Hughes, 2012). Moreover, the researcher is not seeking internal validity, external reliability/generalisability or objectivity, but the corresponding constructs of Guba's (1981); credibility, transferability, dependability and confirmability.

3.1.7 Phenomenological advantage: responding to challenges

The heterogeneity of enterprise education (Jones and Matlay, 2011, Valero, 2014) demands that an understanding of the context is essential, as there is no 'one size fits all approach' (Lackéus, 2015).

Historically, within the broader context of education research, there are challenges when attempting to capture the complexity of education phenomenon (Greene, 2007 Johannigmeirer and Richardson, 2008, Walters, et al., 2008, Ponce and Pagan-Maldonado, 2015). Subsequently mixed methods (Kim, 2017), with both quantitative (Balnaves and Caputi, 2001) and qualitative (Miles and Huberman, 1991,1994, Morgan and Smircich, 1980) approaches are advocated (Hartas, 2010). This is of particular note, as the range and design of this portfolio has been employed beyond its original intentions, to inform policy.

The understandings learned from design education theory and practice provide an additional ingredient to the action research methodology; the ability to contrast and select from a scientific approach of problem solving by analysis with 'problem-focused' strategies, with that of the designers' approach of problem solving with synthesis and 'solution-focused' strategies (Cross, 1989, Swann, 2002). Moreover, designers tend to encounter solutions opportunistically rather than via a systematic search for optimal solutions (Visser, 2006, Kim and Ryu, 2014). Thus, the phenomenology approach enabled themes to emerge through practice and research, facilitating rich descriptions of the phenomenon expanding on prior

knowledge (Remenyi et al., 1998), as opposed to explaining or analysing, fundamental as a method of knowing in phenomenology (Qutoshi, 2018) and for the development of the research contribution to knowledge. Initial understandings were 'bracketed' to the best of the researcher's ability to facilitate new meaning rather than previous held conceptions (Gearing, 2004, Qutoshi, 2015, Gray, 2017). Value theory (Brentano, 1902) in its broad and narrow sense of axiology (Finley, 1970, Schroeder, 2016) is applied within the varying contexts, when reflecting on such questions as 'what is 'good' enterprise education and what is 'good' design education?'

3.2 The portfolio: pragmatism and paper selection

In accordance with pragmatism research philosophy, the research question 'Through a design education lens: Are we reinventing the wheel for entrepreneurial education?' is the most important determinant of the research philosophy. Decisions on the design of the respective research activities were based on how they provided insights, responding to the question, in order to achieve the research objective (Ponce and Paglan-Malonado, 2015). Dewey being a most well-known advocate of pragmatism, due to its influence on pedagogical methods and education systems (Dewey, 1948, Gray, 2017, Rai and Lama, 2020) has particular resonance with this body of research.

The researcher asserts that the body of research being discussed in this thesis, by integrating approaches, provides valid interpretations when responding to the research questions of the day (Coyle and Williams, 2000, Creswell and Piano Clark, 2007, Kim, 2017) and thus achieves inference validity (Ponce and Pagan-Maldonado, 2015).

Cognisant of the above, the researcher selected 14 of their international peer reviewed co-authored publications for the portfolio. These were chosen for their contributions to the field of entrepreneurial education, whilst supporting the central tenet of this accompanying thesis. Themes were identified, and a literature review designed to align observations and insights with the entrepreneurial learning discourse. Two thematic mapping exercises were undertaken, firstly a thematic integration of observations and secondly the mapping of

published outputs against the challenges presented when engaging only with the dominant business school paradigm, especially when supporting policy makers and the entrepreneurial educator community.

3.3 Introducing the researcher's role in methodological development.

3.3.1 Designerly thinking as method – a conceptual framework.

Berglund (2007, 75) observes that it is 'often recognised that entrepreneurship is to a great extent a form of art, a practice-orientated endeavour that requires a sensitive and committed engagement with a range of phenomena in the surrounding world'.

In alignment with the ontological position and methodology presented, designerly thinking has been employed as an overarching method. Thus, engagement is less about the ontological perspective of the researcher but more about the perspective of the entire discipline of design. An adaptation of Gartner's 2007 iterative research cycle (Gartner, 2010), was considered appropriate for this polemic overview and synthesis of the peer reviewed research, as it seeks to generate theory inductively and then to ground the inquiry in real life evaluation and review (Cope, 2005). The cycle, which in itself is an example of designerly thinking, was first utilised and articulated in the researcher's MA in Enterprise Education, awarded in 2013, which provided a foundation for this type of investigation (Penaluna, 2013).
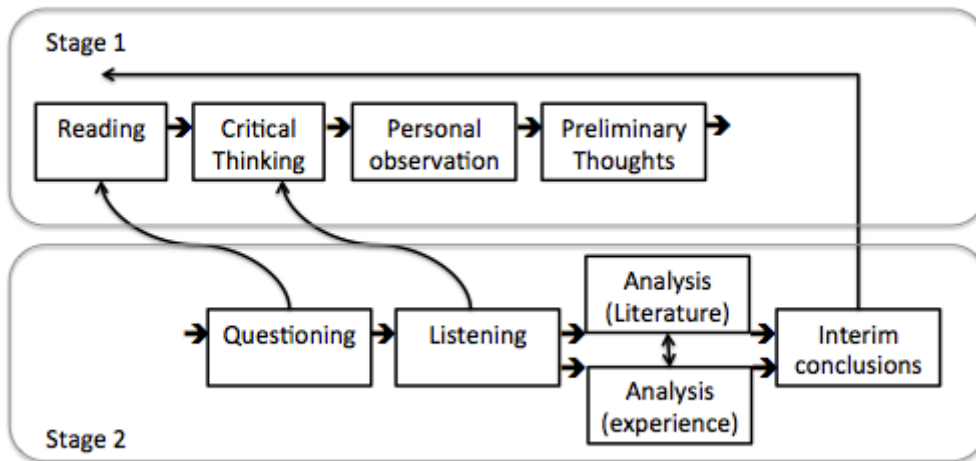
Figure 5. The iterative research cycle, developed from Gartner 2007 in Gartner (2010).

Reading - Enterprise and entrepreneurship texts including: international policy guidance, educational research, academic journals and conference papers. Broader education and learning literature including: design thinking,

Critical thinking - Reviewing findings from empirical and theoretical understandings that lead to new directions of thinking, especially when they challenge existing perceptions and boundaries. Includes broader and less traditional perspectives.

Personal observation - Free flowing thinking using relaxed cognition to discover new links and connections / linking personal experiences to informed discussions.

Preliminary thoughts - Iterative stages of thinking that may easily be discarded or reviewed. Includes broader perspectives and insights that may extend significantly beyond the existing observations and insights but can be linked in some way to offer new insights.

Questioning – Challenging current findings from self and others / seeking out omissions and shortfalls of understanding.

Listening - Taking new and emerging thinking into account from, for example, alumni, conference presentations, newsworthy events and critiques of practice.

Analysis – Actively aligning the academic literature and personal experiences / things learned.

Interim conclusions – deciding on paths to take to further inform the research. Considered as part of a prototyping process and thus merely an iterative stage / never viewing the outcome as wholly sufficient.

3.3.2 Reflecting on reflection

A central tenet of the designer is being a reflective practitioner (Schon, 1983), an epistemology of practice-based reflections 'in action' and 'on action' that evolves into action research (Swann, 2002). The reflexive practice demonstrated in the portfolio aligns with naturalist inquiry, and continuously informs subsequent reflective writing. In a continuation of this practice, the synthesis articulated in this thesis has, in itself, become professional development for the researcher in the melding of theory and practice (Moon, 2004).

4. SYNTHESIS

4.1 Introduction

The underlying aim of this body of research was to inform the development of entrepreneurial education and, in doing so, respond to emerging calls that it should enhance the creative capacity of learners. Based on insights and observations of theories and practices that were evolving, the portfolio is comprised of 14 internationally peer reviewed co-authored publications from 2011 to 2020; 9 journal articles, 4 book chapters and 1 thematic paper for the OECD/European Commission. Additionally, these explore the perceived parallels between the teaching, learning and assessment strategies being called for, with established pedagogies from the design education disciplines.

This narrative discusses the publications, as a journey of pathways, routes and reflections that span the 10 years 2011 – 2020. These are under-pinned with insights and observations from previous publications, in order to provide context that both illuminates the drivers for the research and illustrates the pre-existing level of academic engagement.

The insights and observations developed within the portfolio are critically interrogated and compared and contrasted with contemporary practice and perceived goals that were advocated within the field of entrepreneurial education. The absolute 'truth' was not being sought, but in line with educational research practice, strong evidence has been gathered and interpreted from a breadth of resources to produce 'provisional' and 'perspective' truths (Briggs, et al., 2014). These in turn could support nascent understandings and guide future practice.

Whilst the understandings gained from each paper informs others; contextually, methodologically and with enhanced subject acumen, they are not hierarchal but a cohesive body of work that theoretically underpin emerging premises and provide a vehicle for reflection, which in turn stimulates further research. This emulates designerly thinking, as in

the world of design, all goals are temporary, and interim investigations may bring forth further, previously unseen goals. The research is acknowledged to be original, providing a new contribution to the discourse at the time of publication.

To aid clarity, the synthesis of the body of work is initially discussed as a chronological journey, presenting the drivers, the opportunities arising and the subsequent insights and observations that informed the publications. The methodological approaches are articulated within that journey and in 4.5.2 the published outputs, in considering potential solutions from design education, are mapped against the challenges facing entrepreneurial educators, as presented by scholars and policy makers. A full description of the thematic integration is provided in 4.5. Motivated by the citations and increasing invitations to engage with policy makers, the research continues along its trajectory, seeking out meaningful insights to inform practice. Thus, this 'point in time' portfolio builds upon research informed practice and in turn, practice informed research.

Ultimately, this synthesis demonstrates potential opportunities to advance entrepreneurial education through an understanding of design education. It also clarifies the limitations within the portfolio and considers gaps in knowledge that require further investigation. It will initially illustrate sources of insight that led to direct observations that informed thematic development, consider the perceived balance of interdisciplinary expertise required, and explain the logic behind interdisciplinary co-authorship, before considering why the message of entrepreneurial education needs entrepreneurial educators has become a central tenet. Researcher and stakeholder perspectives are represented and the definitional confusion discussed in the introduction addressed at each pertinent point. Each published output is mapped against the challenges presented at that point in time, and opportunities for further advancement are introduced as they evolved.

4.2. Initial sources of insight

Within an inductive reasoning paradigm (Cope, 2005), first insights are based on experiences and observations that were initiated by a failed pedagogic intervention, and considers the

subsequent understandings gained. This failure triggered the research into how to advance entrepreneurial education, and specifically, saw potential value through cognisance of educational practices within the design discipline. The initial thinking is presented diagrammatically in figure 6 'The Sources of insights'. This locates the research by mapping it against the researcher's experiences and contexts.
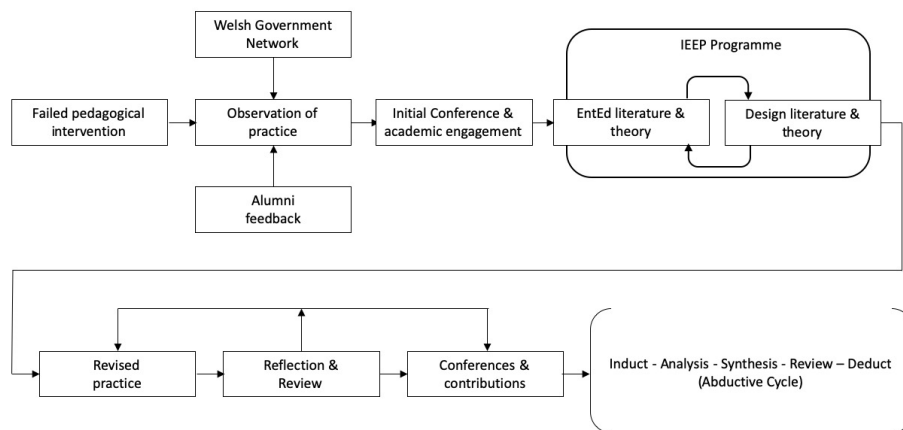
Figure 6. The Sources of Insights

4.2.1 Failed pedagogic intervention: Business educator meets (clashes with) art and design education

The initial motivation for the research goes back to the early 2000's based on a failed pedagogic intervention, as discussed in 2.2.1 a.

As a former bank manager used to loaning funds to new businesses, the researcher was in awe of the creative students' insights and ideas, including the advice they gave her on ways to teach creatives. As a direct result and through reflection, the researcher started to better understand her own decision-making in banking, and wanted to learn how to harness and develop the very creativity that she had witnessed in successful entrepreneurs she had funded.

She realised very quickly that whist business acumen is vital for entrepreneurial success, creativity is the essential ingredient for every aspect, from that initial spark of an idea, through to accessing finance and communicating ideas to diverse networks and stakeholder groups.

Thus, her research and publication journey began in collaboration with her partner, a design educator, based on the established way that alumni informed curriculum development, pedagogies and assessment strategies, and were instrumental in new programme developments.

4.2.2 Welsh government network, alumni feedback: observation of practice.

The researcher's engagement as the University Enterprise Manager and remit as Welsh Government Entrepreneurship Champion, as discussed in 2.2.2, afforded engagement with, and insights from, multiple stakeholders, as it included external networking with those directly involved with entrepreneurial endeavour both within and beyond education. Examples of those supporting the start-up process were banks, business support agencies, business angels and incubator managers. Internally, it afforded a level of responsibility for careers, teaching and learning, staff development and student recruitment, retention and attainment. These networks were integral to developing the infrastructure of support for staff, students and graduates starting their own businesses. Such understandings informed the practice, and reflection on practice not only led to more informed dialogues with stakeholders, but also triggered more scholarly thinking in terms of what assumptions were being made, especially in terms of preparedness to conduct business in the manner required by an entrepreneur.

The network of managers in Higher and Further Education institutions who had overarching institutional remits for entrepreneurship, as a component of third mission activities, contributed distinct offerings to those of academics, whose understandings were guided by their research and discipline specific interests. Quarterly meetings afforded the sharing of practice for embedding entrepreneurial education into the curriculum and the design of extra-

curricular interventions. As an academic, in addition to being the champion, the researcher was frequently invited to share their understandings amongst the network and in return receive contextual insights from Welsh Government policy makers and champions.

What became increasing evident during the observation of practices shared, was the number of extra-curricular initiatives that were developed within business schools. Amongst these were Student Entrepreneurship Clubs, volunteering opportunities and workshops with titles such as 'Marketing: What they don't teach you in Business Schools'. The interventions were designed to develop learners communication, leadership, creativity and self-promotion skills. As these practice based activities were designed to model theories and develop the skills, the researcher questioned why they weren't delivered as core, and the recurring response was that the educators considered the learning impossible to assess (Roulin and Bangerter, 2013, Lau, et al., 2014).

Yet, the researcher was observing such activities as being core to the delivery, with authentic assessment approaches, within the design disciplines.

Design alumni, who had participated in the failed pedagogic intervention, many of whom by now had become freelance or were working in small businesses were providing a clear message for the delivery of the professional studies module 'Tell them from me, they need to know this stuff'. Further fuelling the researcher's motivation to enhance understandings.

4.2.3 Initial Conference and academic engagement: researcher motivation and research triggers 1 (2005 – 2007)

Triggered by the observations from alumni and the Welsh Government network that the researcher should provide an academic contribution to the entrepreneurship education discourse, she co-authored their first paper. 'Entrepreneurship for Artists and Designers' (Penaluna and Penaluna, 2005) was accepted and presented at the Internationalising Entrepreneurship Education and Training Conference (IntEnt) held at the University of

Surrey in 2005. The conference was organised by an international committee and hosted in different countries each year. The event reinforced the perception that the entrepreneurship research community was dominated by the Business School paradigm, and few researchers had looked beyond business school approaches to other areas of education.

The case study presented challenged this perceived limitation and introduced design-led educational insights, including the use of alumni as 'intelligence informants'. The research immediately received critical acclaim from international delegates and was specifically referenced in the final plenary as a new way forward. Here the conference Chair (Professor David Kirby) stated that the paper was the first of its kind to be accepted, and the work was subsequently debated amongst all 250 international delegates. Kirby, together with eminent keynote Professor Allan Gibb laid down the challenge to provide further evidence of the embedded enterprise approaches adopted in Swansea, with a specific goal to further illuminate the theoretical underpinnings of the various approaches that had been employed.

Thus, at IntEnt 2006 in Sao Paulo, Brazil, two co-authored papers were presented that provided robust evidence from the perspective of alumni, including deeper engagement with the literature and alignments with the authors' personal experience as educators. One, of these two papers, 'Business Paradigms in Einstellung: A Creative industries perspective on enhancing entrepreneurship education' won the Best Empirical Paper Award for Senior Researchers (Penaluna and Penaluna, 2006c). It has since been utilised in Higher Education Academy (HEA) and Quality Assurance Agency (QAA) guidance to UK Higher Education Institutions HEI). Also of note is that the other of the two papers was cited in the opening address of the conference as it 'challenged existing thinking and opened new doors of exploration to the academic community' (Hills, 2006). This unexpected recognition led to numerous enquiries and invitations to further develop the observations presented.

The set of publications presented in this thesis are, therefore, a direct result of the challenges that Hills (2006) referred to, specifically, the enhancement of creativity within entrepreneurship education and adding a new dimension to the literature in entrepreneurship and entrepreneurial learning. Where the focus had been almost solely on business knowledge, theory and skills, we should now consider innovative capacity. In essence, the message was that whilst Business Schools concentrated on theories and models for analysing business

success, they did not design learning environments that enhance a learner's propensity for ideas generation, problem solving and opportunity recognition.

The profile of the researcher was thus raised significantly and the prestige associated with the research award and citations of the best practice not only attracted academics, but also opened the door to interested policy makers and educational leaders. For example, the pedagogic approaches in these early papers are cited in the European Commission's (2009) study 'The Impact of Culture on Creativity', which was prepared for the Directorate-General for Education and Culture, because it is 'an essential feature of a post-industrial economy' (European Commission, 2009, 5).

Whilst these papers are not included within the body of works submitted, because they fall outside of the regulatory time frame (10 years) for submission in the defence of a PhD by Published works, they are preparatory explorations without which the narrative presented here would be incomplete.

4.2.4 The International Entrepreneurship Educators Program (IEEP) and the influence and support of Professor Allan Gibb OBE.

The late Professor Allan Gibb, the 2005 IntEnt conference keynote, was, and is still, acknowledged internationally, as a leading figure in the field of entrepreneurship. His publications, span 1980's to 2014, and are some of the most cited works globally. This portfolio, builds on his academic criticality of the business school paradigm (Gibb, 2003, 2005, 2007, 2011) and considers the potential that entrepreneurial education has to positively impact on the University and its wider stakeholders (Gibb and Haskins, 2013).

Influenced by Gibb's provocations to develop research responding to his calls for mindset and competency development, the researcher successfully secured a Welsh Government funded place on the International Entrepreneurship Education Program 2007-8, which Gibb led (Gibb, 2011). The program was supported by the Ewing Marion Kauffman Foundation,

who at that time, with their US approaches, were the acknowledged leaders in entrepreneurship education. The researcher subsequently learned from the diverse cohort of participants on the program, and was in the privileged position of having extended personal debates with Gibb, who questioned and embraced the researcher's understandings of the synergies between design education and that of 'good practice' in enterprise education. From this, Gibb subsequently supported the researcher's journey, participating in their events, referencing their work, and was one of their most influential mentors until his death in December 2019.

Literature reviews into, what at that time, were distinctly different fields of study 'entrepreneurship education' and 'design education' were undertaken to explore and articulate the apparent synergies and, or, opposing perspectives, became the focus of study during this period.

4.2.5 Revised practice, reflection and review

In 2007-2008 the researcher was responsible for teaching, learning and assessment of four modules, that would now be termed as 'entrepreneurial'. These included undergraduate and post graduate level within both Art and Design (Professional Studies and Arts Enterprise) and the Business School (Entrepreneurship for Sports, Leisure and Events and an Entrepreneurship pathway on an MBA).

Thus, there were opportunities to design and implement revised practices, informed by the literature and first-hand experiences of the impact of the interventions employed. Reflection on impact was multifaceted. During the studies themselves, they were considered in terms of learner engagement, the influence on grades and what could be termed the 'distance travelled' of the learner. Of particular interest, was taking into account the learners experience post-graduation, especially when their observations on the impact of their studies suggested opportunities for improvement. This feedback directly led to curriculum

development, a process first articulated in Penaluna and Penaluna (2006a) and more recently in Paper 7.

4.2.6 Conferences and contributions: researcher motivation and research triggers 2

From 2005, conference participation and dissemination of research continued at local, regional and international events, including the IntEnt conferences in Poland, Netherlands and Ohio. However, the IntEnt conference planned for Egypt in 2011 collapsed due to political unrest and the conference was never reinstated.

The researcher wished to participate in conferences that are designed specifically to advance entrepreneurial education with proven impact, and these have remained a constant throughout the production of the portfolio. They are the International Conference of the Institute for Small Business and Entrepreneurship (ISBE) and the International Enterprise Educators Conference (IEEC). To make the distinction between the two, ISBE is an academic conference where all papers are double blind peer reviewed and considered to rank as refereed academic papers. IEEC on the other hand is an interactive conference, with the sharing of practice amongst practitioners and academics alike. Presentations are accepted more on the basis of their ability to showcase and demonstrate practice, rather than author 'about' it, with theoretical underpinnings. In accordance with the researcher's goal, these conferences complement the aim of putting theory into practice as well as ensuring that practice is interrogated through theory development.

It was whilst presenting research as a newcomer to ISBE in 2006, where the Treasury funded review into creativity in business, led by Sir George Cox (Cox, 2005), facilitated a review of the implications for entrepreneurship educators, that the researcher met her next co-author. The paper presented at the conference (Penaluna and Penaluna, 2006,b) was shortlisted for a best paper award, and Dr Colin Jones from the University of Tasmania joined the table to express his interest in the findings, which in turn led to extended dialogues. The culmination of these discussions and introductions to other researchers, in turn, led to a collaboration between others interested in the argumentation that educator development would be a key

factor in moving the agenda forward. The resultant paper, 'Entrepreneurial Education needs Entrepreneurial Educators: Assessing our Performance' (Penaluna et al., 2008), also drew upon the expertise of Dr Simon Brown of Sheffield Hallam University as well as Professor David Gibson OBE of Queens University Belfast, and was selected as a conference plenary at ISBE 2008

The 2008 presentation was a deliberate provocation piece, focusing 'on the view of lecturers 'at the 'chalk face' who were attempting to avoid the 'altitude sickness' of theoretical debate, that in the view of the authors missed pertinent and relevant perspectives' (Penaluna et al., 2008,1). The collaborative transdisciplinary perspectives of design, physics, law, management and finance, informed the paper, based on practice based understandings and empirical evidence, captured the audience imaginations, and unusually, received a standing ovation (observed to be a first by attendees). Following this, the Vice Chair of ISBE Professor David Brooksbank stated that: -

> Enterprise education needs to be challenged regularly and effectively. I was delighted to include an innovative and thought-provoking paper by colleagues from Swansea Metropolitan University and a range of other institutions in the opening plenary, which provided the perfect backdrop for our conference and its related themes. The work that Dr Andrew and Mrs Kath Penaluna are doing to further the bounds of enterprise education is perfect testament to their dedication to improving student experience.

Delegates engaged with the researcher throughout the remainder of the conference, keen to know more about the practices being discussed. The information most sought was elaboration on the approaches for the assessment of student performance, which included formative and 'process analysis' and self-reflection and eventual meta-reflection. The practice for the delegates, from business schools across the globe, was perceived as new, innovative and a way forward for entrepreneurship education. Whilst new for that audience, it was of course a fully established approach within design education.

Thus, the conference provided triggers for and credence to:

- the methodological approach of co-authorship for enhanced understandings,
- exploration into developing entrepreneurial educators for entrepreneurial education
- the potential for design education to advance entrepreneurial education
- an acceptance of conceptual papers from the research community

Co-authored, conceptual papers, enhancing the development of educators are prevalent within this body of research, and the rationale is further articulated within the emerging observations and themes section 4.3.

4.2.7 Induct – Analysis, Synthesis, Review, Deduct (Abductive Cycle).

In line with the sources of insight model (Figure 6) and its' cyclical process, this journey led to significantly revised practice in curriculum delivery (Art and Design and Business School), which offered opportunities for further reflection and review, which in turn provided insights that were developed and published in conference and academic papers. The process is borrowed from design educators, it is an abductive cycle of; induct, analysis, synthesis, review – deduct, then repeat the process (Kolko, 2010).

Reflecting on the feedback from the 2008 conference, the researcher considered that in offering perspectives from design, in addition to those from the most prevalent paradigm of the business school (Katz, 2003, Kirby, 2004, Gibb, 2005) they offered something unique. Aligned to the central tenet, collectively, these insights suggested that design education practices, drawn out and interpreted by a business educator, could advance entrepreneurial education.

4.3. Thematic Integration - Emerging observations striking out in search of balance

Reflections from the presentation at ISBE 2008, in tandem with the understandings gained from the educator program IEEP, re-affirmed the researcher assertion that 'entrepreneurial education needs entrepreneurial educators'. It confirmed that researching and co-authoring with a design educator, establishing potential synergies between what was emerging as 'good practice' for entrepreneurial education with that of design education was the most pragmatic approach to ensuring that designerly thinking was infused, both in research and what was practiced. In essence, it represents interpretation and adaptation of the practices found in design education and its theoretical stances. Subsequent reflection and debate also reinforced just how new/innovative some of the thinking was to the business education community that the researcher had come from, especially to those charged with curriculum development. Thus, the body of work is developed from a solid base of theoretical and practice understandings of design education, as interrogated and interpreted by a business educator, and utilised in publications that are directly aimed at business educators and policy makers.

A recurring theme explored and addressed within the portfolio is that pertaining to the increasing call for mindset and competency development for creative thinking amongst all learners, across the disciplines and levels of education, formal and informal (Bacigalupo, 2016). Design educators rarely used the terms, 'enterprise', 'entrepreneurship', 'entrepreneurial' and, with the exception of the co-author, in 2011, at the chronological starting point for the body of evidence presented in this submission of PhD by publication, did not appear to be engaged in the mainstream entrepreneurial education discourse.

The researcher's proposition that 'entrepreneurial education needs entrepreneurial educators', asserted that educators themselves needed to demonstrate the very creativity they were charged with instilling and developing within their learners, as had been observed in design education. Thus, the emerging research and observations enabled a preliminary map to be developed, by the researcher, which is represented diagrammatically in Figure 7.

Emerging observations and themes – striking the balance

Business Education

Design Education

Creativity is lacking in Business Education

Design Education is more aligned to developing 21st C skills

Design - based competencies should lead education process

Business - based knowledge should support education process

Design Education is better aligned with contemporary learning theories
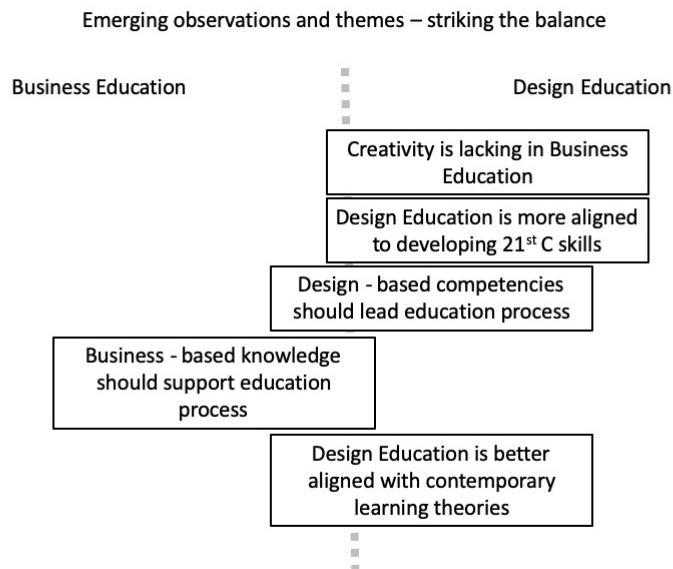
Figure 7. Emerging observations and themes – striking the balance.

Emerging observations, from the literature and networks, led to the development of 5 themes which were a somewhat subjective assimilation of thoughts, that provided a spring board and impetus for further exploration. They were not designed as unique studies, but provided an underpinning premise upon which to explore and reflect. Before proceeding to consider the portfolio in greater detail and the subsequent challenges posed by Business School scholars and policy makers that it sought to respond to, an overview of each of the initial supposition is now provided, and is discussed in conjunction with the paper (s) that subsequently aligned with each challenge that emerged.

4.3.1 Observation 1. Creativity is lacking in Business Education (Papers, 7, 10, 13, 14)

Business school scholars, typically anchored in US Management Schools, dominate the research agenda for entrepreneurship education (Landström and Perrson, 2010, Ratten and

Usmanij, 2021). These scholars have long called for a paradigm change to move away from the reliance on theories 'about' entrepreneurship and business functionality, towards pedagogies for enhancing creativity, visionary skills and flexibility (Carey and Matlay, 2010, Rae et al., 2014, Azanza et al, 2017).

Provocations from thought leaders such as Kirby (2004), who asked 'Entrepreneurship Education: can business schools meet the challenge', led to initial work where argumentation suggested a move from 'left brain' analytical and liner thinking towards the development of 'right brain' creative thought. Although this overly simplistic dichotomous view is now thought to be dated, in 2015 Shepherd, as editor in chief of the Journal of Business Venturing, called for 'entrepreneurship research that is more interactive, activity based, cognitively hot, compassionate and prosocial' (Shepherd 2015,1).

In their study that aimed to provide future directions for entrepreneurial education and learning, Higgins and Galloway's, 2014 concluded that;

> Entrepreneurship is about creativity and critical thinking, which suggests the need to move away from traditional pedagogical approaches to teaching and learning toward a more real-life application of entrepreneurial practice in which experience needs to be gained through active participation (Higgins and Galloway, 2014, 455).

Indicative of this long-standing nature of this debate Higgins and Galloway (2014) support their argumentation with references to Gorman et al, (1997), who themselves called for future research to draw upon theory from other disciplines, referencing and reflecting the proposals from Dainow (1986).

4.3.2 Observation 2. Design education is more aligned to developing 21st Century Skills (Papers 7, 8, 12, 13)

Kariv et al, 2019, observe that business education is conservative and insufficiently forward looking, whereas developing 21st century skills, the core competencies of collaboration,

critical thinking and problem solving are integral to design education. The increasing attention for design thinking in academic and business discourses (Dorst, 2011, Martin, 2009) and an evolving series of texts advocating that design thinking techniques be integrated into the business school educator approaches, are indicative of a recognised need for design education expertise. However, scholarly work from design educators consider these initiatives to be at a very early stage of development (Johansson-Sköldberg, 2013, Rutgers et al., 2017, Ghajargar and Bardzell, 2019, Laursen and Haase, 2019), and research undertaken at UWTSD underscores the belief that when observed during lessons, designers have a far more structured approach to developing creativity-based competencies such as opportunity recognition than their counterparts in business education (Tynan, 2017).

4.3.3 Observation 3. Design – based competencies should lead entrepreneurial education process (Papers 7, 12, 13, 14)

Design education can be compared with Bloom's (1956), three taxonomies of learning, the cognitive, the psychomotor and the affective domains, due to its interwoven mix of thinking, doing and feeling. It is through 'design doing', when making things, that designers Rutgers, et al, (2017, 2) observe 'provides the fertile ground for the acquisition of 21st century competencies' and in turn develops the 'creative confidence' (Kelley and Kelley, 2013) to undertake open ended projects without clearly defined outcomes. It has been suggested by Bandera et al., (2019) that applying a studio-based model addresses the need for relevance as well as disruption of learning. Rae, (2007) emphasises that enterprise and entrepreneurship can be viewed as applied creativity. In developing its 2021 Creative Thinking framework, PISA defines creative thinking as:

> the competence to engage productively in the generation, evaluation and improvement of ideas, that can result in original and effective solutions, advances in knowledge and impactful expressions of imagination (OECD, 2019, 8).

Yet, Runco, (2007, 5) observed that 'most educational efforts emphasise convergent thinking and therefore may do very little to develop creative potential'. It also re-emphasises the question that if learners are not subject to disruption, how will they learn to become adaptive and resilient (Bandera et al., 2019)? Noteworthy, is that design-based approaches such as designing a logo feature in the creativity tests devised by OECD (2019).

4.3.4 Observation 4. Business - based knowledge should support, not lead, the entrepreneurial education process (Papers 7, 14).

Thirty years ago, the long-standing difficulties for defining and evaluating entrepreneurship education, were noted by Curran and Stanworth, (1989, 12), observing it to be a 'little understood phenomenon'. Building on the work of Jamieson (1984), and the typology of educating 'about', 'through' or 'for' entrepreneurship, Curan and Stanworth identified four main categories of education and training linked to small business, namely; entrepreneurial education, education for small business, self-employment and small business awareness education. As previously noted, discussions as to what constitutes 'entrepreneurship education' are still on-going (Valero, et al., 2014, Moberg, 2020), however, it is the final three categories that most align with the practice of 'business', for which the acumen from business educators can facilitate the delivery of the technicalities of business, such as finance, business models, legal issues, operations and management. Moving directly to these practices assume underlying competencies such as visioning a potential future, spotting future orientated opportunities and being flexible and adaptable are already present, or can be learned through failure. In contrast, design education progressively builds such competencies, and should therefore precede the development of business knowledge. It could be posited that this would mitigate for the number of business failures witnessed anecdotally by the researcher, when such thinking has not been embraced.

4.3.5 Observation 5. Design education is better aligned with contemporary learning theories (Papers, 1, 3, 4, 7, 12, 14)

It is beyond the scope of this submission to discuss each learning theory individually, however as the researcher has identified, design education can be mapped against the three main theories of constructivism, behaviourism and cognitivism.

Constructivism is the dominant educational theory, having been embraced by every educational reform initiative within the last two decades (Karagiorgi and Symeous, 2005, Ertmer and Newby, 2013, Dagar and Yadav, 2016). Problem- based learning, curiosity based learning and authentic 'constructively aligned' (Biggs, 2003) instruction and assessment core to teaching, learning and assessment.

As design educators are typically designers themselves they continually demonstrate and reinforce the behaviours that they wish to instil in their learners. The manner in which they continuously respond to external stimuli, emulates the behaviourist approach. The processing of information to problem identify, problem-solve and make connections with varying concepts, responds to cognitivism. Design educators are cognisant of Gestalt theory, from its literal meaning as 'pattern or form', to the consideration that the whole is greater than the sum of its parts. In consequence, it is inherent that designers view the experiences and perceptions of learners as having a significant impact on the way that they learn, which in turn is often predicated by their own lived experiences as design practitioner (Komenić et al., 2016).

The scholarly link between teaching and design is not new (Dewey, 1934, Schon, 1983), though it has been observed more explicitly in recent years (Boling, 2010, Kirscher, 2015). Moreover, Norton and Hathaway (2015) observed a growing need for a teacher education framework based on design.

4.4 Stepping back to go forward: 2011 – 2020: The journey and the portfolio

Before considering the papers in more detail, I will step back to 2011 and revisit the momentum that the contribution to entrepreneurial education was gaining and in particular the opportunities afforded by the success of the 'Entrepreneurial education, needs entrepreneurial educators' conference paper (Penaluna et al, 2008).   It deserves a brief commentary as it is integral to the research and the subsequent opportunities for research embodied within this 10-year portfolio.

By 2010 the researcher's contributions received the attention of senior policy makers in Wales and the researcher was tasked by Welsh Government, to work with fellow Welsh participants from the International Entrepreneurship Educators Program (IEEP) to investigate the potential for a program of development for educators in further and higher education in Wales. The funding enabled the researcher to lead a feasibility study (Penaluna et al., 2010) and interpret the findings to shape a course and its deliverables. The only formal offerings at the time were based on non-accredited continuous professional development. The study demonstrated a demand for a module at level 6/7, which was also seen to offer a sustainable approach, as it could be undertaken as a credit bearing integral element of formal teacher training. The module was the first of its kind in the UK, hence significant theoretical underpinning with supporting empirical evidence was required by the researcher's University validation process.

For the first time the researcher co-created the programme of study with educators from the field of education in Swansea Metropolitan University and was directly involved in its delivery for the first cohort in 2012. The insights and understandings were developed as a co-authored publication under the clear title of Enterprise Education needs Enterprising Educators: A case study on teacher training provision' (Paper 1). This paper represents the first step of the Thematic Representation in Figure 8.

Running parallel to this were invitations to engage in European projects designing educator training, for developing entrepreneurial competencies in learners across all levels and disciplines, for both formal and informal education. This in turn, not only led to increased understandings, but also an enhanced interdisciplinary educator and researcher network with whom to collaborate, and gain insights into the impact of regional policies and corresponding practitioner perspectives. Co-authorship led to enhanced understandings and mitigated for bias (Carter and Little, 2007, Gordon, 2009).

The subsequent practices explored included investigations that drew on cutting edge research in neuroscience related to the learning brain and its different way of operating. Based on

collaborative work with Drexel and Midwestern Universities in the United States, this is an area that was developed by Professor Penaluna and to which the researcher makes no claim. Whilst the researcher is interested in the field and has incorporated the findings, she has not been immersed in this aspect of the academic context.

4.5 Thematic integration of papers

4.5.1 Advancement and synthesis: Entrepreneurial Education needs Entrepreneurial Educators

Through understanding entrepreneurial education and design education, the portfolio of fourteen published works posits the view that design education can contribute to the development of entrepreneurial education. They follow the developmental journey described, offer examples of related work and demonstrate a framework that moves the premise of entrepreneurial education needing entrepreneurial educators, towards what evidence is required and what theoretical constructs will facilitate progress in the context of educating educators. These are presented as interlinking themes in Figure 8. The individual papers are located in the text that follows in a manner that demonstrates both advancement and synthesis.

Entrepreneurial Education needs entrepreneurial educators

1

International contextual understandings

2

Scholarship of teaching and learning cluster

Competency developments

3, 4, 5, 6, 7

Academagogy

8, 9

Enhancing creativity through education cluster

Policy engagement

10, 11

Neuroscience of learning

12

Assessment of learning

13

Teacher training and development

Designerly thinking lens

14

Figure 8.   Thematic clustering of portfolio submission

Entrepreneurial education needs entrepreneurial educators – Paper 1

The following contributions advance thinking towards the strategic aim of enhancing teacher training and development, through understandings derived from engagement in design education. Set within international initiatives that the researcher has been engaged in, they are thematically grouped into a) the Scholarship of Teaching and Learning, and b) the subset of Enhancing Creativity through Education.

Paper 1 sets the scene, and is based on learning related to setting up a new programme of study in 2009-10, within a university when there were no similar offerings to reference when going through validation procedures for quality enhancement.

1. Penaluna, K., Penaluna, A., Usei, C. and Griffiths, D. (2015), 'Enterprise education needs enterprising educators: A case study on teacher training'

A critical exploration into the development and delivery of the entrepreneurial learning module on UWTSD's PCET. The first such educational programme in the UK.

International contextual understandings – Paper 2

At the time of writing, no international research existed that took a holistic view from the perspective of the educator and their influences and motivations. Paper 2 therefore, was designed to add clarity to the context within which further work could be developed.

2. Penaluna, K., Penaluna, A. and Jones, C. (2012), 'The Context of Enterprise Education: insights into Current Practices'.

Critical investigation into practice from 142 participants from across different disciplines, within 34 countries. Explores the heterogeneity of provision and considers what inspires educators to engage.

Scholarship of teaching and learning – Papers 3 - 9

As the practices developed and theoretical understandings evolved, the authors' contributions were shared with their peers and policymakers for further consideration. Two main themes emerged, firstly a focus on competency development as opposed to simply knowledge enhancement, and secondly, that a learning journey should move the learner from dependency on the educator to autonomy of thought.

3. Penaluna, A. and Penaluna, K. (2015), 'Entrepreneurial Education in Practice, Part, 2 – Building Motivations and Competencies'.

Commissioned by the OECD in partnership with the European Commission, this white paper explores competency development, using examples of practice from schools from 27

countries. Introduces a conceptual framework for assessment that makes the distinction between the two 'I's of 'implementation' and 'innovation'.

4. David, K, Penaluna, K, McCallum, E, and Usei, C (2017), 'Embedding Entrepreneurial Skills development in Teacher Education'.

Underpinned and aligned with evolving European policy, provides insights from those experienced in educator development.

5. Jones, C., Penaluna, K. and Penaluna, A (2020), 'Value creation in entrepreneurial education: towards a unified approach'.

Provides critical insights into the concept and appropriate positioning of creating value 'for others' as a learning objective within entrepreneurial education.

6. Jones, C., Penaluna, K., Penaluna, A., and Matlay, H. (2018), 'The changing nature of enterprise: Addressing the challenge of Vesper and Gartner'.

Introduces a triangular mapping model whereby scholars can locate their contribution. At the base of the triangle is enterprise, development fundamental for most learners, raising to the tip to entrepreneurship, the starting of a business, which is for the few.

7. Penaluna, A and Penaluna, K. (2020) 'In search of entrepreneurial competencies: Peripheral vision and multi-disciplinary inspiration.'

Illuminates the research process developed by Komarkova et al., (2015) that resulted in the development of EntreComp, and aligns outcomes with practice borrowed from a design-

based programme at UWTSD, one of 10 selected EU case studies (specifically advertising). Introduces the 'crit' as a teaching. learning and assessment vehicle.

8. Jones, C., Matlay, H., Penaluna, K. and Penaluna, A (2014), 'Claiming the future of enterprise education'.

Introduces the concept of Academagogy - moving entrepreneurial education from an emphasis on pedagogical content knowledge to andragogy (student centred learning) and heutagogy (self-directed learning), which addresses the need for independency of thought, with less reliance on the educator.

9. Jones, C., Penaluna, K. and Penaluna, A. (2019), 'The promise of andragogy, heutagogy and academagogy to enterprise and entrepreneurship pedagogy'.

Develops prior understandings from Paper 8, in response to growing interest from scholars and educator networks.

Enhancing creativity through education – Papers 10 - 14

As policy engagement and influence increased, it became apparent that creative acts such as opportunity recognition and ideas generation were neglected in the entrepreneurial education literature, and that assumptions were being made when researcher(s) had not looked beyond the business and management paradigms. The following papers have been selected to illustrate this journey, which borrowed heavily on educational strategies that had been developed in design and the creative industries, including underpinning understandings of brain functionality and how creative capacity can be mapped, developed and assessed.

10. Penaluna, A. and Penaluna, K (2011), 'The evidence so far: calling for creative industries engagement with entrepreneurship education policy and development'.

Aligns practice from design with that advocated for entrepreneurial education. Responds to the published perspective that creative aspects are unteachable, by providing examples based on designerly thinking.

11. Penaluna, A., Penaluna, K. and Polenakovikj, R. (2020) 'Developing entrepreneurial education in national school curricula: lessons from North Macedonia and Wales'.

Knowledge transfer paper, discusses how policy interventions designed to enhance creativity were informed by theory and practice developed by the researchers.

12. Penaluna, A, Penaluna, K and Diego, I. (2014), 'The role of creativity in entrepreneurship education'

Design education strategies for developing divergent and convergent thinking within solution finding projects, underpinned by theories of neuroplasticity in cognitive science.

Note: Extends and updates understandings from; Penaluna, A. Coates, J and Penaluna, K (2010) Creativity-based assessment and neural understandings: A discussion and case study analysis.

13. Penaluna, K., Penaluna, A., Jones, C. and Matlay, H. (2014), 'When did you last predict a good idea?: Exploring the case of assessing creativity through learning outcomes'.

Critically considers where the initial spark for a business idea comes from – from an enhanced understanding of business functionality, or from a passion emerging from creative endeavour. Highlights ineffectiveness of learning outcomes that predict student performance.

Thematic Integration – Paper 14

The final paper, a book chapter, takes us full circle, and re-appraises what has been learned and what potential actions could provide more impactful learning, based on the experience of using theory and practical developments - as viewed through the lens of design education.

14. Penaluna, A and Penaluna, K. (2019), 'I'm a designer, get me out of here: can entrepreneurial education advance through learning from design education?'

Compares and contrasts experience of design and design education with new and emerging challenges of education for new business development and enterprise.

4.5.2 Mapping of Published Outputs: challenges and posited solutions.

When the researcher joined the entrepreneurship academic community in 2005, questions were being asked such as 'Entrepreneurship education can it be taught? (Henry et al., 2005 a, b). Haase and Lautenschläger (2010), when referencing the need to develop the attributes of motivation, knowledge and skills, also asked, 'whether entrepreneurship is really teachable?' West et al, (2011), considered the same question, and whilst observing that entrepreneurship was a 'hot topic', there was no agreed definition of what it was. To bring us to 2021, these observations are still being echoed by Allahar (2021, 2) who in discussing the teaching of entrepreneurship within Business Schools, asserts that 'the soft skills such as creativity, proactiveness, leadership, risk-taking propensity, and developing an entrepreneurial mindset are difficult to teach'. Perhaps interestingly, he doesn't ask whether they can be learned? Allahar also suggests his readership should consider a publication by Pittaway and Edwards (2012), which, coincidentally, references the researcher's contributions to assessment practice.

One of the observations made by Henry et al, (2005a) was that Entrepreneurship education needed both the arts and the science, with an assertion that the sciences, the technicalities of business and management, such as finance, were considered 'teachable' using the traditional structured approaches from the Business School domain. However, the art of creativity challenged the business community and were considered 'unteachable'.   Critiques of business schools educational practice, in general, and specifically for entrepreneurship raised questions of legitimacy of the topic (Fayolle et al., 2016).

Such criticism continues, with business schools critiquing their internal practice not just for entrepreneurship education, but also reflect on their inability to prepare graduates for the world of work. At its most extreme, though referencing many scholars from the domain, a UK professor, who has taught in business schools for 20 years, advocates that they should be 'Shut Down' (Parker, 2018a, b) and re-organised to better meet the needs of stakeholders. Arguably, this research contributes to these types of discussion.

Within this context and with each pedagogic challenge the business community posed, the researcher could see exemplars of how the design community had already integrated interventions that responded to the challenges being articulated, without referencing the terms enterprise or entrepreneurship at all. Hence the established practice that could be found within the designers' classroom remained as Kellet (2006) had noted, under the radar of the business education community. This provided the stimulus to contribute to conferences and publish what have been predominantly conceptual works that made links more overt, and interpreted silos of disciplinary language.

To provide both context for and the corresponding contribution within this process of synthesis, the papers within the portfolio have been mapped against the challenges posed by business school scholars and policy makers, predominantly from the US and Europe, in their various guises as stakeholders of entrepreneurial education. It might be anticipated that in spanning some twenty years, many of the challenges posed would have been met, however as can be seen in the mapping, this remains a long-term challenge. The researcher is aware that as the literature has developed, emphasis on disciplinary credibility and robustness appears to

have led to a research culture where cited works must come from business, enterprise or entrepreneurship, which limits the potential to seek out solutions elsewhere.

The body of research proposes a solution to each of the challenges presented and each paper numbered from 1- 14 has been mapped against the identified challenges. The primary source (s) of the calls for action are presented, indicating whether they are policy, scholarly or both.

During the mapping exercise, three distinct themes emerged:

1.Lack of understanding amongst entrepreneurship educators of the scholarship of teaching and learning.

2. Limitations of pedagogic approaches

3. Limitation of methods.

1. Lack of understanding amongst entrepreneurship educators of the scholarship of teaching and learning.					
Challenges	**Indicative Key authors**	**Paper**	**Posited Solution**	**Policy Call?**	**Scholarly Call?**
Risk to learners, educators and faculty with venture creation pedagogy.	Shepherd (2019), Bandera et al., (2020), Ratten and Umanij (2021).	5, 7, 9, 14	Consider what competencies are required prior to business planning		√
Emergent Value Creation Models theory driven and assume idea generation	Mishra and Zachary, (2014), Lackéus, (2015), QAA, (2018).	14	Consider design – led education where value creation is inherent, but prior learning required. Mindset as well as skills development	√	√
EE educators have not all received educator training / undertake scholarly research in educational practice	Welsh Government (2010), Neck and Corbett (2018), European Commission, (2011) Moberg, (2020).	3, 4, 5, 6, 7, 8, 9	Embed scholarship of teaching and learning in studies	√	√

2. Limitations of pedagogic approaches					
Challenges	**Indicative Key authors**	**Paper**	**Posited Solution**	**Policy Call?**	**Scholarly Call?**
Assessment is underdeveloped and remains focussed on positivistic business education methodologies	Pittaway and Edwards, (2012), Neck and Corbett, (2018), Bacigalupo et al., (2016), QAA, (2018), Morselli, (2019), Allahar, (2021).	7,10, 13, 14	Look beyond the business school – towards interdisciplinary approaches and behaviourist as well as pre-known knowledge assessment.	√	√
Business Schools challenged to develop both science and art of entrepreneurship	Henry et al., (2005, a, b), Schlee and Harich, (2014), Kuratko and Morris, (2017), Bacigalupo et al., (2016), QAA, (2018), Allahar, (2021).	7,10, 11, 12, 13, 14	Engage with models from Design Education and Neuroscience Research	√	√
Limitations of educator-led pedagogical approaches	Gibb, (2005, 2007),Volkmann et al (2009), Lackéus, (2015), Bacigalupo et al, (2016), Azanza et al., (2017), Linton and Kinton, (2019).	3, 8, 9	Use design-based trajectories based on Andragogy and Heutagogy (Academagogy)	√	√
To move beyond a start-up focus to competency and mindset development	Gibb, (2003), European Commission, (2011, 2013, 2015), Bacigalupo et al., (2016), Fletcher, (2018), QAA, (2018), Allahar, (2021).	1, 3, 4, 7	Educate educators to develop entrepreneurial education in subjects and disciplines	√	√
Lack of clarity beyond 'learning about' rather than 'for' or 'through'	Johnson, (1988), Edwards and Pittaway, (2012), Fletcher, (2018).	7, 14	Use techniques from design: Experiential learning Action based	√	√

3. Limitation of methods.					
Challenges	**Indicative Key authors**	**Paper**	**Posited Solution**	**Policy Call?**	**Scholarly Call?**
Business education charged with inadequately equipping graduates with appropriate skills.	Pfeffer and Fong, (2002), Gibb, (2003), Mintzberg, (2004), Binks et al., (2007) Waddock and Lazano, (2013), Parker, (2018), Starkey and Thomas, (2020).	1, 3, 7, 13, 14	Look beyond the business school – towards interdisciplinary approaches / educate educators		√
A lack of future entrepreneurs.	Matlay, (2005), Burns, (2018), Neck and Corbett, (2018), HM Government, (2017), World Economic Forum (2020a)	1, 3, 7, 13, 14	Look beyond the business school – towards interdisciplinary approaches / educate educators	√	√
Questions over the legitimacy of entrepreneurship and small business as a field of study.	Katz, (2008), Heriot et al., (2014), Fayolle et al., (2016).	1, 3, 7, 13, 14	Look beyond the business school – towards interdisciplinary approaches / educate educators		√
Approach found to have negative impact on student's intention of starting a business.	Von Graevenitz et al., (2010), Kalyoncuoğlu, (2017)	4, 5, 7, 8, , 9, 12, 13, 14	Mindset development as well as skills		√
Conservative models rather than forward looking ones	Shepherd, (2015), Kariv et al., (2019).	7, 14	Use abductive methodology to propose future orientated solution development		√
Fragmentation - scholars not cross-	Ucbasaren et al., (2001), Henry et	All	Co-authored works that draw		√

3. Limitation of methods.

Challenges	Indicative Key authors	Paper	Posited Solution	Policy Call?	Scholarly Call?
referencing work – discipline specific as opposed to interdisciplinary.	al (2005, a) Fayolle, (2013), Dino, (2015), Ferreira et al, (2015), Fayolle et al., (2016).		on / align different scholarly perspectives.		
Educators solely engaged in research and publication does not fully reflect contemporary educator / practitioner practice	Gibb, (2005), Azanza et al, (2017), Nabi et al., (2017), Advance HE, (2019).	All	Co-authored educator research based on practice. Supported by international practitioner approaches.	√	√
Research does not fully reflect the 'how' that sits behind published best practices.	Martinez, (2010), Fayolle and Gailly, (2015), European Thematic Working Group for Entrepreneurship Education, (2014), Lackéus, (2015), OECD, (2018), Turner and Gianiodis (2018).	1, 2, 4, 7,11, 12,13,14	Adopt design methodology – where 'how' is integral to experience	√	√
Insufficient studies with deep reflection on practice	Fayolle, (2013), Fayolle et al., (2016), Moberg, (2020).	6, 7, 8, 10, 11, 12, 13, 14	Use reflection approach inherent in design education	√	√
Definitional confusion between the 3E's limits robust program evaluation	Valero, et al., (2014), Sirelkhatim, (2015), Moberg, (2020).	7	Make explicit at outset with conceptual understandings.		√

Figure 9. Challenges of the dominant paradigm – posited solutions

The challenges presented here primarily relate to pedagogic issues, which are exacerbated by a lack of understanding amongst entrepreneurship educators of the scholarship of teaching and learning, particularly from within US business schools who dominate the domain. Calls are made for research from those engaged in both practice and research, that is interdisciplinary and reflects the 'how' of practice, and this needs further discussion.

Challenge theme 1: Lack of understanding amongst entrepreneurship educators of the scholarship of teaching and learning.

Many scholars, especially those from business and management in the US, whose publications have dominated the agenda, have not undertaken any educator training, and in consequence have minimal understandings of the scholarship of teaching and learning (Neck and Corbett, 2018). Thus, studies and findings emanating from such scholars need to be considered within that context. Of note, is the recent attention given to the 'Darkside' (Shepherd, 2019, Bandera et al, 2020, Ratten and Usmanij, 2021). A Delphi study conducted by Bandera et al., (2020) into the 'Dangers and unintended consequence of entrepreneurship education' was dominated by US scholars. Their observations included; the overuse of pitching – leading students to think that entrepreneurship was just about pitching, and encouraging venture creation within students, by using examples of heroic entrepreneurs. Calls were made for educators training to be 'grounded on good educational research' (Bandera et al., 2020, 15) and moreover that they should have 'one foot in entrepreneurship as a profession'. Unusually for a subject, entrepreneurship is frequently delivered by educators who have no experience in running a business themselves, which illuminates a double deficit. In contrast, designer educators frequently have owner/manager experience.

Interestingly, 76% of respondents to the researcher's international survey (Paper 2) had business owner experience. However, assertions from Bandera et al., (2020) are informed by a Delphi study that consisted only of award winning entrepreneurship educators, whose awards, in the main, are based on academic research outputs 'about' entrepreneurship/venture creation in high ranking journals, and not on practice.

In line with the thematic integration, all of the papers respond to an observation that entrepreneurial education needs entrepreneurial educators. Thus, the scholarship of teaching and learning provides the theoretical underpinning for all of the papers. The researcher progressed her own understandings of educational practice during the portfolio development.

Challenge theme 2. Limitation of pedagogic approaches

Within the contemporary discourse, there are still discussions reflecting Henry et al., (2005a, b) observation of the challenges of developing creativity within business and management studies (Rideout and Gray, 2013, Valero et. al, 2014, Weicht, 2018, Allahar, 2021). The insights provided within the portfolio leads the researcher to suggest that the questions are still valid, as many within the community still view entrepreneurship as something to 'teach' (educator led - pedagogy) rather than a co-created learning process where the learner is central, especially when developing autonomy of thought (learner led - heutagogy) (Papers, 3, 8, 9). Following a career as a Business School educator, Burns (2018) asserted that he taught MBA students to write excellent business plans, about ventures they usually had no intention of starting. In becoming an entrepreneur himself Burns (2018, iv) observes that 'Creativity—in particular the ability to spot innovative business opportunities—is probably the most important entrepreneurial characteristic'.

Conversely, nurturing creativity is inherent in design education, as those within the discipline respond to challenges, such as creating new products and services, problem solving and seeking out new opportunities. 'It (design education) also develops abilities and intentions, encourages communication and social interaction, critically selects and retains meaningful memories' (Joglekar, 2019, 1).

Authoring a business plan, or derivatives such as the business model canvas is a frequently used assessment vehicle within the Business School entrepreneurship environment (Neck and Corbett, 2018), whereby the studies are more 'about' entrepreneurship, rather than learning through 'doing' and in turn 'for' entrepreneurship (Paper 2). In contrast, design education is inherently experiential, with Beckman and Barry (2007) observing its resemblance to Kolb's (1984) experimental learning cycles. To use the much-used analogy of riding a bike to explain experiential learning, knowing all about a bike does not give you the skills to ride one. To extend this into the domain of the designer, they would seek out ways to redesign it

gaining empathy with the cyclist and their stakeholders in order to communicate a new iteration. In doing so, designers acknowledge the distinction between experiencing and understanding (Marton and Pong, 2005) using empathy to meet the needs of people rather than an organisational or efficiency perspective. (Norman, 2014).

Even when experiential learning takes place (Kolb, 1983) within an entrepreneurship program, the assessment is typically through instruments such as examinations and essays 'about' (Pittaway and Edwards, 2012). Pittaway and Edwards (2012) observed the paucity of research into assessment and in referencing the researcher's contribution towards innovative forms of entrepreneurship education (Penaluna et al., 2009), specifically called for continued efforts. Paper 13 was written in direct response, it is indicative of the 'How' to enhance and evaluate the entrepreneurial capacity of learners, as is articulated within all the papers, and drawn from insights taken from design education.

Challenge theme 3: Limitation of methods.

The researcher, having worked in design education since 1997 developing entrepreneurial forms of education, observed that understanding and teaching the creative aspects associated with the art of entrepreneurship would be valuable, and should be a pre-requisite. It was her view that such an approach would not only equip individuals with an enhanced capacity to create ventures, be they commercial, social or cultural, but to respond to the global calls to enhance individual creative capacity, in order to respond to the opportunities and challenges presented in our world (Bacigalupo, et al., 2016).

The collaborations were based on what the researcher perceived as the intersection of business and creativity. To explain and illustrate the distinctive yet synergistic partnership's success, the researcher provided business theory and practice, and Professor Penaluna focussed on the creativity aspects. It is this unification of diverse approaches that drove the research, though each brought different knowledge skills and abilities to the debate. The portfolio of papers selected for this thesis have been co-authored extensively with a design educator, Professor Andy Penaluna. This was a pragmatic approach to ensure that the designerly thinking that the researcher advocates is infused at all stages of the research and is a correct interpretation of the practices and associated theoretical stances. Professor Penaluna chaired the QAA task group for Enterprise and Entrepreneurship Education, yet had never

studied or worked in a business school until engaged by the researcher - his previous research and publications all related to art and design.

Other co-authors have been engaged through mutual interests in scholarly learning for educator and curriculum development, alongside methodological compatibility. A key contributor being Dr Colin Jones, an Australian researcher and educator, who also came from a business education background, but was critical of the stereotypical approaches he observed in the business school environments he researched. Indicative of his standing, Dr Colin Jones, has published internationally recognised and recommended text books for teaching entrepreneurship to undergraduates and post graduates.

As a very simple overview of the respective offerings, Jones brought interests from the field of education and his teaching within a business school. Penaluna, brought expertise from design and teaching within Art and Design. The researcher's expertise developed from teaching within both Art and Design and the Business School. All parties had been entrepreneurs themselves and entered academia post industry experience. The researcher is the only author to have worked extensively across both disciplines.

All researchers author independently of one another, in addition to the collaborative research which is on-going. The researcher's contributions ether lead or inform conceptual developments and methodological approaches. Papers are debated at length and the conversations and reflections spur other papers that are often written consecutively, commencing another before the other (s) are finalised. As there is a fast-growing international educational demand, all researchers have been engaged by the United Nations Conference on Trade and Development, as well as working on European projects. This extends their networks and provides unique insights into current high-level discussions, which in turn enables timely responses.

In an endeavour to provide distinctiveness in the contributions, the researcher can be positioned using the 3E model (Figure 1 see 2.1.2) in the entrepreneurship sphere by managing and developing start-up support and the associated intellectual property rights (Penaluna et al., 2017). Jones and Penaluna lean towards the enterprise aspects. Jones with the scholarship of teaching and Penaluna enhancing learners' capacity for creativity and initiating the engagement with research on the neuroscience of learning. There are

synergistic overlaps and in the broader sense, the message is that opportunities for sustainable start-ups (entrepreneurship) are not possible without the enterprise skills behaviours and knowledge.

The researcher, in recognising the limitations of research into education that excluded those from the field, has also co-authored with educators of educators engaged with policy development (David, Diego, Griffiths McCallum, Polenakovikj, Usei). Co-authoring with Professor Matlay, brought longitudinally informed perspectives, from his editing the Journal of Small Business and Enterprise Development since 2001, and editor of special issues on entrepreneurial education for Education + Training.

4.6 In search of contrasting evidence

When commencing the mapping exercise, there was an anticipation, indeed a hope by the researcher, that research would be identified that challenged designerly approaches, which in turn would facilitate a discourse into the limitations of design education for enhancing the business school approaches for entrepreneurial learning. However, over time the opposite has become the case, especially as the term 'design thinking' has become increasingly accepted as a way forward by the business community and is itself a developing theory within the management discourse (Laursen and Haase, 2019). Albeit with its challenges for implementation, due to its lack of clear definition and methodology (Johansson-Sköldberg, 2013, Foster 2019)

4.6.1 Business school theory development for entrepreneurial education: design thinking, lean start-up, effectuation and value creation pedagogy. What's new?

What the exploration revealed, was that commonly expressed 'new theories' from business school scholars, were not in fact new, when compared to the design education literature. For example, 'Lean Start-up' (Ries, 2011) and 'Effectuation' (Sarasvathy, 2008) can readily be compared to designerly thinking (Müller and Thoring, 2012, Frederiksen and Brem, 2017).

The principle of iterative experimentation, early customer insight and the ability to pivot in response to new information (Ries, 2011) and assessing the resources and working with them to achieve goals (Sarasvathy, 2008) are already evident in the day to day delivery of experiential 'studio-based' design education, in terms of both skills and behaviours appropriate to the constantly changing world of work. Their students' learning environment is predominantly a professional simulation based on the knowledge and working experiences of actual designers, where projects are individually or collaboratively executed, and based on their applicability and conformance to the actual practice of that particular design discipline (Gray, 2011). Moreover, this form of situated learning where theory follows practice, prepares students for interconnected thinking, so as to be able to deal with complex problems in a systemic, integrated and collaborative fashion, working together to deal with issues holistically, not simplistically (Vester, 2012).

Business school scholars are now contesting effectuation (Kitching and Rouse, 2020) as they consider it to be an under-developed theory, which fails to adequately consider the influence of structural and cultural contexts on venture creation. With some going as far as describing it as 'ineffectual' effectuation (Arend et al., 2015, 2016). The design educators' approach already offers the holistic approaches that are called for within such critiques, without any knowledge of the term 'effectuation'. Their practice already offers the advancement that those critiquing it advocate (Koper, 2005, Oxman, 2001), however as designers rarely engage with, or contribute, to entrepreneurship research, their insights are not being capitalised upon to develop such interventions.

A 'pedagogy' recently introduced as new in the entrepreneurship education literature is 'Value Creation Pedagogy' (Lackéus, 2018, Lackéus et al., 2020), where learning takes place through the practice of creating value for others. Of note, however, is that whilst this is heralded as being 'new' it was first discussed in Japan in the 1920's by Makiguchi, who considered the way in which human creativity should be employed for the benefit of society (Bethal, 1989). Value creation for others is a long-standing tenet of design, and it is questionable how the creativity-based discipline could work without it, because design briefs that are issued to start a studio-based project, nearly always have a target audience to respond to. Moreover, a good brief, whether simulated or presented as a 'live project' for a real client, are designed to maximise novelty and usefulness in idea generation (Koronis et al., 2020).

A point of note is that unlike the entrepreneurship literature that advocates creating value for others at the outset of the learning, design education prepares the learner through simulations that develop agency, skills and behaviours as well as professional and theoretical knowledge, thus providing a richer platform on which to commence creating value for others. Although conjecture, it is anticipated that Value Creation Pedagogy will learn the same lessons as those learned within design education, namely that better prepared students produce better results, in terms of both creative novelty and effectiveness (papers 5, 7, 14).

4.6.2 Future orientation derived from a synthesis of the evidence.

When appraising the body of a work as a whole, the arguments provided support the premise that business schools alone may not be able to effectively deliver the type of learning, teaching and assessment required to develop an entrepreneurial graduate, and question whether Business Schools are the most appropriate place to base entrepreneurship programmes (European Commission, 2008, Azanza et al., 2017, National Centre for Enterprise Education, 2019).

However, the emerging themes and observations shown in Figure 7, make a case for Business School engagement as contributors, but not as sole providers. The positioning of the Business School's contribution can be set within a continuum of interdisciplinary practice that is cognisant of design education's inherent capacity for enhancing creative thinking (Brown, 2008, 2009, Cross, 2006, Lau, 2009) and more effectively teaching opportunity recognition (Tynan, 2017). The evidence presented within this portfolio has the potential to better inform the design of study programs whose intentions are to support the development of entrepreneurial capacity, and in turn, enhance an individual or teams propensity for starting and growing a social, cultural or commercial venture.

The investigatory paper within the portfolio (Paper 2) was deliberately designed to capture insights into contextual differences in the delivery of entrepreneurial education in higher education globally. Acknowledging the limitation of sample size, 142 participants from across disciplines, across 34 countries, this has been used as an indicator that helped to

develop questions, and not assumed to be generalizable. However, as its findings have been widely cited because no similar study has yet been undertaken, the insights from the paper continued to influence both the research direction and the routes for dissemination.

Amongst these insights, the research illuminated two key factors pertinent to the appraisal of this body of work. Firstly, the entrepreneurial educators consulted used their personal experiences of business start-up extensively, and were less inclined to believe in, or act upon, academic discourses without testing them. This was achieved by working with other educators, via networks and attending conferences to inform and develop their practice, rarely were other educator's texts or pedagogical theories used. This indicated the demise of the traditional textbook-based classroom that was theory-led. This was an important discovery, because it aligned with the way that design is taught through practice, then informed by theory that is compared to experiences gained through practice. It also mirrored design education's preference to recruit educators with experience, as opposed to business education's preference for academic qualifications and research publications over experience, particularly prevalent in elite US business schools (Bennis and O'Toole, 2005, Finch et al., 2016).

The researcher's model of working was also influenced by this study, as she progressively disseminated her findings at specialist conferences and considered the feedback before attempting to write a full academic paper. There are therefore, conference iterations of the published papers within this portfolio, which are presented following consideration of peer review and associated feedback from delegates prior to writing and submitting. This includes considering the most appropriate publishing route in terms of potential impact, as opposed to academic considerations such as journal rankings.

The second significant finding, was that these educators frequently saw themselves as a lone voice within their institutions, yet were made responsible for bringing about significant cultural change. With the support of colleagues at conferences and external workshops, they were aware of the entrepreneurial nature of this challenge and often relished it because of the impact of their teaching, as one respondent explained:

> I view my role as a catalyst for change in the midst of good, yet solid, business education in the US. For too long, our business students have been shown corporate jobs as the ultimate goal for pursuing a college degree. Instead, I encourage them to consider how this world would be different if, instead, they began to think of

themselves as everyday entrepreneurs both in creating entirely new ventures or in launching new innovations within the confines of an existing corporation. My role as an educator has never been more enjoyable and enlivening as it has been since I began teaching entrepreneurship in 2006.

Before we move on, it is important to consider additional evidence suggesting that the researcher's insights and experience have led to her institution's success in start-up rankings, an area that the researcher is responsible for. Whilst parallels might be drawn from the portfolio that the interventions have influenced and positively impacted this result, there are too many intervening variables to provide a robust argument that the sum of this research and the resulting practices implemented contributed to the researcher's institution being consistently ranked highly, for example 1st in Wales and 2nd in the UK for having the highest number of graduate businesses to have survived 3 or more years (Higher Education Statistics Agency, 2020).

The nature of the metrics employed are, in the eyes of the researcher, too narrow, thus the data collection fails to capture other factors of influence. They are a sampling approach of convenience, not effectiveness. Research into the Anxious Parade of Knowledge (APK) suggests that the ontology and implicit biases that underpin this type of research is often ignored, and as has been evidenced during the Covid-19 pandemic, can lead to poor decision making (Conn and McLean, 2020). It is often a realisation of the questions that have not been asked that reveal hidden truths.

In this context, it should be reiterated that this research is based in part on feedback from alumni spanning over 30 years (See Penaluna and Penaluna, 2006), thus it is arguable that the university simply has more trusted connections with its entrepreneurial alumni than other institutions enjoy, or that our method of connecting through subject specialists who taught their students are more effective than a centralised system that is inherently less well trusted. A separate study designed to explore and explain potential causality is advocated.

4.7 Perceived opportunities to advance entrepreneurial education

4.7.1 Contextual observations from business and design education

The portfolio of evidence in this submission is informed by contextual observations from within both business and design education. Once viewed holistically through these lenses, their associated literature provides insights into perceived alignment and opportunities to advance entrepreneurial education. The researcher observes that business school expertise lies in its theory led and training approaches, ones that can be predicted and are thus more readily measured in a traditional academic manner. For example, accounting and taxation have mandatory rules, and preparing business plans for funders have accepted norms and approaches that can be explained through lecture based education. Business model canvases can be used to break down processes and illuminate key stakeholders, and historic case studies can be used to explain what happened in the past. These are all integral to the entrepreneurship and venture creation process.

Conversely the Design School, is practice led and adopts an enquiry approach to business. Their process of education sets future orientated tasks and asks learners to consider multiple alternatives, which can be selected and adapted as things change. Unlike the business education domain, predictability is almost impossible, and surprising results are expected. The question of how it is done is replaced with 'how could it be done?' Moreover, an essential aspect of design is that it is not creativity for creativity's sake, but problem solving that addresses issues that have been identified by those who commission the designer, thus value creation through problem solving is already a central tenet.

As illustrated diagrammatically in Figure 10, the insights provided through the synthesis demonstrated within this research portfolio, suggest that design education develops innovation abilities, and should therefore precede and stimulate the pursuit of learning about business process and accepted norms and procedures. Supporting this insight is an increasing number of programs emanating from Business Schools entitled 'Creativity and Entrepreneurship', because they are seen to have more positive impacts on all entrepreneurial

competencies and intention, than the more generic business and management offering (Wang et al., 2019). This in itself begs the question of why 'creativity' needs to be viewed as an 'add on', rather than an integral element of the education, it suggests a perceived newness of approach from those who have yet to engage in the range of discourses suggested in the researcher's portfolio. A potential question, of interest, more than one advocated as a result of the evidence presented. However, it brings us to observations of gaps in knowledge.

Opportunities to advance entrepreneurial education

Figure 10. Perceived opportunities to advance entrepreneurial education

4.7.2 Considering gaps in knowledge, terminology, language and interpretation

In this portfolio of research an absolute 'truth' is not being sought, but strong evidence has been gathered and interpreted from a breadth of resources to produce 'provisional' and 'perspective' truths (Briggs, et al., 2014), that aim to improve understandings and guide

future practice. A past truth may no longer be applicable in an environment of continuous change, so the designerly approach of developing provisional truths, that can be adapted and modified the closer one gets to a deadline, informs the method employed. Accepting that any knowledge is temporary and subject to contextual challenges and associated change factors, results in a discourse that is never complete, it adds to a body of knowledge that can be employed when and where the situation demands. The result is a constructivist contribution as opposed to a positivistic argument.

A challenge within the research is that design educators rarely use the terms enterprise and entrepreneurship, because the words are akin to 'dirty words' (Bridgstock, 2012, Arts and Humanities Entrepreneurship Hub, 2020), therefore there is a dearth of academic literature from which to easily build upon, because a translation process has to precede it. The paucity of easily accessible interpretative literature (Bridgstock, 2012, Pittaway and Edwards, 2012) means that activities within a designerly led classroom are overlooked and their impact on policy development difficult to ascertain (Bandera et al., 2019). This is a reason why, informed in part by the earlier work in this portfolio, the EU-Joint Research Centre deliberately side stepped the definitional arguments and terminologies used predominantly in business education environments, and looked to engage a wide stakeholder group across Europe to identify a range of competencies (Komarkova et. al., 2015, a, b). Once entrepreneurial competencies were identified and systematically employed to develop a framework (Bacigalupo et al., 2016), the paucity of any engagement with design education prior to the research became apparent, not least because there was an assumption that design thinking was the same thing as designerly thinking (for a detailed discussion see Paper 7).

4.7.3 Theory led/training approaches to business v practice-led/enquiry approaches to business: What is experiential learning?

Culturally the business school approach to teaching and learning is significantly different to that of art and design, for example with assessment strategies that are examination-led as opposed to project-led, and with delivery strategies that are frequently led by presentations to large classes, as opposed to developing incremental problems for students to solve through student-led experience (Pittaway and Edwards, 2012, Bandera et al., 2019). The distinctions

came to the fore as the researcher developed this portfolio of research and practice into what can be viewed simplistically as creativity in business disciplines and business in creative disciplines.

There is an evolving discourse from business school scholars observing how 'innovative' experiential practice-led learning improve academic performance and better prepare graduates for the world of work, than more theory led approaches (Baldwin, 2015, Breunig, 2017). The premise being that learning happens best when students are engaged in doing – in designing or creating something and using and developing discipline knowledge to do so (Bereiter and Scardamalia, 2003). However, unlike design, where the depth, value and validity is in the practice of 'design doing' Rutgers et al., 2017), in business schools experiential/practice based learning include business simulations (Costin et al., 2018) and activities such as shadowing an entrepreneur and providing a reflective piece (Leal-Rodriguez and Albort-Morant, 2019). Reflection being a key component of experiential learning (Moon, 2004) and integral to transformative learning (Maizirow and Taylor, 2009).

Just as with the conflated terminology with enterprise, entrepreneurship, entrepreneurial and employability, the context of experiential learning and the notion of experience has multiple interpretations (Moon, 2004). In viewing experiential learning within the context of entrepreneurial education, the researcher distinguishes between the approaches of the 'real' life events of students and those in which the experience is constructed through such techniques as simulation and role play (Higgins and Galloway, 2014). Noting here the increasing number of Business Schools adopting computer-based business simulations, such as Sim Venture, within their entrepreneurship programs (Costin, et al., 2018),

This conceptual complexity to the view of experiential learning presents challenges for the researcher in determining and capturing evidence of experiential practices with which to meaningfully compare and contrast impact to those within the design discipline.

4.7.4 Re-thinking design thinking v designerly thinking: What if?

'Design thinking' has gained considerable traction during the development of this portfolio in terms of entrepreneurial education (Bandera et al., 2019) and with what might be described as

'good practice' for teacher development (Henriksen et al., 2020). Initially perceiving design thinking, and its use within entrepreneurial education, as being aligned with some of the principles being considered within this portfolio, it is referenced within the earlier body of research, supporting the conceptual understandings. However, as the portfolio of work progressed it became apparent that there were clear distinctions between design thinking and the designerly thinking, designerly led pedagogies, reflected in design education that are under consideration within the central tenet.

As is referenced in paper 14 the management design thinking discourse can be seen to be less thoughtful and robust than designerly thinking (Johansson-Sköldberg, 2013, Laursen and Haase, 2019). The most apparent shortcoming is that designerly thinking is a mindset change from rigid to flexible (Gaither et al., 2015) and not merely a technique or procession of tool use as prescribed within design thinking models. As observed by Laursen and Haase (2019, 814), 'Design thinking facilitates the general, non-situated application of tools and techniques, which is neither linked to nor anchored in a design paradigm'.

The insights from this portfolio suggest it is the reflective capacity and adaptability competencies from design education that are being assumed, and opportunity recognition that precedes opportunity exploitation has been given scant attention (Tynan, 2017). However, this leads to a question and a gap in this body of research for an evaluation presenting generalizable knowledge, as to the potential offering of design thinking delivered from a business practitioner v designerly thinking to satisfy the intended deliverables and aspirations of entrepreneurial programs.

4.8 Positioning the research and the advancement of entrepreneurial education within a leadership narrative

4.8.1. Micro to Macro insights, activities and engagement.

Before moving on to discuss the contribution to knowledge from this portfolio. It is necessary to situate the research, partially because what started out as a micro intervention within a

single institution gained traction once published and presented at conferences, and partially because the impact discussion that will follow will draw on the context.
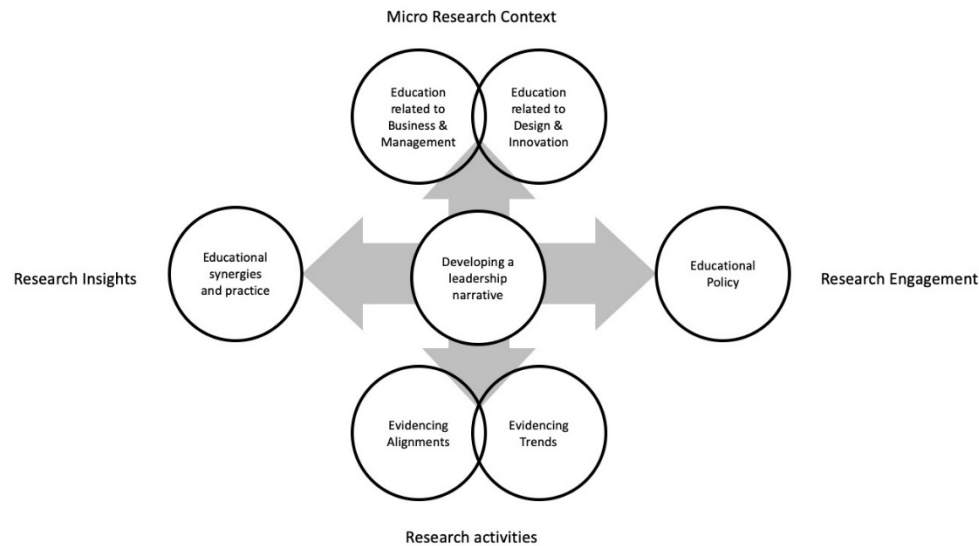
Figure 11. From Micro to Macro: Insights Activities and Engagement

As illustrated in Figure 11, there are a number of dimensions to the context. Studies prior to this submission were mainly related to a micro context, that of two different faculties in the same institution. However, insights from the research were perceived by others to respond to trends and argumentation calling for research that stepped back from start-up training, and considered arguments such as are entrepreneurs born or bred? (Burger-Helmchen, 2012). Assuming the latter, also assumed that education could be developed that responded to the identified needs of developing capacity in, for example, creativity, adaptability and opportunity recognition.

As the journey described here commenced with a failed pedagogic intervention, from an academic with extensive experience of delivering enterprise support and funding within the banking field, whose education was almost entirely related to qualifications gained in a Business School learning environment, it provided the initial motivation to undertake research exploring educational practices related to business and management and those

related to design and innovation. Prior to this failure, the researcher had assumed that lecturing and essay writing type activities, combined with summative examinations were the norm. However, by moving beyond her subject's silo of experience and entering a different type of learning environment, where studio practice preceded theory debates and lectures were rare, new avenues of enquiry emerged. Within the studio environment, continuous reflection on practice over time was a key aspect, not memory recall in constrained time scales. In simple terms, she was curious about ways of educating that appeared to change behaviour without the usual 'telling' people what they needed to know first.

4.8.2 Innovative ways of teaching and/or a curriculum topic.

Just as design educators have yet to participate in discussions, it is only recently that those trained in the science of education are engaging with the entrepreneurial learning discourse. Within the researchers' own institution 'entrepreneurial learning' is being integrated into both initial teaching training and CPD programs for educators across all levels of education (Papers 1, 4).

Within an educational context, entrepreneurial learning, can be viewed as innovative ways of teaching, in addition to being considered as a curriculum topic. Whilst competency development would be more overt within the curriculum topic, it is innovative approaches to teaching, learning and assessment that increase a learner's propensity to be entrepreneurial. Whilst the central tenet of this synthesis, considers the alignment of advocated good practice with design education, there can also be seen an alignment with what is viewed as 'good practice' within education. An example being the educator moving from being the 'sage on the stage' to the 'guide on the side' (King, 1993), being advocated within the entrepreneurial literature without any reference to King herself. The design educators practice is to be the 'guide on the side' and/or, more specifically a 'meddler in the middle', as advocated for teaching creativity by educationalist McWilliam (2009), (Papers 7, 14).

As has been discovered through reflection on initial failures and subsequent levels of success, the researcher became aware that she had no understandings of educational practice that developed competency, but had focussed only on knowledge dissemination and knowledge recollection. Moreover, distinctions that could be made between the art and the science of

education had thus far eluded her, and in retrospect, it should have come as no surprise that the creative minds she attempted to engage with had more to teach her than she had realised.

Although some considerable time prior to this research, the emotional challenge of being rejected by design students when attempting to teach them 'what they needed to know' has left some considerable mark, not least because it forced her to consider the perspective of the learner more overtly, and to challenge her own assumptions as to why she had enjoyed nationally recognised success in banking. Entrepreneurial education it appeared, should combine the action and thinking processes of an entrepreneur with those of an educator, an educator who thinks like a designer and never sees anything as fully complete, merely sufficiently developed within a given context and time, and subject to additional learning beyond the timeframe of the educational experience provided.

This was the first time that she faced challenges from not only students, but alumni whose experience helped to shape the study programme and actively contributed to not only its development, but also its delivery. The researcher's banking and business experience had always drawn on feedback from customers, often after having used a product or service over time. It therefore struck her that this approach, potentially at least, was more connected to business approaches and elicited better, more immediate evidence to work with. She had not experienced this in her business school domain, and on further enquiry, could not find similar practice in any university business education environment that she researched.

This observation continues, as hot topics and theories that have entered the entrepreneurship and enterprise discourse can often be challenged in terms of newness, because they pre-exist in another domain. To offer three examples that typify this, Value Creation Pedagogy (Lackéus, 2015, Lackéus et al., 2020) has been employed by the European Commission, Effectuation Theory (Sarasvathy, 2008) has been used to explain how entrepreneurs manage affordable risks and of course, design thinking (Martin, 2009), claims to explain how a designer's thought processes work. As has been evidenced in this portfolio all of these pre-existed in design education.

To offer an alternative insight into what the researcher describes in her papers as 'myopic' business education practice, a central model in recent years has been to ask if the education is designed to be 'about', 'for', or 'through' enterprise and entrepreneurship. This typology is sometimes attributed in the business and management literature to Jamieson (1984) or more often to Henry et al., (2005a, b), whose work is more widely known. However as is explained in the researcher's published work, sports education had been using these indicators for decades (Irwin, 1940) thus the approach once again precedes the literature cited by business academics who rarely seek evidence from outside of their disciplinary boundary (Paper 7).

It is posited that the manner in which siloed peer review takes place in journals and conferences exacerbates this problem, because it fails to take account of those who have already tackled similar issues in other domains. The portfolio of papers posits the view that much can be learned by taking a more holistic view, and through consulting the literature on other education practices, plus the scholarly work related to education itself, much can be learned from prior experience elsewhere.

As has become apparent during the research, this mirrors what happens in design education and design practice. At its root, design education employs both divergent and convergent thinking strategies, ones that both synthesise and criticise. Synthesis requires outward looking approaches that combine knowledge and competencies in new and unusual ways. This precedes the critical thinking that dominates business education, and by using both, new understandings on brain structuring and learning have been brought to bear on the discussions in this portfolio. The distinction between, for example, analytical thinking and insightful thinking, might not have informed progress, which in turn could have potentially led to the assessment distinctions developed by the author and published by the OECD being overlooked. The specific question relating to this is, if we do not understand how the learning brain works in terms of plasticity as evidenced through learning, how can we make claim to educate?

4.8.3 Evidencing arguments and evidencing trends: the interface between business and design education

By interrogating the interface between business and design education, the portfolio has developed a new leadership narrative that embraces educational synergies and practices, whist being mindful of new educational policy development that it has helped to inform. By clarifying alignments between design led and business led education and their associated goals, the portfolio offers a new lens through which to view and understand the trends that are happening in education, specifically when the goal is to develop 21st Century skills that embrace creativity and innovation.

By developing a series of forward -facing conceptual works that responded to the perceived needs of entrepreneurial education, the central tenet that entrepreneurial education can be advanced with understandings from the field of design education has held true. The published research and associated conceptual frameworks can be observed to respond to the challenges presented by scholars and policy makers. These in turn, recognise that the dominant Business School paradigm has shortfalls in terms of scholarly works and associated practices from which to draw.

From the insights derived from the synthesis of the research, it can be seen that design educators could make the greatest impact in mindset development and enhancing innovative capacity. It is consequently posited that this should precede or complement development of the business acumen associated with taking forward a social, cultural or commercial venture. In this regard, the researcher considers that within the QAA (2018) gateway triangle, 'design education' is synonymous with 'enterprise education', whereas the business school expertise is better aligned to 'entrepreneurship education'. This observation, in turn, helps us to explore the notion of a pipe way of education that leads learners towards a choice, as is indicated in the gate of the triangle.
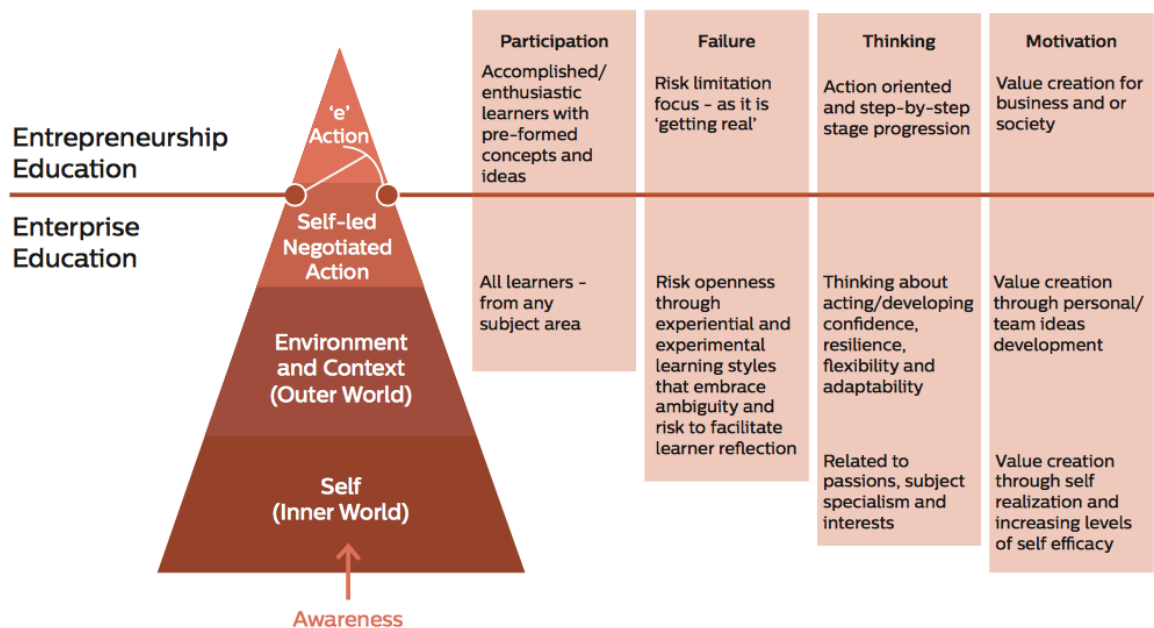
	Participation	Failure	Thinking	Motivation
'e' Action	Accomplished/ enthusiastic learners with pre-formed concepts and ideas	Risk limitation focus – as it is 'getting real'	Action oriented and step-by-step stage progression	Value creation for business and or society
Self-led Negotiated Action / **Environment and Context (Outer World)** / **Self (Inner World)**	All learners – from any subject area	Risk openness through experiential and experimental learning styles that embrace ambiguity and risk to facilitate learner reflection	Thinking about acting/developing confidence, resilience, flexibility and adaptability

Related to passions, subject specialism and interests | Value creation through personal/ team ideas development

Value creation through self realization and increasing levels of self efficacy |

Figure 12. Assessing Enterprise and Entrepreneurship – the gateway triangle. *Source,* QAA, 2018, 16.

This model from QAA was a direct development of the conceptual framework published in Paper 6, Fig. 1 under the title of 'The enterprise – entrepreneurship triangle'. This in turn was a development of thinking first presented in papers 8 and 9, where the interrelationships of Andragogy and Heutagogy were explored in conjunction with the pedagogy of teaching. As above, this model visualised a need for a conceptual framework that brought together the fragmented works of authors in different contexts, to enable them to be seen as contributing parts of a jigsaw, not conflicting ideals. Adapted from activity theory (Engeström et al., 1999), and informed by the work of Barnes (2012), the triangle also highlights potential limitations of pedagogical approaches when distinctions are not made between Enterprise and Entrepreneurship.

This takes us to the final dimension of the research portfolio, because whilst we have looked back at what precedes entrepreneurship in a university context, the next step back would be to consider what happens in schooling. The seminal works of Gibb, the professor who

encouraged the researcher's first steps, also have resonance here, as in 2009 he too posed this question, and investigated the potential for school provision in the early 1990s (Gibb and Cotton, 1998, Gibb 2008).

Thus, the final context explored in the papers considers what can be done in schooling, and draws on the experience of being part of a team that developed what is considered to be the World's first school curriculum that progressively develops the learner's capacity from a Primary and Secondary School perspective, as well as leading European projects on developing schooling practice and expertise. An overview for which is published in Paper 11.

As is suggested within this narrative, the researcher became increasingly engaged in research that stepped ahead of the existing state of play, and this in turn led to opportunities to engage beyond practice and into policy making, which we will now discuss in terms of progressive impact.

5 Contribution and Impact

5.1 Setting the scene: Initial insights into research impact

The portfolio of research, Appendix 2, informs the areas of work for which the researcher has current responsibility within her working environment; enterprise and entrepreneurship curriculum and extra curriculum developments across disciplines and campuses (3 in Wales and 2 in England). This includes CPD for staff (professional and academic) and managing the infrastructure of start-up support for UWTSD, including intellectual property management (IP). Her broader research and positioning of IP as a component of entrepreneurial learning is not the focus of the portfolio however, and sits within it as a component of applied creative thinking. Although not highlighted independently, this research resulted in national influence as a member of the UK Intellectual Property Office's IP in Universities and Colleges Steering Committee, a position the researcher has held since 2014. As a direct result, UWTSD trainee teachers have had the opportunity to engage with prototype learning resources, helping to develop new support for other teachers across the UK.

The researcher's distinct contribution to knowledge within the portfolio is in advancing teaching, learning and assessment within enterprise and entrepreneurship education, using combined academic and practitioner interests to inform policy, and drawing from the almost unique perspective of a business educator who has become immersed in design education theory and practice.   The underlying theme for all of the papers is the scholarly development of entrepreneurial education. The original Greek 'scholastes' can be translated to mean one who lives at ease, and scholarly assumes study in detail. As a contributor, the researcher is equally at ease with academic discourse in business as well as design education, and as the latter is inherently interdisciplinary, her contributions look beyond traditional silos of thought.

Initially intended to inform colleagues within an HE context, its breadth of impact has extended into schooling and in particular, educator development. Arguably, design and business marketing require insights into how people think and perceive, therefore,

understanding how people learn is extremely relevant to both the researcher's scholarly work and her practice. The insights gained required making links with cutting edge research into the neuroscience of human-centred thinking strategies and learning, which the researcher has introduced into the entrepreneurial education discourse.

The researcher's primary motivation for the authorship of each of the papers within this portfolio, was a quest to share fundamental understandings that are 'useful' for the entrepreneurial education community, in that they provide insights to inform the development of learning environments for developing entrepreneurial capacity, be this in learners or their educators. The citations in policy and scholarly publications, in parallel with invitations to participate in policy level activities to take forward the entrepreneurial education agenda, on a regional, national, European and international scale, are indicative of the research being 'useful' for stakeholders. Thus, it sits in what Stokes observed as the 'use-inspired' quadrant (Stokes, 1997), as is advocated by Furlong and Oancea (2005) for assessing the quality of applied and practice based educational research.

As discussed, the publications within this submission are also rooted in challenges laid down by Business School scholars at the beginning of the 21st century (Gibb, 2002, Kirby, 2004, 2006, Hills, 2006), which are still prevalent in their literature (Shepherd, 2015, Fletcher, 2018, Neck and Green, 2018, Allahar, 2021). These relate to the need for the enhancement of creativity within entrepreneurship education, which the researcher believes to be at a nascent stage of development, partially because entrepreneurship scholars who wish to publish rarely look into other disciplines that have more experience in this area. As evidenced in the portfolio, this perspective was not lost on the EU's joint Research Centre, when they decided to move from research that focussed on clearly defined enterprise and entrepreneurship courses, and look for research that sought out entrepreneurial learning cases that demonstrated appropriate competency and knowledge development, in whatever discipline that might be (Komarkova et al., 2015).

The portfolio therefore provides a new lens on the literature in entrepreneurship and entrepreneurial learning, as it progressively introduces designerly-led thinking and transdisciplinary research into the scholarship of learning and teaching. Specifically, it moves

away from discipline-specific approaches in order to address contemporary issues more holistically, and offers discoveries that have been made through engagement with both scholars and policy makers.

Business Schools have traditionally concentrated on theories and models for analysing business success, as opposed to creating learning environments that enhance a learner's propensity for ideas generation, problem solving and opportunity recognition. The focus had been almost solely on learning business knowledge and associated theory, which in turn can be assessed within examinations (Pittaway and Edwards, 2012). In contrast, the author's contribution is acknowledged to have supported the development of innovative capacity, without which few entrepreneurs can succeed. The portfolio demonstrates that the concept of newness has to be considered at all levels of learning, teaching and assessment. Taking a future orientation means that examinations, especially standardised ones for large groups, are no longer fit for purpose, simply because they require known answers to grade against, and true innovation surprises.

Advancing designerly approaches such as 'curiosity-based learning', an extension of problem-based learning where learning is enhanced by the educator posing questions not telling answers, requires evaluation metrics that are iterative in nature - so that they can follow ideas development. Thus, formative assessment and assessment for, not about, learning takes centre stage. The aim of designerly education is that by the time a design student graduates, they will have become experts at evaluating their own work.

This is theoretically underpinned in the portfolio's discourses on academagogy, where the educator moves thoughtfully between pedagogy for content delivery, andragogy for negotiated learning and heutagogy for learner-led activities. As this moves the student from dependency on the educator towards autonomous thinking and acting, the research suggests that it is better aligned to the needs of entrepreneurial education. Moreover, the research indicates that these approaches are both motivational and well-aligned to the cognitive neuroscience research on learning to become more creative (Kounios et al., 2006, Kounios and Beeman, 2009), which is acknowledged to be new by leading US scholars in Babson College. Considered to be US leaders, and acknowledged by many international learned bodies, Neck and Corbett (2018, 34) of Babson stated that;

> EE researchers need to delve into primary questions such as how do we train professors to take more heutagogical and andragogical approaches? (…) what more can we learn from theory related to andragogical or heutagogical approaches that can enhance EE practice and research? (Neck and Corbett, 2018, 33).

Specifically, these activities are designed to increase learner's capacity for ideas generation in addition to the more traditional reliance on ideas evaluation. It is the former activity, capacity for ideas generation that was unique in the UWTSD provision, as is evidenced in the OECD / EU Entrepreneurship360 research group's findings under the headings of assessing 'implementation' or assessing 'innovation capacity':

> As Penaluna and Penaluna pointed out, there is a dominant tendency to focus on getting an idea quickly through a short brainstorming session or two, then focussing deeply on the convergent type of analytical thinking that tests the ideas, and report on them for assessment purposes (Hofer, 2015a, 30).

External interest in this solution and the associated thinking has resulted in a series of global debates, as it has provided models for others to consider. In part, this has been triggered by recognition that designers don't just think about different things, they think differently, and are trained to do so. As the portfolio demonstrates, this extends some considerable way beyond the models of design thinking that have become more prevalent in business and management education, where little or no engagement with the scholarly work of the design education community has taken place. By working with design education expertise, and through a process of interpreting terminologies and approaches, a more considered approach has evolved.

5.2 Thinking earlier / thinking of a pipeline: moving into education for schools

In 2004, as part of research to develop the Welsh Government's Youth Entrepreneurship Strategy (Business Wales, 2020) the 'ACRO' model of Attitude, Creativity, Relationships and Organisation became the central tenet of an approach that aimed to bring entrepreneurial learning into education and youth work. Despite a revamp in 2010 (Welsh Government 2010) and possibly due to the lack of discussion between business and education ministries, it

remained peripheral to educational practice in schools. It would not be until 2014 that this type of thinking surfaced within the goals of the Welsh Baccalaureate (Welsh Joint Education Committee, 2015), partly informed by earlier works in this portfolio, that enterprise became mainstream.

The ACRO model provides insight into the reasons why Welsh Government were so supportive of UWTSD when it came to developing learning for enterprise and entrepreneurship. With national and governmental support, UWTSD was the first UK institution to validate and deliver an entrepreneurial educator programme in 2010, which in turn has provided a platform to test ideas and extend research. No other UK HEI has this advantage in terms of uniqueness and timing. The research continuously informed the evolution of the programme and the researcher was engaged to deliver the module in the Education Faculty during its pilot year, so as to help train the staff who would subsequently deliver it. Having experienced the learning from a student perspective, the Program Director went on to accept a secondment with Welsh Government to develop the progression model and evaluation metrics for the aforementioned Welsh Baccalaureate. Thus, a clear pathway between the early research presented in this portfolio and the impact on educational development can be clearly evidenced. Moreover, the programme was selected by the former Higher Education Academy as best UK practice (Owens and Tibby, 2014, 42), and the researcher was selected as a national case study for 'Be the Spark', an initiative based on MIT guidance to Welsh Government (https://bethespark.wales/inspiration/case-studies/kathryn-penaluna-university-wales-trinity-st-david).

In another first, and in preparedness for the Successful Futures (Donaldson, 2015) school curriculum in Wales, UWTSD drew on the research to develop a new Education Doctorate. The contribution can be seen in two main aspects. Firstly, the inclusion of a creativity module that is almost entirely based on the research, and secondly, the alignment of the study programme to the European EntreComp Framework (Bacigalupo et. al. 2016), which the research is acknowledged to have informed during its development.

In 2019 the researcher was funded by Welsh Government to review the new curriculum proposals as they neared completion. Two overarching reviews were commissioned, firstly to ensure that creativity was at the core of all Areas of Learning Excellence, and secondly, that interdisciplinary learning would be facilitated. Thus, the researcher's work had direct bearing on the version published in February 2020 (Welsh Government Hwb, 2020).

5.3 Influencing policy and practice through academic discourse

In addition to contributing to the academic discourse related to competency development and learning, and although not intended at outset, a key aim of the research became to influence policy that would support the new practices that were evolving. Indicative of the research portfolio's contribution are the number of citations by policy makers and associated invitations to provide expert opinion on the development of entrepreneurial education. As will be discussed momentarily, experience gained from delivering keynote presentations, in conjunction with authorship and the experience of reviewing draft policy publications, continuously fed into the portfolio.

To further situate the research, and running parallel to the researcher contributions, was the development of policy and guiding frameworks for the advancement of entrepreneurial learning that advocated a broad competency approach rather than a business start-up focus (Bacigalupo, 2016, QAA, 2012, 2018). The supporting evidence for the broad competency approach, became more prolific during the researcher's journey, as new models of education, designed to respond to the fourth industrial revolution were being championed. Specifically calls for the development of the skills of innovation and creativity (Weicht, 2018, World Economic Forum, 2020b) the competencies that the researcher's insights observe to align well with that of the design educator. It is worth noting here, that this is for education as a whole, and not as something unique to entrepreneurial education, which in turn gives the research extra resonance.

As at 25 April 2021, according to Google Scholar (2021), papers 1, 2, 6, 8 and 9 have been cited 203 times. Paper 5 has attracted 19 readers (Education + Training, 2021) and for the

most recent publication, paper 7, advocating multi-discipinary inspiration, usage is reported as 492, (Industry and Higher Education, 2021). Paper 2's investigation into what drives entrepreneurial educators across the globe is referenced in the Department of Business, Innovation and Skills (2013) report into Enterprise Practice in HE and FE. Paper 12 is referenced in the UNESCO/UNEVOC guide for technical and vocation education and training (TVET), (Lindner, 2020).   Paper 11's discussion on the contribution of the research in the development of curriculum in Wales and North Macedonia was based on an international conference paper presented to the Institute for Small Business and Entrepreneurship in 2019, which received the distinguished award of 'Best Knowledge Exchange Paper' of the conference (Penaluna and Penaluna, 2019). Most recently, and within the final week of preparing this submission, Paper 5 has been cited in the call for papers for a special issue 'Educational theory driven teaching in entrepreneurship' (Kakouris et al., 2021).

Whilst citations of the work amongst the scholar community and associated awards are indicative of its impact, it is by no means the full story, because their use by policy makers, be it within bibliography's and/or in their leading to invitations to provide expertise, provides further indication of dissemination opportunities that have arisen from expert recognition of the research's contribution. To help to situate this journey and to align it with the portfolio presented, the contributions will now be discussed in terms of their academic contribution and application in practice, with quotes from policy makers when appropriate. For clarity, these are presented on a geographical basis rather than chronologically, so that the reader can see how the research has been utilised in different contexts.

5.4 Further insights 1: National – Wales and UK Consultancy and Projects

On a national basis, the research has contributed to the development of Welsh Government Entrepreneurship Champions. This is a network of academics and professional staff appointed within each College and University in Wales to drive forward the Welsh Governments Youth Entrepreneurship strategy. Its aim is 'to develop and nurture self-sufficient, entrepreneurial young people in all communities across Wales, who will contribute positively to economic and social success' (Welsh Government, 2010, 2). Specifically, it

first led to the development of the aforementioned accredited module for entrepreneurial learning, which as it was delivered within the Education Faculty, had to be robust in terms of scholarly approaches and development. Sir Tim Wilson, when writing his 2012 white paper for the UK Government on University Business Collaboration, observed that:

> (UWTSD) takes a national lead in developing and delivering initial teacher training for enterprise and entrepreneurship. The HEA, Enterprise Educators UK and the United Nations Conference for trade and Industry are amongst those who draw upon this expertise … it is an integrated contextualised approach to enterprise education (Wilson, 2012, p33).

Recognition such as this provided a springboard for further engagement at policy levels, as did continuous success being reported in statistical analysis of alumni start-up and survival rates, i.e. ranked 2nd in the UK (HESA, 2020). Clearly, the researcher did not achieve such levels of success independently of others, but this shared success reflects the level of understanding of the competencies and knowledge required to survive in business environments where failure rates are typically high. Informed by the Office for National Statistics data, Limelight Digital (2020) reported UK start-up failure rates of 20 per cent in the first year and 60 per cent going under within three years. The researcher asserts that the insights gained into creativity-based competencies led to more effective engagement with the multiple stakeholders of entrepreneurial learning, whether internal or external to UWTSD. Thus, as the pan institution lead, the research was integral to, and made a distinct contribution to the successes in her role as the University's Enterprise Manager and, effective from May 2019, the Director of the International Institute for Creative Entrepreneurial Development (IICED) at UWTSD.

More specific scholarly work based on the researcher's insights include a successfully concluded PhD that empirically supported her propositions (Tynan, 2017), and research that informed the delivery of the first Education Doctorate taught syllabus in UWTSD's Education Doctorate's module on creativity for educators. UWTSD's shared / taught entrepreneurial modules and associated resources also draw heavily on the research presented in this portfolio.

5.5 Further insights 2: European Consultancy and Projects

In May 2012, the researcher was invited to participate in the DG Enterprise and Industry and DG Education and Culture of the European Commission transnational event targeting teacher's preparation for entrepreneurial education, and showcased activities that inspired educators to develop entrepreneurial education. Three of the thirty-eight case studies selected were interventions in which the researcher was actively engaged; 1, European project, Acknowledging and Developing Entrepreneurial Practice in Teacher Training, 2, Wales Enterprise Educator Network, 3, Alumni engagement in entrepreneurial education (European Commission, 2013).

Based on the research findings from practice-based approaches and experiential learning discussed in the portfolio, the researcher has been an invited expert contributor to projects that aim to develop entrepreneurial capacity. For example, as an expert for the Republic of North Macedonia's 2014 three-ministry initiative 'Building capacities for better employability' (Polenakovik et al., 2019) she contributed to the development of a methodology to address youth unemployment, by developing entrepreneurial education to respond to the gap between the skills of students and graduates to meet the needs of employers. From a policy perspective, face-to-face ministerial engagement included the President, Deputy Prime Minister, and Ministers and Deputy Ministers of Education and Science, Economy and Labour and Social Affairs (See: http://ncdiel.mk/wp-content/uploads/2020/08/Macedonian-EL-Strategy-2014-2020-ENG-version-1.pdf, p7).

Subsequently, and supported by funding awarded by the World Bank, North Macedonia introduced a compulsory and progressively evaluated Entrepreneurship and Innovation Curriculum in 2016, based on the policy decisions made in 2014. The progression model that is embedded in the curriculum commences with primary school children investigating who an entrepreneur is and culminates in Entrepreneurial Leadership experience for those aged 17-18 (EE-Hub, 2020). This has been reported to be a world first, and knowledge exchange activities continue.

As part of this project a national teacher handbook was produced (Penaluna et al., 2015) and by 2017, 2030 teachers had received one-day training sessions based on the publication. In 2019, adopting approaches from the UWTSD teacher training approaches (Papers 1, 4), 'Innovation and Entrepreneurship' became a compulsory course at the Pedagogical Faculty in the University St Sliment Ohridski in Bitola (Polenakovik et al., 2019 and Paper 11).

Running concurrently to this research informed work was consultancy commissioned jointly by the European Commission and OECD, which culminated in co-authoring one of four thematic papers for the 27-country intervention for schools 'Entrepreneurship 360'. The resulting work drew heavily on the researcher's publications and ongoing research. This was subsequently published by the EU and OECD as; Part 2, Building Motivations and Competencies in 'Entrepreneurial Education'. The first draft was presented at a stakeholder conference held in Potsdam in 2015 (Paper 3), and the concept of competency-led educational approaches was embraced by the EU-Joint Research Centre in the development of the EntreComp Framework (Komarkova et al., 2015a 2015b, Bacigalupo et al., 2016).

The research publications and insights provided the foundation for the two joint OECD / EU reports that followed, which were prepared to support both educators and policymakers. The researcher's work was cited heavily in both. For example, in the policymaking guidance it was noted that assessment of learner performance 'that compares student performance against specific requirements and criteria, can be major barriers to effective learning as Penaluna and Penaluna (2015) pointed out.' (Hofer, 2015b, 11). Moreover, policymaking readers who wish to better understand role modelling approaches that 'connect with within social roles, and the matching of psychological and cognitive skills that lead to imitation that is evidenced through patterns of behaviour' (Hofer, 2015b, 13) are directed to the researcher's work.

In the educator guidance report, sections on engagement beyond education, looking beyond business education paradigms, emotionally driven learning, educator development, educator resources and extra-curricular support, all reference the researcher and their work. The creative learning derived from a designerly understanding specifically informed the statement that:

As Penaluna and Penaluna (2015) pointed out, if students always have a set target with a clearly defined pathway through which to achieve it, they do not have the opportunity to respond in a flexible and adaptable way, because the situation has not demanded such behaviour. Instead, the entrepreneurial student is a "reasonable adventurer", who is able to demonstrate the ability to act on the information at hand, and to articulate the reasoning behind his/her actions, irrespective of success or failure. (Hofer, 2015a, 26).

During the research period, the researcher also secured the funding and led on; one Leonardo da Vinci, Transfer of Innovation project and four Erasmus + funded projects, to a value in excess of £2 million. Each project required the researcher to use her understandings, when collaborating with European partners on projects for entrepreneurial education. As explained by Grigg, (2020), developing schooling and educator development interventions across countries can be challenging, but there are case studies to draw upon that demonstrate increasing influence in current policy development. Grigg cites papers 4 and 11 from the portfolio, stating that 'Against this background, EntreCompEdu was conceived as a complement to EntreComp… led by University of Wales Trinity Saint David' (Grigg, 2020, 3). The researcher is the project's lead.

All of the above activities utilise the researcher's insights to design interventions that develop an educator's practice, for enhancing the entrepreneurial capacity of learners. This spans all levels of education, primary through to higher education, across subjects and in both formal and informal educational environments. The collaborations, in turn, afforded continual opportunities for insights from European stakeholders.

The EU Joint Research Centre's selection of UWTSD as one of only two leading European Universities who presented sound cases on competency development in their OvEnt Report (Komarkova et al., 2015a), demonstrates the value of the portfolio to the research community as well as those charged with developing a more entrepreneurial Europe, stating that, 'Case study 8 (UWTSD) represents one of the most comprehensive cases analysed' Komarkova et al., 22), and that;

UWTSD, a comprehensive case study at tertiary and further education level, is focused on creative entrepreneurial development and thus explores skills and attitudes

applied across different curricular and extra-curricular programmes (Komarkova et al., 2015b, 27).

In its figure 1, (Komarkova et al., 2015b, 26), it is immediately evident that UWTSD's breadth of understanding is second only to Austria's national school initiative Youth Start, which is significant when we consider that a single University is being compared to one of Europe's top entrepreneurial countries who have over 20 years empirical evidence to support their approaches.

A list of specific papers that secured the funding and informed the design of the interventions, and in turn informed the papers through the project insights, are offered below. The portfolio includes co-authors from these projects and are highlighted to demonstrate how practice has informed research and research informed practice.

- Acknowledging and Developing Entrepreneurial Practice in Teacher Training. 2011 - 2013 (Spanish partner, Diego, co-author of paper 12)
- Eco systems App, 2015 – 2017 on-line training course for educators, https://ecosystemapp.net (Macedonian partner Polenakovik co-author of Paper 11)
- EntreAssess, 2016 – 2018 assessing entrepreneurial teaching and learning http://entreassess.com (Belgium partner McCallum co-author Paper 4) Informed by papers 1, 3, 4 and 13 and informs paper 14) Spanish partner Diego, co-author of Paper 12)
- EntrecompEdu 2018 -2021 training teachers to enhance their learners' entrepreneurial competencies https://entrecompedu.eu (Belgium partner McCallum co-author Paper 4) Informed by papers 1, 3, 4 and 13 and informs papers, 7 and 14) (Macedonian partner Polenakovik co-author of Paper 11)
- Art and Humanities Entrepreneurship Hub, 2018 – 2021 utilising Entrecomp as a vehicle to develop entrepreneurial capacity in arts and humanities graduates and to promote the transferable skills (with an emphasis on creativity) to employers. https://www.artshumanitieshub.eu (informed by papers 10, 12 and 13 and informs paper 7)

In 2018 a guide was published by the European Commission to showcase transferable educational activities that utilised the Entrecomp framework for theoretical underpinning. Eco Systems App, Entreassess and EntrecompEdu, were all selected for inclusion, along with the UWTSD Professional Education Doctorate (McCallum et al., 2018, 126, 136, 58, 54).

Entrepreneurial education, develops competencies to respond to opportunities and problem solve, to support an individual to achieve their ambitions, whether this is in employment or self-employment. As portfolio careers are becoming the norm and freelancing/start-up predicted to increase (UK Commission for Employment and Skills, 2020) potentially by necessity, an understanding of all elements of entrepreneurial education are required.

Indicative of the breadth of understanding is the researcher being a reviewer for academic journals, including; Journal of Management, Innovations in Education and Training International and Education +Training and a member of the international scientific committee for the European Journal of Research on Education and Teaching. The motivation to review papers is for the immediacy of insights, into current directions of thinking and practice, without the usual time lag between a study and its publication. For example, the researcher's review contribution is acknowledged in the 2020 European Commission's policy paper 'The entrepreneurial employee in the public and private sector: What, Why and How' (Lackéus et al., 2020).

Further evidence of the value of the researcher's acknowledged insights in developing training for start-ups based on competency development and evaluation, is their engagement in August 2020 as an international expert to design the methodology for SME trainings for the Government of Armenia. The assignment aims to support anyone considering starting a business, with an emphasis on engaging and supporting the most vulnerable groups. The intervention having added impetus following the Armenian war. The project is funded by the Deutsche Gesellschaft für Internationale Zusammerbeit (GIZ) GmbH.

To bring this full circle, the introduction to this thesis made mention of a literature review undertaken on behalf of the OECD and European Commission, as part of the development of

the OECD's HEInnovate 'Epic' evaluation of entrepreneurial learning in Higher Education contexts (Moberg, 2020). The review referenced the QAA Guideline's Gateway Triangle as being a key influential document, as it made the distinction between Enterprise and Entrepreneurship clear, which was lacking in other guidance. Within the portfolio the reader will find the first developments of what became this triangle (Paper 6) describing it as first pedagogical content knowledge (PCK), as adapted from Magnuson et al. (1999), but presenting it as a middle, beginning and end of entrepreneurial learning. This incorporates the conceptual distinctions between learning through Pedagogy, Andragogy and Heutagogy (Papers 8, 9), and discussed them in terms of aligning and uniting prior work. In turn, this informed the work on the changing nature of enterprise education, which proposed steps to navigate learning for the world of start-ups. Presented as Figure 1. (Jones et al., 2018, 5), the resulting triangle,

> …moves us beyond definitions of what is enterprise education as opposed to entrepreneurship education (QAA, 2018). It offers a schema with which to sharpen our collective thinking about the purpose of our own piece of the EE puzzle in both local and broader contexts. For example, we can ask what are the logical out- comes that should be assessed at each level of the triangle (Jones et al, 2018, 7/ Paper 6).

Thus, we see that the portfolio's journey has a concrete example of impact, because it led to the QAA presenting a slightly modified and extended version for use in UK HEIs, and also had significant influence in the development of the OECD's HEInnovate evaluation metrics for entrepreneurial learning - through 'assessment tools for Higher Education Institutions who wish to explore their innovative potential' (HEInnovate 2021).

5.6 Further insights 3: United Nations Conference on Trade and Development Consultancy and Projects

Competency-based learning and evaluation metrics developed in the portfolio have also contributed to the development of research methodologies. The researcher has engaged in a range of formal discussions at the Palais Des Nations in Geneva as an invited expert consultant in 2013, 2014, 2015, 2017 and 2018. Within that capacity, for example, she peer

reviewed a seven-country research project on woman's entrepreneurship and participated in trainer workshops for innovation in 'pro poor' education strategies for use in developing countries. She also helped to design the Business School entrepreneurship curriculum for developing countries in 2014. In 2017 the researcher co-developed a training manual for educators delivering entrepreneurship education in developing countries, with specific reference to the UN's sustainability development goals.

5.7 Further insights 4: Keynotes and panellist contributions – as an indicator of research esteem

The insights gained through developing the portfolio of research are referenced in best practice events internationally, and many invitations to speak have resulted. In the UK, these include an invited presentation on innovation capture for the UK Intellectual Property Office (UKIPO, 2015) and Welsh Government conferences on enhancing entrepreneurial education. As has been discussed throughout the thesis, the papers selected for the portfolio include those that have been co-authored with Jones and Penaluna amongst others. These are researchers/practitioners who, as the explorations developed, have become acknowledged international leaders within the field. Each author provides a distinct contribution, the researcher's being a back ground in finance and management, a University wide remit for the management of its entrepreneurial provision and immersion in Welsh Government policy and practice.

The insights that the portfolio evidences have therefore been developed from initial understandings of finance and funding gained as a professional leader within a banking career, to one who has become familiar with teaching methodologies employed in design education. The alignments discovered have been seen to add significantly to debates on all aspects of entrepreneurial education, and, in turn, have informed interventions designed to address particular issues that have arisen. Importantly, these have required the researcher to translate discoveries made in the research into design education into concise messaging for those charged with leading development of learning strategies that aim to enhance innovative capacity. At the highest international levels, examples include being a panellist in expert

meetings, for example, in 2013, Women's Entrepreneurship in Developing Countries and Global Value Chains, for the United Nations Conference on Trade and Development. .

The researcher also provided a high-level keynote at the University and Industry Interaction Network annual conference in Helsinki in June 2019, which challenged Universities to become more effectively engaged when collaborating with industry to equip learners with 21st century skills in addition to the acumen of the profession/discipline. With the UK's Higher Education statistics agencies generating league tables for employability and in turn, graduate level positions, the researcher's insights into authentic assessment based on design education approaches chimed well with the representatives from industry.

The researcher's insights into the need for creativity to pervade all aspects of taking forward a business, not just the initial spark of an idea, caught the attention of the European Commissioner for Employment, Social Affairs and Skills and Labour Mobility. As a further indication of esteem and the acknowledgment of her contribution to the field, the researcher was invited to keynote and contribute to a panel session alongside Commissioner Marianne Thyssen in the European Parliament in Strasbourg. As the event was at capacity, it was broadcast to over 8,000 attendees of the European Youth Event (EYE, 2016).

As part of a following panel session in Strasbourg titled 'Show me the money', the researcher used examples from her alumni to showcase how, by investigating opportunities for co-creation and collaboration, they could better respond to the needs of a broad spectrum of stakeholders of a venture, by generating resources, beyond the traditional financial routes of banks, angels and venture capitalists.

To bring the research within a few months of submission, in November 2020, and in response to COVID-19 generating new ways of working, the researcher's most recent international contribution was at the opening of the on line NOFEAR 2020 Conference, organised by those delivering a Team Academy approach for HE entrepreneurship education. The event was a 'fishbowl' conversation with fellow researchers' Dr. Colin Jones (Australia), Professor Andy Penaluna (Wales) and Professor Norris Krueger (USA), and presented a provocation into

what is currently perceived to be wrong with entrepreneurship education, with suggestions as to how it might look in the future.

The researcher met Professor Krueger in 2015, when he also authored a thematic paper and delivered a session at the OECD/European Commission 360 Entrepreneurship Education in Schools event in Potsdam. As a final indicator of esteem based on the portfolio, Professor Krueger is eminent within the field of mindset development within entrepreneurial education, having in excess of 21,000 citations. Collaborative work borne out of the conversations is being discussed, and provides new avenues for further research.

5.8 Conclusion and further investigation

The overarching aim of the body of research presented in this portfolio was to provide insights relating to observations that the researcher had personally noted following engagement with design education and designerly ways of thinking. These led the researcher to develop and co-develop a series of questions that progressively investigated potential alignments with the needs of entrepreneurial education. Her experience of being a student who gained her qualifications in a Businesses School, did not wholly fit her experience of small and micro business as perceived within banking. Questions arose when, as a lecturer, she tried to use the same pedagogical approaches with which she was familiar in the creative discipline of design.

Rather than simply teaching, she found herself having to immerse herself into an environment where practice led theory developments, and learning experiences led competency development. As time and experience evolved, she developed her central tenet that entrepreneurial education can be advanced with understandings from the field of design education, and that the emerging debate on design thinking had significant limitations, primarily because it had only superficially engaged with scholarly work from design specialists. This may be in part because of terminologies and language, as within the arts entrepreneurship is often considered to be a dirty word.

The body of work in this portfolio therefore makes a distinct contribution, as it articulates how design education, its principles, concepts and techniques employed can be employed within entrepreneurial education. Because design thinking has been recognised as a potential contributor to program development generically within Business Schools, it already has some impetus. However, it is typically delivered by educators who do not have design backgrounds, and have not developed designerly ways of enquiring and knowing, it is not about what you think, but how you think. The lack of engagement has resulted in significant resistance from design education scholars, who observe that their work is misrepresented.

Thus, the original terminology and stances of the design discipline's designerly thinking were recognised by the researcher for their potential to respond to the educational challenges being posed by researchers and practitioners in her own domain. The researcher is the first from the Business School research community to explore and publish cohesive research that makes overt the synergistic value of engaging the design community. Indicative of the unique understandings that have been presented in the portfolio, are the associated consultancy commissions from high level bodies such as the European Commission, European Parliament, OECD, and the United Nations.

As the OvEnt study and its in-depth case studies directly informed the first stage of development of the pan-Europe 'de facto' Framework EntreComp, upon which all new European initiatives are compared including funding bids, the impact is increasingly extensive and continues. Countries beyond Europe are now consulting it, as has been evidenced by the author's consultancy in Armenia.

The portfolio demonstrates that from small beginnings in a single university, international impact has been achieved, and the aim to advance research through meeting objectives that contribute to the advancement of teaching learning and assessment for enterprise and entrepreneurship education (entrepreneurial learning), has moved beyond an educational discourse, to influence international policy.

Further investigation

Key insight – engaging design educators

The insights derived from the portfolio point to a need for wider engagement with the design community, even though the terms enterprise and entrepreneurship are not always well received. As University curriculums around the globe develop provision in response to Covd-19, anticipating that self-employment may be an only option, the competencies of reflection, adaptability and synthesis found in designerly approaches to idea generation and opportunity recognition will almost certainly be in great demand. Such engagement requires an interdisciplinary approach that not only embraces design education, it mimics its ability to see beyond a single specialism. With very rare exceptions, design scholars are not currently engaged in conferences, forums and publications related to developing entrepreneurial education, and terminologies and language appear to impede goals that can be readily aligned. This suggests a need for more 'explanationists', or at the very least, more translators who are capable of learning to be ontologically flexible.

Key insight – constructively aligned educational practice

There are also those within the education community who consider that 'entrepreneurial education' is nothing more than good education, because its teaching, learning and assessment practices align well with experiential learning, problem solving and curiosity-based learning. These consider the learner's progression in terms of increased autonomy and self-sufficiency – they have learned to learn for their lifetime. This, in turn, provokes exploration into educational science and contextually sound methodological studies, to seek out potential parallels between entrepreneurial education and perceived 'good' education, noting that very few educators from the discipline of education are sharing practice that contributes to the scholarship of teaching and learning in entrepreneurial education. For example, design education has developed educationally robust and constructively aligned assessment practice that evaluates creativity and innovative thought development in

ambiguous and changing contexts, they can map the development of entrepreneurial aspects such as flexibility and adaptability.

Whilst a number of initial teacher training programs are introducing 'enterprise' as a term into their modules, there is little consistency in provision and in turn, no unified approach to research is emerging. At the time of writing, the Welsh initial teaching training and CPD for in service educators is being designed to respond to the new Curriculum for Wales, where creativity and enterprise is one of four purposes of schooling. Curriculum development and leadership development, however, are already borrowing heavily from discipline design expertise, and an open acceptance could inform research and practice.

Key insight – design thinking models may limit, not expand understanding

This leads to an overarching question. Should we embrace all educators regardless of their subject or discipline and help them to become more entrepreneurial in their learning and teaching, as is happening in Welsh and North Macedonian Schooling and is evident in EEUK's ETC toolkit? Or alternatively, should the business school community develop specialist entrepreneurial educators who learn more about the subject or disciplines they serve, so as to gain disciplinary insights that enhance relevance and more fully considers existing entrepreneurial expertise that may have been overlooked, possibly due to language and terminologies?

In the case of the increased traction that design thinking is gaining in the entrepreneurial literature, there appears to be an assumption that the design thinking models fully represent design's educational practice, however, as discussed, many designers are critiquing its value. In a Ted Talk style video presentation, the highly regarded award-winning designer Jen (2017) goes as far as using an expletive to express her view that, 'Design Thinking is Bullsh*t', her definition being,

124

'Design thinking packages a designer's way of working for a non-designer audience by codifying their practice into a prescriptive, step-by-step approach to creative problem solving- claiming that it can be applied by <u>anyone</u> to any problem' (Jen, 2017, 4.16).

In a subsequent blog post Herrero (2017, 1) describes design thinking as 'a little emperor getting cold because it has thin clothes' and within the academic discourse Baker and Moukhliss (2019, 1), posit that, 'it has become a force of innovation in business, and a point of contention in design – having created a reductionist perspective of design which has simultaneously become a buzzword for innovation'. This thesis and accompanying portfolio concur, suggesting that the original designerly thinking and its track record of synthesising to create greater value in uncertain contexts warrants further investigation.

REFERENCES

Advance HE (2019), *Enterprise and Entrepreneurship in Higher Education: Guidance and best practice for embedding enterprise and entrepreneurship into the curriculum*. Available on-line https://www.advance-he.ac.uk/guidance/teaching-and-learning/enterprise-and-entrepreneurship, accessed 21 January 2021

Allahar, H. (2021), 'Teaching Entrepreneurship: A Business School Dilemma'. *Academia Letters,* Article 831. Available on-line https://doi.org/10.20935/AL831 accessed 1 April 2021

Alsos, G.A. and Ljunggren E. (2017), 'The Role of Gender in Entrepreneur–Investor Relationships: A Signalling Theory Approach'. *Entrepreneurship Theory and Practice*, **41** (4):567-590

Altbach, P. G. and Knight, J. (2006), 'The Internationalization of higher education: motivations and realities'. *The NEA 2006 Almanac of Higher Education*. NEA, Washington

Amabile, T. and Khaire, M. (2008a), 'Creativity and the Role of the Leader', *Harvard Business Review,* **86**, (10) (October 2008).

Amabile, T and Khaire, M. (2008b), 'Creativity and the Role of the Leader', Blog, *Harvard Business Review.* https://hbr.org/2008/10/creativity-and-the-role-of-the-leader

Anderson, S., Culkin, N., Penaluna, A. and Smith, K. (2014), *An Education System for an Entrepreneur*. London: All Party Parliamentary Group for Micro Businesses.

Ansah, W.O., Ansah, M. O. and Poku, K. (Toerien, D.F. reviewing editor) (2019) 'Entrepreneurial scaled behavioural indicators: Concept development and measure validation', *Cogent Social Sciences*, 5:1, available on-line doi: 10.1080/23311886.2019.1685366 accessed 1 February 2021.

APPG Entrepreneurship (2018), *APPG For Entrepreneurship Education,* available on-line https://static1.squarespace.com/static/58ed40453a04116f46e8d99b/t/5c7ea2144e17b606144c554b/1551802909907/007_APPG_EnterpriseEducation_AWK_REV2_WEB.pdf, accessed 3 February 2021

Arend, R., Sarooghi, H. and Burkemper, A. (2015), 'Effectuation as ineffectual? Applying the 3E theory-assessment framework to a proposed new theory of entrepreneurship. *Academy of Management Review,* **40** (4): 630–651.

Arend, R., Sarooghi, H. and Burkemper, A. (2016), 'Effectuation, not being pragmatic or process theorising, remains ineffectual: Responding to the commentaries', *Academy of Management Review,* **41**(3): 549–556.

Arts and Humanities Entrepreneurship Hubs, (2020), *Research findings: an investigation into European entrepreneurial support for arts and humanities students and graduates.* Available on-line https://www.artshumanitieshub.eu/results/ accessed 1 December 2020

Azanza, G., Grama, S. and Bono, G. (2017), *Entrepreneurship Education in Business Schools: Best practices and recommendations.* Available on-line,

https://equal.network/wp-content/uploads/2018/10/1.-Entrepreneurship-Education-in-Business-Schools_Project-report-Spain.pdf accessed 2 January 2021

Bacigalupo, M., Kampylis, P., Punie, Y. and Van den Brande, G. (2016) *EntreComp: The Entrepreneurship Competence Framework.* Seville: European Joint Research Centre.

Badke-Schaub, P., Roozenburg, N. and Cardoso, C. (2010), *Design thinking: a paradigm on its way from dilution to meaninglessness?* Proceedings of the 8th Design Conference, 39-49. Available on-line, http://www.academia.edu/4918192, accessed 1 February 2021

Baker, F.W., III and Moukhliss, S. (2020), 'Concretising Design Thinking: A Content Analysis of Systematic and Extended Literature Reviews on Design Thinking and Human-Centred Design'. *Review of Education*, 8 (1): 305-333. Available on-line, https://doi.org/10.1002/rev3.3186, accessed 1 April 2021.

Baldwin, L. P. (2015), 'Editorial', *Active Learning in Higher Education.* **16** (1):3-10.

Balnaves, M. and Caputi, P. (2001), *Introduction to Quantitative Methods: An investigative Approach*, London, California, New Delhi, Singapore: SAGE Publications Ltd.

Bandera, C., Santos, S.C. and Liguori, E.W. (2020), 'The Dark Side of Entrepreneurship Education: A Delphi Study on Dangers and Unintended Consequences'. *Entrepreneurship*

Education and Pedagogy. July, Available on-line, doi:10.1177/2515127420944592 accessed 12 February 2021.

Bandera, C., Somers, M., Passerini, K., Naatus, M. K. and Pon, K. (2019), 'Disruptions as opportunities for new thinking: applying the studio model to business education', *Knowledge Management Research & Practice*, **18** (1): 81-92, Available on-line, doi: 10.1080/14778238.2019.1621225, accessed 1 April 2021.

Barnes, J. (2012), *Changing perceptions of ICT at KS3: a critical investigation using activity theory*, unpublished dissertation, University of Wales Trinity Saint David, Swansea.

Basadur, M., and Goldsby, M. (2016), *Design-Centered Entrepreneurship*. London, New York: Routledge.

Beckman S.L. and Barry M. (2007), 'Innovation as a Learning Process: Embedding Design Thinking'. *California Management Review*. **50** (1):25-56.

Bennis, W. and O'Toole, J. (2005) 'How Business Schools Lost Their Way', Harvard Business Review, Magazine May 2005. Available on-line https://hbr.org/2005/05/how-business-schools-lost-their-way, accessed 4 January 2021.

Bereiter, C. and Scardamalia, M. (2003), 'Knowledge building', in J. W. Guthrie, (Ed) *Encyclopedia of Education,* New York: Macmillan. pp. 1370–1373.

Berger, P. L. and Luckmann, T. (1967), *The Social Construction of Reality, A Treatise in the Sociology of Knowledge*, London: Penguin Press.

Berglund, H. (2007), 'Researching entrepreneurship as lived experience', in H. Neergaard, and I. Ulhoi (Eds), *Handbook of Qualitative Research Methods in Entrepreneurship*. Cheltenham and Northampton, Massachusetts: Edward Elgar. pp 75-93.

Berglund, H. (2015), 'Between Cognition and discourse: phenomenology and the study of entrepreneurship', *International Journal of Entrepreneurial Behaviour and Research*, **21** (3): 472-488.

Bethal, D. M. (Ed) (1989) *Education for creative living: Ideas and proposals of Tsunesaburo Makiguichi*, Ames: Iowa State University Press.

Bhaskar, R. (1979), *The possibility of naturalism*. Brighton: Harvester.

Bhaskar, R. (1989), *Reclaiming reality: A critical introduction to contemporary philosophy*. London: Verso.

Biggs, J. (2003), *Teaching for quality learning at university*, (2nd ed), Buckingham: Open University Press/Society into Higher Education.

Binks, M., Starkey, K and Mahon, C. L. (2006), 'Entrepreneurship Education and the Business School', *Technology Analysis & Strategic Management,* **18** (1): 1–18 February.

Blenker, P., Trolle Elmholdt, S., Hedeboe Frederiksen, S., Korsgaard, S. and Wagner, K. (2014), 'Methods in entrepreneurship education research: A review and integrative framework', *Education + Training*, **56** (8/9): 697–715.

Bloom, B. S. (1956), *Taxonomy of educational objectives. Vol. 1: Cognitive domain*. New York: McKay.

Boland, R. and Collopy, F. (2004), *Managing as Designing*. Stanford, CA: Stanford University Press.

Bonsiepe, G. (2007), 'The Uneasy Relationship between Design and Design Research', in M. Ralf, (Ed) *Design Research Now*. Zurick Birkhauser Verlag, AG Part of Springer Science+Business Media 25-39

Bosna, N., Hill, S., Ionescu-Somers, A. Kelley, D., Levie, J. and Tarnawa, A. (2020), *Global Entrepreneurship Monitor 2019-2020 Report*, London: London Business School, Available on-line, https://www.gemconsortium.org/report/gem-2019-2020-global-report, accessed 1 January 2021.

Brentano, F. (1902), *The Origin of the Knowledge of Right and Wrong,* translated by Cecil Hague, Available on-line, http://www.gutenberg.org/files/49228/49228-h/49228-h.htm, accessed 1 January 2021.

Bridgstock, R. (2013), 'Not a dirty word: Arts entrepreneurship and higher education', *Arts and Humanities in Higher Education*, **12** (2/3): 122–137

Briggs, A. R., Coleman, M. and Morrison, M. (Eds) (2014), *Research Methods in Educational Leadership and Management*. 3rd ed, London, California, New Delhi, Singapore: SAGE publications.

British Council (2016), *Developing and Embedding Enterprise and Entrepreneurship in the vocational curriculum in Thailand: sharing UK innovative practice*, Available on-line, https://www.britishcouncil.org/sites/default/files/thai_case_study_0_0.pdf, Accessed 4 January 2021.

British Council (2017), *The value of enterprise and entrepreneurship education*. Available on-line, https://www.britishcouncil.org/education/skills-employability/what-we-do/vocational-education-exchange-online-magazine/october-2017/value-enterprise-entrepreneurship-education, accessed 1 January 2021.

Brown, T. (2008), 'Design Thinking', *Harvard Business Review*, **86**, pp 84-92.

Brown, T. (2009), *Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation*, New York: Harper Business.

Brown, T. and Katz, B. (2019), *How Great Design Could Fix the World's 'Wicked Problems'*. February 15, Available on-line, http://fortune.com/2019/02/15/change-by-design-new-excerpt-tim-brown/ accessed 1 April 2021.

Breunig M. (2017), 'Experientially Learning and Teaching in a Student-Directed Classroom', *Journal of Experiential Education*. **40** (3):213-230.

Buchanan, R. (1992), Wicked Problems in Design Thinking, *Design Issues*, **8** (2): 5-21.

Bullough, R. V. (2012), 'Against best practice: Uncertainty, outliers and local studies in educational research', *Journal of Education for Teaching*, **38** (3): 343-357.

Burger-Helmchen, T. (Ed) (2012), 'Born, Made and Educated', *InTechOpen,* Available on-line, https://www.intechopen.com/books/entrepreneurship-born-made-and-educated, accessed 1 January 2021.

Burns, P (2018), 'Foreword', in D. Hyams-Ssekasi, and E. Caldwell, (Eds) (2018) *Experiential Learning for Entrepreneurship, Theoretical and Practical Perspectives on Enterprise Education*, Palgrave Macmillan v-ix

Burr, V. (2003), *Social constructionism*. London: Routledge.

Busenitz, L.G., West, G.P., Shepherd, D., Nelson, T., Chandler, G.N. and Zacharakis, A. (2003), 'Entrepreneurship research in emergence: Past trends and future directions', *Journal of Management*, **29** (3): 285–308.

Business Wales, (2020), *Understanding Entrepreneurship the ACRO Model*, Available on-line, https://businesswales.gov.wales/bigideas/understanding-entrepreneurship-acro-model, accessed 1 March 2021.

Cardella, G. M., Hernández-Sánchez, B. R. and Sánchez-Garcia, J. C. (2020), 'Women Entrepreneurship: A Systematic Review to Outline the Boundaries of Scientific Literature', *Organizational Psychology*. Available on-line, doi.org/10.3389/fpsyg.2020.01557, accessed 1 March 2021.

Carlgren, I. (1999), Professionalism and teachers as designers. *Journal of Curriculum Studies*, **31**(1): 43–56.

Carlgren, L., Elmquist, M. and Rauth I. (2016), 'The Challenges of Using Design Thinking in Industry: Experiences from Five Large Firms', *Creativity and Innovation Management*, **25** (3): 344-362

Carey, C. and Matlay, H. (2010), 'Creative disciplines education: a model for assessing ideas in entrepreneurship education?, *Education + Training*, **52** (8/9): pp. 694-709.

Carr, J. (2014), *A dialogue between critical realism and phenomenology in educational and pedagogical research*. UK: Advance HE, Available on-line,

https://www.heacademy.ac.uk/dialogue-between-critical-realism-and-phenomenology-educational-and-pedagogical-research, accessed 1 March 2021.

Carr, W. (2006), 'Philosophy, Methodology and Action Research', *Journal of Philosophy of Education*, **40** (4): 421-435.

Carter, S. M. and Little, M. (2007), 'Justifying Knowledge, Justifying Method, Taking Action: Epistemologies, Methodologies, and Methods in Qualitative Research, *Qualitative Health Research,* **17** (10): 1316-1328.

Chevalier, J. M. and Buckles, D. J. (2019), *Participatory Action Research: Theory and Methods for Engaged Inquiry*. London: Routledge.

Clews, D. and Boddington, A. (2007), *Creative Entrepreneurship', Art Design and Media-Higher Education Academy* (ADM-HEA) and the National Endowment for Science, Technology and the Arts (NESTA) London.

Colaizzi, P. (1978) 'Psychological research as the phenomenologist views it', in R. Valle and M. King, (Eds), *Existential Phenomenological Alternative for Psychology*. New York: Oxford University Press, pp. 48–71.

Conn, C. and McLean, R. (2020). *Six problem-solving mindsets for very uncertain times*. McKinsey Quarterly September 15. Available on-line, https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/six-problem-solving-mindsets-for-very-uncertain-times# accessed 1 March 2021.

Cope, J. (2005), 'Toward a Dynamic Learning Perspective of Entrepreneurship'. *Entrepreneurship Theory and Practice*. **29** (4):373-397

Costin, Y., O'Brien, M. and Slattery, D. (2018), 'Using Simulation to Develop Entrepreneurial Skills and Mind-set: An exploratory case study', *International Journal of Teaching and Learning in Higher Education*, **30** (1): 136 -145.

Cox. G. (2005), *Cox Review of Creativity in Business: Building on the UK's Strengths*, London: HM Treasury.

Coyle, J. and Williams, B (2000), 'An exploration of the epistemological intricacies of using qualitative data to develop a quantitative measure of users views of health care', *Journal of Advanced Nursing*, **31** (5):1235-1243.

Creswell, J. W. and Piano Clark, V. L. (2007), *Designing and conducting mixed methods research*, Thousand Oaks, CA: SAGE

Cross, N. (1982) Designerly ways of knowing, *Design Studies*, **3** (4): 221-227

Cross, N. (1989), *Engineering Design Methods*, England: John Wiley.

Cross, N. (2006), *Designerly ways of Knowing*, Berlin: Springer.

Crotty, M. (1996), *Phenomenology and Nursing Research*. Melbourne: Churchill Livingstone.

Crotty, M. (1998), *Foundations of social research: Meaning and Perspective in the Research Process*, (Reprinted 2015), London, California, New Delhi, Singapore: SAGE

Crowell, S. (2001) 'Subjectivity: Locating the First-Person in Being and Time', *Inquiry*, **44** (4): 433-454

Curran, J. and Stanworth, J. (1989), 'Education and Training for Enterprise: Problems of Classification, Evaluation, Policy and Research', *International Small Business Journal*, **7** (2):11-22.

Dagar, V and Yadav, A. (2016), 'Constructivism: A Paradigm for Teaching and Learning', *Arts and Social Sciences Journal*, **7** (4): 1-4, Available on-line, doi: 10.4172/2151-6200.1000200, accessed 1 March 2021.

Dainow, R. (1986), 'Training and Education for Entrepreneurs: The current state of the literature', *Journal of Small Business and Entrepreneurship*, **3** (4):10-23.

Department for Business Innovation & Skills (2013), *Enterprise Education Impact in Higher Education and Further Education: Final report*, June 2013, Available on-line,

http://www.aoc.co.uk/sites/default/files/ENTERPRISE%20EDUCATION%20IMPACT%20IN%20HIGHER%20EDUCATION%20AND%20FURTHER%20EDUCATIONFull_Report.pdf, accessed 1 March 2021.

Dewey, J. (1934), *Art as Experience*. New York: Minton, Balch & Company

Dewey, J. 1948, Education and the Philosophic Mind, New York, the Macmillan Co

Dino, R. N. (2015), 'Crossing boundaries: Toward integrating creativity, innovation, and entrepreneurship research through practice', *Psychology of Aesthetics, Creativity, and the Arts, 9* (2): 139–146.

Dodd, S. D. and Anderson, A. R. (2001), 'Understanding the enterprise culture: Paradigm, paradox and policy', *The International Journal of Entrepreneurship and Innovation*, **2** (1): 13-26

Donaldson, G. (2015), *The Donaldson Review of Curriculum and Assessment*. Cardiff: Welsh Government.

Doran, J. McCarthy, N. Marie O'Connor, M. and Nsiah, C. (2018), 'The role of entrepreneurship in stimulating economic growth in developed and developing countries', *Cogent Economics & Finance*, 6:1, Available on-line, doi: 10.1080/23322039.2018.1442093, accessed 1 March 2021.

Dorst, K. (2011), 'The core of 'design thinking' and its application', *Design studies*, **32** (6): 521-532.

Dunne, D. (2018), Implementing design thinking in organizations: An exploratory study, *Journal of Organization Design*, Springer, Cham, **7** (16): 1-6, http://dx.doi.org/10.1186/s41469-018-0040-7

Dunne, D. and Martin, T. (2006), 'Design Thinking and How it Will Change Management Education: An Interview and Discussion', *Academy of Management Learning & Education*, **5** (4): 512-523.

Draycott, M. and Rae, D. (2011), 'Enterprise education in schools and the role of competency frameworks', *International Journal of Entrepreneurial Behavior & Research*, **17** (2): pp. 127-145.

Easton, E. and Djumalieva, J. (2018), *Creativity and the future of skills*, Creative Industries Policy and Evidence (PEC) in partnership with NESTA.

Education + Training (2021), Value creation in entrepreneurial education: towards a unified approach. Emerald Altmetrics, Available on-line https://emerald.altmetric.com/details/94953453, accessed 21 April 2021.

Edwards, D., Ashmore, M. and Potter, J. (1995), 'Death and Furniture: The rhetoric, politics and theology of bottom line arguments against relativism'. *History of the Human Sciences*, **8**: 25-49.

EE-HUB (2020), *The Macedonian Entrepreneurial Learning Strategy*, Available on-line http://content.ee-hub.eu/EE-HUB/National-Policies/The-Macedonian-Entrepreneurial-Learning-Strategy, accessed 1 March 2021.

EEUK (2021), 'Design and Enterprise the marriage made in …' *Enterprise Educators UK on-line event* 23 February 2021. Available on-line

https://www.enterprise.ac.uk/events/design-and-enterprise-the-marriage-made-in/, accessed 1 March 2021.

Elo, M., Harima, and Freiling, J. (2015), 'To Try or Not to Try? A Story of Diaspora Entrepreneurship', *Progress in International Business Research*, 10: 283-293. Available on-line, https://doi.org/10.1108/S1745-886220150000010015, accessed 1 January 2021.

Engestrom, Y. (1987), *Learning by expanding: An activity-theoretical approach to developmental research*. Helsinki: Orienta-Konsultit.

Erlandson, D. A., Harris, E. L., Skipper, B. L. and Allen, S. D. (1993), *Doing naturalistic inquiry: a guide to methods*. Newbury Park, CA: SAGE publications.

Ertmer, P and Newby, T. (2013), 'Behaviourism, Cognitivism, Constructivism: Comparing Critical Features from an Instructional Design Perspective'. *Performance Improvement Quarterly*. Available on-line, https://doi.org/10.1002/piq.21143, accessed 1 March 2021.

Etzkowitz, H. (2014), 'The Entrepreneurial University Wave: From Ivory Tower to Global Economic Engine'. *Industry and Higher Education*, **28** (4), 223 -232.

Etzkowitz, H. and Zhou, C. (2018), *The Triple Helix: University – Industry – Government Innovation and Entrepreneurship* (2nd ed) London, New York: Routledge.

European Commission (2008), *Best Procedure Project: Entrepreneurship in Higher Education, Especially in Non-Business Studies*, Final Report of the Expert Group.

European Commission (2009), 'The Impact of Culture on Creativity', *A Study prepared for the European Commission (Directorate-General for Education and Culture*, KEA European Affairs.

European Commission (2011), Entrepreneurship Education: Enabling Teachers: a Critical Success Factor. A report on Teacher Education and Training to prepare for the challenge of entrepreneurship education. Brussels: Directorate General for Enterprise and Industry.

European Commission (2013), *Entrepreneurship Education: A guide for educators*, Brussels: Directorate-General for Enterprise and Industry.

European Commission (2015), *Entrepreneurship Education: A Road to Success. A compilation of entrepreneurship strategies and measures*. Brussels: Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs

European Thematic Working Group on Entrepreneurship Education (2014), *Thematic Working Group on Entrepreneurship Education, Final Report November 2014*, Available on-line, https://ec.europa.eu/assets/eac/education/experts-groups/2011-2013/key/entrepreneurship-report-2014_en.pdf, accessed 1 January 2021.

Eurostat, (2015), *Statistics on small and medium sized enterprises*. European Commission, Available on-line, http://ec.europa.eu/eurostat/statistics-explained/index.php/Statistics_on_small_and_medium-sized_enterprises, accessed 1 April 2021.

Eurydice (2016), *Entrepreneurship Education in Schools in Europe*, European Commission, Available on-line,

https://eacea.ec.europa.eu/national-policies/eurydice/content/entrepreneurship-education-school-europe_en, accessed 1 January 2021.

EYE (2016), 'Skills Gap: Bridge over troubled water', *Together we can make a change*, The Strasbourg: European Youth Event. Available on-line, https://www.europarl.europa.eu/news/en/headlines/priorities/eye-2016, accessed 1January 2021.

Fallman, D. (2003) Design-Orientated Human-Computer Interaction, Proceedings of CHI2003, *Conference on Human Factors in Computing Systems*, Fort Lauderdale, Florida, April 5-10.

Fayolle, A. (2013), 'Personal views on the future of entrepreneurship education', *Entrepreneurship and Regional Development*, **25**: 692–701, Available on-line doi.org/10.1080/08985626.2013.821318, accessed 1 January 2021.

Fayolle, A. and Gailly, B. (2015), 'The Impact of Entrepreneurship Education on Entrepreneurial Attitudes and Intention: Hysteresis and Persistence', *Journal of Small Business Management*, **53** (1): 75-93.

Fayolle, A., Verzat, C. and Wapshott, R. (2016), 'In quest of legitimacy: The theoretical and methodological foundations of entrepreneurship education research', *International Small Business Journal*, **34** (7): 895-904

Ferreira, J. J., Fayolle, A., Fernandes, C., and Raposo, M. (2017), 'Effects of Schumpeterian and Kirznerian entrepreneurship on economic growth: Panel data evidence', *Entrepreneurship & Regional Development*, **29** (1/2): 27-50.

Ferreira, M.P., Reis, N.R. and Miranda, R. (2015), Thirty years of entrepreneurship research published in top journals: analysis of citations, co-citations and themes. *Journal of Global Entrepreneurship Research* **5,** 17

Finch, D., Deephouse, D.L., O'Reilly, N. Massie, T and Hillenbrand, C. (2016), Follow the leaders? An analysis of convergence and innovation of faculty recruiting practices in US business schools. *Higher Education,* **71** (5): 699–717.

Finley, J. N. (1970), *Axiological Ethics*, London: St Martins Press.

Fletcher, D. (2018), 'Prologue: Looking to the future: how can we further develop critical pedagogies in entrepreneurship education?' in A. Fayolle and P. Riot (Eds) *Revitalizing Entrepreneurship Education: adopting a critical approach in the classroom*, London: Routledge, pp. xxi.

Fosnot, C. T. (2005), *Constructivism: Theory, perspectives and practice* (2nd ed.). Williston, VT: Teachers College Press.

Foss, L and Gibson, D. (2015), *The Entrepreneurial University: Context and Institutional Change,* London: Routledge.

Foster M. K. (2019) 'Design Thinking: A Creative Approach to Problem Solving', *Management Teaching Review*, August, Available on-line doi:10.1177/2379298119871468, accessed 1 January 2021.

Frank H. and Landström, H. (2016), 'What makes entrepreneurship research interesting? Reflections on strategies to overcome the rigour–relevance gap'. *Entrepreneurship & Regional Development,* **28**(1/2): 51 75.

Frederiksen, D.L. and Brem, A. (2017), 'How do entrepreneurs think they create value? A scientific reflection of Eric Ries' Lean Startup approach'. *International Entrepreneurship and Management Journal* **13:**169–189

Fretschner, M. and Weber, S. (2013), 'Measuring and Understanding the Effects of Entrepreneurial Awareness Education', *Journal of Small Business Management*, **51** (3): 410-428.

Fuentelsaz, L. González, C., Maícas, J. and Montero, J. (2015), 'How different formal institutions affect opportunity and necessity entrepreneurship', *Business Research Quarterly*. **18**: 246-258.

Fuller, A. and Unwin, L. (1998). 'Reconceptualising apprenticeship: reconceptualising the relationship between work and learning', *Journal of Education and Vocational Training,* **50** (2): 153-173.

Furlong, J. and Oancea, A. (2005), *Assessing Quality in Applied and Practice-based Educational Research, A framework for Discussion*. Paper presented at the Australian Association for Research in Education, Cairns, 2005, Available at, https://www.aare.edu.au/data/publications/2005/fu05018y.pdf, accessed 1 January 2021.

Furlong, J. (2015), *Teaching Tomorrow's Teachers: Options for the future of initial teacher education in Wales*. A Report to Huw Lewis, AM, Minister for Education and Skills. John Furlong, Initial Teacher Training Adviser to the Welsh Government March, 2015. Resource Document. Welsh Government, Available on-line, https://www.cscjes-cronfa.co.uk/api/storage/4b992f03-a649-4b64-9615-baf4fea3d252/150309-teaching-tomorrows-teachers-final.pdf, accessed 1 January 2021.

Gaither S.E., Remedios J.D., Sanchez, D.T and Sommers S.R. (2015), 'Thinking Outside the Box: Multiple Identity Mind-Sets Affect Creative Problem Solving', *Social Psychological and Personality Science*. **6** (5): 596-603.

Gandhi, T. and Raina, R. (2018), 'Social entrepreneurship: the need, relevance, facets and constraints', *Journal of Global Entrepreneurship Research* **8**, 9, Available on-line, https://doi.org/10.1186/s40497-018-0094-6, accessed 4 January 2021.

Garcia, L, M. (2012), 'Understanding design thinking, exploration and exploitation: Implications for design strategy', in T. M. Karjalainen (ed.) *International Design Business Management Papers Vol. 2*. Helsinki: Aldus Publishing

Gardner, H. (1982), *Art, Mind and Brain: A Cognitive Approach to Creativity*, New York: Basis Books.

Gardner, H. (1987), *The mind's new science: A history of the cognitive revolution*, New York: Basic Books

Gartner, W. B. (2010), 'A New Path to the Waterfall: A Narrative on a Use of Entrepreneurial Narrative', *International Small Business Journal*, **28** (1): 6-19.

Gearing, R. (2004), 'Bracketing in research: A typology'. *Qualitative Health Research*, **14** (10), 1429-1452

Ghajargar, M. and Bardzell, J. (2019), 'What design education tells us about design theory: a pedagogical genealogy', *Digital Creativity*, **30** (4): 277-299, Available on-line, doi: 10.1080/14626268.2019.1677723, Accessed 4 January 2021.

Gibb, A. A. (2003), 'In pursuit of a new 'enterprise' and 'entrepreneurship' paradigm for learning: creative destruction, new values, new ways of doing things and new combinations

of knowledge'. *International Journal of Management Reviews*, 4 (3): 233-269. Available on-line, https://doi.org/10.1111/1468-2370.00086, accessed 4 January 2021.

Gibb, A. A. (2005), *Towards the Entrepreneurial University: Entrepreneurship Education as a lever for change*, National Council for Graduate Entrepreneurship report. Available on-line, https://ncee.org.uk/wp-content/uploads/2018/01/towards_the_entrepreneurial_university.pdf, accessed 4 January 2021

Gibb, A.A. (2007), 'Entrepreneurship: Unique Solutions for Unique Environments. Is it possible to achieve this with the existing paradigm?', *International Journal of Entrepreneurship Education*, **5**:93-142.

Gibb, A. A. (2008), 'Entrepreneurship and Enterprise Education in Schools and Colleges: Insights from UK practice'. *International Journal of Entrepreneurship Education.* **6** (2): 48

Gibb, A. (2011), 'Concepts into practice: meeting the challenge of development of entrepreneurship educators around an innovative paradigm: The case of the International Entrepreneurship Educators' Programme (IEEP)', *International Journal of Entrepreneurial Behavior & Research*, **17** (2): 146-165

Gibb, A.A. and Cotton, J. (1998), 'Work Futures and the role of Entrepreneurship and Enterprise in Schools and Further Education'. Background Keynote paper to the '*Creating the Leading Edge'* Conference held in London, December.

Gibb, A. A. and Haskins, G. (2013), 'The University of the Future: An Entrepreneurial Stakeholder Learning Organization?' in A. Fayolle and D. Redford (Eds), *Handbook on the Entrepreneurial University*. Cheltenham and Northampton, Massachusetts: Edward Elgar. pp. 25-63.

Giorgi, A. (1985), *Phenomenology and Psychological Research*. Pittsburgh, PA: Duquesne University Press.

Giorgi, A and Giorgi, B (2003), 'Phenomenology', in J. A. Smith (ed) *Qualitative Psychology: A Practical Guide to Research Methods*. London: Sage Publications pp. 25-50.

Given, L. M. (2008), *The SAGE Encyclopedia of Qualitative Research Methods (Vol. 2,* Thousand Oaks, CA: SAGE Publications, Inc. Available on-line, doi: 10.4135/9781412963909, accessed 4 January 2021.

Glen, R., Suciu, C. and Baughn, C. (2014), 'The need for design thinking in business schools', *Academy of Management Learning & Education,* 13 (4): 653–667.

Goldman, S. and Zielezinski, M. (2021), Design Thinking for Every Classroom: A Practical Guide for Educators. Taylor Francis.

Goldsby, M. G. and Nelson, T. E. (2012), 'Entrepreneurial Design: A Design Based Theory of Entrepreneurship', *Journal of Business and Entrepreneurship,* 23 (2): 80–95, Winter.

Google Scholar (2021), Kathryn Penaluna, Available on-line, https://scholar.google.com/citations?user=HWTfUIwAAAAJ&hl=en accessed 25 April 2021.

Gordon, M. (2009), 'Toward A Pragmatic Discourse of Constructivism: Reflections on Lessons from Practice', *Educational Studies*, 45 (1): 39-58.

Gorman, G., Hanlon, D. and King, W. (1997), 'Some Research Perspectives on Entrepreneurship Education, Enterprise Education and Education for Small Business Management: A ten-year literature review', *International Small Business Journal*, 15(3): 56-77.

Gray, C.M. (2011), *Design Pedagogy in Practice: Barriers to Learning and Evaluation in the Design Studio*, Indiana University Bloomington: Dept. of Inst. Systems Technology.

Gray, D. E. (2017), *Doing Research in the Real World*, (4th ed), Los Angeles, London, New Delhi, Singapore: SAGE.

Greene, J. (2007), *Mixed Methods in Social Inquiry*. California: Jossey-Bass & Wiley.

Greene, M. J. (2014), 'On the Inside Looking In: Methodological Insights and Challenges in Conducting Qualitative Insider Research'. *e Qualitative Report*, 19 (29): 1-13.

Greenwood, L. and Levin, M. (2007), *An Epistemological Foundation for Action Research: Introduction to Action Research. Introduction to Action Research.* (2nd ed), Thousand Oaks California: SAGE.

Grigg, R. (2020), 'EntreCompEdu, a professional development framework for entrepreneurial education', *Education + Training*, ahead-of-print. Available on-line, https://doi.org/10.1108/ET-06-2020-0166, accessed 1 April 2021.

Guba, E.G. (1981), Criteria for assessing the trustworthiness of naturalistic inquiries. *Educational Communications and Technology Journal,* **29**, 75

Guba, E. G. and Lincoln, Y. S. (1994), '*Competing paradigms in qualitative research'.* in N. K. Denzin and Y. S. Lincoln (Eds.), *Handbook of qualitative research* (p. 105–117). Thousand Oaks: SAGE pp. 105–117.

Haase, H. and Lautenschläger, A. (2010), The 'Teachability Dilemma' of entrepreneurship. *International Entrepreneurship and Management Journal,* **7:** 145–162

Hannon, P. (2006), 'Teaching pigeons to dance: sense and meaning in entrepreneurship education', *Education + Training*, 48 (5): 296-308.

Hardin, D., Westcott, M. and Berno, T. (2014), 'Redesigning Graduate Education', *Design Management Institution Review*, Spring 12-22.

Hartas, D. (Ed) (2010), *Educational research and Inquiry: qualitative and quantitative approaches*. London, New York: Continuum International Publishing Group.

HEFCW (2020), *Higher Education for the Nation: Embedding Skills and Employability*, Available on-line, https://www.hefcw.ac.uk/wp-content/uploads/2020/12/HE-for-the-Nation-Embedding-Skills-and-Employability-English.pdf, accessed 1 January 2021.

Heidegger, M. (1962), *Being and Time*. New York: Harper and Row.

HEInnovate (2021), *Is Your Higher Education Institution prepared for future challenges?* European Commission/OECD. Available on-line, https://heinnovate.eu/en, accessed 4 January 2021.

Henriksen, D., Gretter S. and Richardson, C. (2020), 'Design thinking and the practicing teacher: addressing problems of practice in teacher education', *Teaching Education*, **31** (2): 209-229. Available on-line, doi: 10.1080/10476210.2018.1531841, accessed 1 January 2021.

Henry, C., Hill. F. and Leitch, C. (2005a), 'Entrepreneurship education and training: can entrepreneurship be taught? Part 1', *Education + Training*, **47** (2): 98-111.

Henry, C., Hill. F. and Leitch, C. (2005b), 'Entrepreneurship education and training: can entrepreneurship be taught? Part 11', *Education + Training*, **47** (3): 158-169.

Heriot, C, Jauregui, K., Huning, T. and Harris, M. (2014), 'Evaluating the legitimacy of entrepreneurship and small business as a field of study: An exploratory study in the USA', *Journal of Enterprising Communities: People and Places in the Global Economy*, **8** (1): 4-19.

Herrero, L. (2017) 'Design thinking is ********', blog post, 8 November 2017, Available on-line https://leandroherrero.com/design-thinking-is-bullshit/ accessed 5 January 2021.

Higgins, D. and Galloway, L. (2014) 'Refocusing – building a future for entrepreneurial education and learning', *Industry and Higher Education*, **28**, (6): 449-457.

Higher Education Statistics Agency (2020), *HE Provider Data: Business and Community Interaction- Open data release*. Available on-line, https://www.hesa.ac.uk/data-and-analysis/business-community, accessed 1 March 2021.

Hills, G. (2006) Opening speech, at the *Internationalizing Entrepreneurship Education and Training Conference*, Sao Paulo. Brazil.

Hine, D. and Carson, D. (Eds) (2007) Innovative Methodologies in Enterprise Research, Cheltenham and Northampton, Massachusetts: Edward Elgar.

Hirschman, E. C. (1985), 'Primitive Aspects of Consumption in Modern American Society'. *Journal of Consumer Research*, **12** (2): 142-154.

HM Government, (2017), *Industrial Strategy: Building a Britain fit for the future*. Industrial Strategy White Paper. London: HM Government.

Hofer, A (2015a), *From Creativity to Initiative, Building Entrepreneurial Competencies in Schools: Entrepreneurship360 Guidance Note for Teachers and School Managers*. Organisation for Economic Co-operation and Development, Local Economic and Employment Development (LEED) Programme and the European Commission, Directorate General for Education and Culture (DG-EAC), with the financial support of the DG-EAC.

Hofer, A (2015b), *Building Entrepreneurial Competencies in Schools: Entrepreneurship360 Guidance Note for Policymakers*. Organisation for Economic Co-operation and Development, Local Economic and Employment Development (LEED) Programme and the European Commission, Directorate General for Education and Culture (DG-EAC), with the financial support of the DG-EAC.

Hoffman, L. (2016), 10 *Models for Design Thinking,* Available on-line, https://medium.com/@elizabeth7hoffman/10-models-for-design-thinking-f6943e4ee068, accessed 1 March 2021.

Huberman, A. M. and Miles, M. B. (Eds.) (2002). *The qualitative researcher's companion*. Thousand Oaks: SAGE

Hudson, L. and Ozanne, J. (1988), 'Alternative Ways of Seeking Knowledge in Consumer Research', *Journal of Consumer Research*, **14** (4): 508-521.

Hughes, J. (2012), *SAGE visual methods*. Thousand Oaks: SAGE

Huq, A. and Gilbert, D. (2015), 'All the world's a stage: Transforming entrepreneurship education through design thinking'. *Education + Training,* **59** (2): 155–170.

Husserl, E. (1982), *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy*, trans. by F. Kersten, Netherlands: Springer.

Industry and Higher Education (2021), 'In search of entrepreneurial competencies: Peripheral vision and multidisciplinary inspiration', *Article Metrics,* SAGE Journals. Available on-line https://journals.sagepub.com/doi/metrics/10.1177/0950422220963796 accessed 25 April 2021.

Irwin, L. (1940), 'Education through Sports', *The School Review*, **48** (1): 73-75, Available on-line, http://www.jstor.org/stable/1081334, accessed 4 January 2021.

Jamieson, I. (1984), 'Schools and Enterprise', in A.G. Watts, and P. Moran, (Eds), *Education for Enterprise*, Careers Research and Advisory Centre (CRAC), Cambridge:19-27.

Jen, N. (2017), *Design Thinking is Bullsh*t,* Available on-line

https://99u.adobe.com/videos/55967/natasha-jen-design-thinking-is-bullshit, accessed 5 January 2021.

Joglekar, N (2019), '*Design Education'* blog post, Available on-line https://blog.usejournal.com/design-education-5d84f2a540e9, accessed 1 April 2021.

Johannigmeirer, E. V. and Richardson, T. (2008), *Educational Research, the National Agenda, and Educational Reform: A History. A Volume in Studies in the History of Education*. Charlotte: Information Age Publishing Inc.

Johansson-Sköldberg, U. Woodilla, J. and Mehves, C. (2013), 'Design Thinking: Past, Present and Possible Futures', *Creativity and Innovation Management*, **22** (2): 121-146.

Johnson, C. (1988), 'Enterprise education and training', *British Journal of Education and Work*, **2**: 61-65.

Jones, C. and Matlay, H. (2011), 'Understanding the heterogeneity of entrepreneurship education: going beyond Gartner', *Education + Training*, **53** (8/9): 692-703.

Kaffka, G. and Krueger, N. (2018), 'The Entrepreneurial 'Mindset': Entrepreneurial Intentions from the Entepreneurial Event to Neuroentrepreneurship' in G. Javadian, V. Gupta, D. Dutta, G. Guo, A. Osorio and B. Ozkazanc (Eds) Foundation Reseach in Entrepreneurship Studies. London: Palgrave Macmillan.

Kakouris, A., Morselli, D. and Pittaway, L. (2021) Educational theory driven teaching in entrepreneurship. A call for papers *International Journal of Management Education*, Available on-line https://www.journals.elsevier.com/the-international-journal-of-management-education/call-for-papers/educational-theory-driven, accessed 10 May 2021.

Kalyoncuoglu, S., Aydintan, B., Goksel, A. (2017), 'The Effect of Entrepreneurial Education on Entrepreneurial Intention: An Experimental Study on Undergraduate Business Students'. Journal of Management Research **9** (3):72, Available on-line, https://doi.org/10.5296/jmr.v9i3.11282, accessed 4 January 2021.

Karagiorgi, Y. and Symeou, L. (2005), 'Translating constructivism into instructional design: Potential and limitations'. *Journal of Educational Technology & Society*, **8** (1): 17–27.

Kariv, D., Matlay, H. and Fayolle, A. (2019), 'Introduction: entrepreneurial trends meet entrepreneurial education', in A. Fayolle, D. Kariv and H. Matlay (Eds) *The Role and Impact of Entrepreneurship Education: Methods, Teachers and Innovative Programmes*. Cheltenham and Northampton, Massachusetts: Edward Elgar pp. 1-12.

Katz, J. A. (2003), 'The chronology and intellectual trajectory of American entrepreneurship education', *Journal of Business Venturing*, **18** (2): 283-300.

Katz, J. A. (2008), 'Fully Mature but Not Fully Legitimate: A Different Perspective on the State of Entrepreneurship Education', *Journal of Small Business Management*, **46** (4): 550-566.

Keeley, L. (2015), *Beyond Design Thinking*, Deloitte University Press. https://www2.deloitte.com/us/en/insights/focus/business-trends/2015/beyond-design-thinking-business-trends.html

Kellet, S (2006), *Emerging Practices in Entrepreneurship Education for Creatives,* Higher Education Academy, University of Brighton

Kelley, T. (2001), *The Art of Innovation*. New York: Doubleday.

Kelley, T. and Kelley, D. (2013), *Creative confidence: Unleashing the creative potential within us all*. New York: Crown Business.

Kelly, P. (2019), 'Entrepreneurship and the Creative Graduate in Prospects and AGCAS (2019)' *What do Graduates Do: Insights and Analysis from the UK's Largest Higher Education Survey*, Manchester: Prospects/AGCAS.

Kickul J, Gundry L, Mitra P and Berçot L. (2018), 'Designing With Purpose: Advocating Innovation, Impact, Sustainability, and Scale in Social Entrepreneurship', Education. *Entrepreneurship Education and Pedagogy*. 1(2):205-221.

Kim, C.A. (2017), 'The Value of Mixed Methods Research: A Mixed Methods Study', *Journal of Mixed Methods Research*, **11** (2): 202-222

Kim, J. and Ryu, H. (2014), 'A Design Thinking Rationality Framework: Framing and Solving Design Problems in Early Concept Generation', *Human–Computer Interaction*, **29** (5-6): 516-553.

King, A. (1993), 'Sage on the Stage to Guide on the Side', *College Teaching*, **41** (1): 30-35.

Kirby, D. (2004), 'Entrepreneurship Education: Can business schools meet the challenge?' *Education + Training*, **46** (8/9): 510-519.

Kirby, D. (2006), 'Creating Entrepreneurial Universities in the UK. Applying Entrepreneurship in Practice', *Journal of Technology Transfer*. **31**: 599-603

Kirby, D. and Healey-Benson (2021), Harmonious Entrepreneurship Society, Available on-line https://harmonious-entrepreneurship.org/founders/, accessed 19 March 2021.

Kirschner, P. A. (2015), 'Do we need teachers as designers of technology enhanced learning?' *Instructional Science*, **43** (2): 309–322.

Kitching J and Rouse J. (2020), 'Contesting effectuation theory: Why it does not explain new venture creation'. *International Small Business Journal*. **38** (6): 515-535.

Kolb, D. A. (1984), *Experiential Learning*. Englewood Cliffs, NJ: Prentice Hall.

Kolko, J. (2010), 'Abductive Thinking and Sensemaking: The Driver of Design Synthesis', Design Issues, **26** (1): 15-28.

Komarkova, I., Conrads, J. and Collado, A. (2015a). *Entrepreneurship Competence: An Overview of Existing Concepts, Policies and Initiatives - Final report*. Seville: EU Joint Research Centre.

Komarkova, I., Conrads, J. and Collado, A. (2015b) *Entrepreneurship Competence: An Overview of Existing Concepts, Policies and Initiatives - In-depth case studies report.* Seville: EU Joint Research Centre.

Komenić, B., Borovnjak, I., Filek, S and Velinovski, A. (2016), *Practicing Design: Rethinking Design Education*, Erasmus+ project, European Union, Available on-line,

https://ec.europa.eu/programmes/erasmus-plus/project-result-content/ac932c23-f828-4cd4-8a6e-61dfb7dabc10/Practicing%20Design%201.0%20Training%20Programme%20Handbook.pdf, accessed 1 March 2021.

Koper, R (2005), 'Learning design', in R. Koper and C. Tattersall (Eds) *A Handbook on Modelling and Delivering Networked Education and Training.* Berlin Heidelberg: Springer-Verlag, pp. 3–20.

Koronis, G., Silva, A., Kang, J., and Yogiaman, C. (2020), 'How to best frame a design brief to maximise novelty and usefulness in idea generation'. *Proceedings of the Design Society: DESIGN Conference*, **1**: 1745-1754. Available on-line, doi:10.1017/dsd.2020.77, accessed 1 March 2021.

Korstjens, I. and Moser, A. (2018), 'Series: Practical guidance to qualitative research. Part 4: Trustworthiness and publishing', *European Journal of General Practice*, **24** (1): 120-124.

Kounios, J., and Beeman, M. (2009), 'The Aha! Moment: The Cognitive Neuroscience of Insight'. *Current Directions in Psychological Science*, **18** (4): 210–216.

Kounios, J., Frymiare, J. L., Bowden, E. M., Fleck, J. I., Subramaniam, K., Parrish, T. B. and Jung-Beeman, M. (2006), 'The Prepared Mind: Neural Activity Prior to Problem Presentation Predicts Subsequent Solution by Sudden Insight', *Psychological Science,* **17** (10): 882–890.

Krippendorff, K. (2006), *The Semantic Turn – a New Foundation for Design.* New York: CRC Press/Taylor and Francis Group.

Krueger, N. (2007), 'What lies beneath? The experiential essence of entrepreneurial thinking'. *Entrepreneurship Theory and Practice*, **31** (1): 123-138.

Krueger, N., and Welpe, I. (2014), 'Neuroentrepreneurship: What can entrepreneurship learn from neuroscience?' in M Morris (ed) *Annals of entrepreneurship education and pedagogy.* Elgar online. pp 60-90.

Kupp, M., Anderson, J. and Reckhenrich, J. (2017), 'Why design thinking in business needs a rethink', *MIT Sloan Management Review*, **59** (1):42-44

Kuratko, D. F. (2005). 'The Emergence of Entrepreneurship Education: Development, Trends, Challenges', *Entrepreneurship Theory and Practice*, **29** (3): 577-598.

Kuratko, D. F. and Morris, M. (2017), 'Examining the Future Trajectory of Entrepreneurship', *Journal of Small Business Management*, **56** (1): 11-23.

Lackéus, M. (2015). *What, Why, When, How, Entrepreneurship 360 Background paper*, European Commission, OECD. Available on-line https://www.oecd.org/cfe/leed/BGP_Entrepreneurship-in-Education.pdf, accessed 4 January 2021.

Lackéus, M., Lundqvist, M., Middleton Williams, K and Inden, J. (2020), *The entrepreneurial employee in the public and private sector: What Why and How,* European Commission. Available on-line, https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/entrepreneurial-employee-public-and-private-sector-what-why-how, accessed 4 January 2021.

Lahey, J. (2017), *How design thinking became a buzzword at school*. The Atlantic, January 14th Available on-line, https://www.theatlantic.com/education/archive/2017/01/how-design-thinking-became-a- buzzword-at-school/512150/, accessed 4 January 2021.

Landström, H. and Persson, O. (2010), 'Entrepreneurship research: research communities and knowledge platforms' in H. Landström, and F.T. Lohrke, (Eds) (2010) *Historical Foundations of Entrepreneurship Research*. Cheltenham UK, Northampton, Massachusetts, USA: Edward Elgar. pp 46-76.

Lau, H., Hsu, H., Acosta, S. and Hsu, T. (2014), 'Impact of participation in extra-curricular activities during college on graduate employability: an empirical study of graduates of Taiwanese business schools', *Educational Studies*, **40** (1): 26-47

Lau, K. W. (2009), 'Creativity Training in Higher Design Education', *The Design Journal*, **12** (2): 153-169.

Laursen, L. and Haase, L. (2019), 'The shortcomings of Design Thinking when Compared to Designerly Thinking', *The Design Journal*, **22** (6): 813-832.

Lave, J. and Wenger, E. (1991), *Situated learning: Legitimate peripheral participation*. New York: Cambridge University Press.

Lawson, B. (2006), *How Designers Think – The Design Process Demystified*. Oxford: Architectural Press.

Leal-Rodríguez, A. L. and Albort-Morant, G. (2019) 'Promoting innovative experiential learning practices to improve academic performance: Empirical evidence from a Spanish Business School', *Journal of Innovation & Knowledge*, **4** (2), 2019: 97-103.

Leavy, B. (2012), 'Collaborative innovation as the new imperative – design thinking, value co-creation and the power of pull', *Strategy & Leadership,* **40** (2): 25-34.

Levy, P. (2003), 'A methodological framework for practice-based research in networked learning', *Instructional Science*, 31 87-109.

Lewis M. and Elaver, R. (2014), 'Managing and Fostering Creativity', *The International Journal of Management Education,* **12** (3): 235-247.

Liedtka, J., Salzman, R. and Azer, D. (2017), *Design thinking for the greater good: Innovation in the social sector*, New York, NY: Columbia University Press.

Limelight Digital (2020), *The Ultimate List of UK Startup & Small Business Statistics for 2020*. Available on-line, http://www.limelightdigital.co.uk/ultimate-list-uk-startup-small-business-statistics/, accessed 1 March 2021.

Lincoln, Y. S. and Guba, E. G. (1985), *Naturalistic Inquiry*. Beverley Hills, CA: Sage

Lindner, J. (2020), *Entrepreneurial learning for TVET institutions: a practical guide*. United Nations Educational, Scientific and Cultural Organisation andUNESCO-UNEVOC International Centre for Technical and Vocational Education and Training. Available on-line,

https://unevoc.unesco.org/up/entrepreneurial_learning_guide.pdf, accessed 1 March 2021.

Linton, G. and Klinton, M. (2019), 'University entrepreneurship education: a design thinking approach to learning'. *Journal of Innovation and Entrepreneurship* **8,** 3, Available on-line, https://doi.org/10.1186/s13731-018-0098-z, accessed 4 January 2021.

Marcotte, C. (2014), 'Entrepreneurship and innovation in emerging economies: Conceptual, methodological and contextual issues', *International Journal of Entrepreneurial Behavior & Research*, **20:** (1).

Mariet Ocasio, V. and Mariet Ocasio, V. (2016), 'Financing village enterprises in rural Bangladesh: What determines non-farm revenue growth?', *International Journal of Development Issues*, **15**: 76–94.

Markauskaite, L. and Goodyear, P. (2016), *Epistemic fluency and professional education: innovation, knowledgeable action and actionable knowledge*. Dordrecht: Springer.

Martin, R. (2009), *Design of Business: Why Design Thinking is the Next Competitive Advantage*. Boston, MA: Harvard Business Publishing.

Martin, L., McNeill, T. and Warren-Smith, I. (2013), 'Exploring business growth and eco innovation in rural small firms', *International Journal of Entrepreneurial Behavior & Research*, **19** (6): 592-610.

Marton, F. and Pong, W.Y (2005), 'On the unit of description in phenomenography', *Higher Education Research & Development*, **24** (4): 335-348

Mautner, G. (2005), 'The Entrepreneurial University – A discursive profile of a higher education buzzword', *Critical Discourse Studies*, **2** (2): 95 –120.

Matlay, H. (2005), 'Entrepreneurship education in UK business schools: Conceptual, contextual and policy considerations', *Journal of Small Business and Enterprise Development,* **12** (4): 627-643.

May, T (2016), *Prime Minister's letter to Sir Mark Walport* 28 November 2016. Available on-line, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data

/file/592417/Improving_entrepreneurship_education_-_PM_response.pdf, accessed 4 January 2021.

McCallum, E. Weicht, R. McMullan, L. and Price, A. (2018), *EntreComp into Action - Get inspired, make it happen: A user guide to the European Entrepreneurship Competence Framework*, Luxembourg: European Union.

McWilliam, E. (2009), 'Teaching for creativity: from sage to guide to meddler', *Asia Pacific Journal of Education,* **29** (3): 281-293.

Mednick, S. A., and Mednick, M. (1971), *Remote Associates Test: Examiner's Manual*. Boston, MA: Houghton Mifflin.

Mezirow, J. and Taylor, E. (2009), *Transformative Learning in Practice, Insights from Community, Workplace and Higher Education*. San Francisco: Jossey Bass.

Michels, N., Beresford R, Beresford K and Handley K (2018), 'From fluctuation and fragility to innovation and sustainability: The role of a member network in UK enterprise education'. *Industry and Higher Education*. **32** (6): 438-450.

Miles, M.B. and Huberman, A.M. (1991), *Analysing Qualitative Data: A Source Book for New Methods*, Beverly Hills, CA: SAGE.

Miles, M. B. and Huberman (1994), An Expanded Sourcebook, Qualitative Data Analysis, (2nd ed) London, New Delhi: SAGE

Mintzberg, H. (2004), *Managers not MBAs*, San Francisco, CA: Berrett-Koehler Publishers

Mir, R. and Watson, A. (2000), 'Strategic Management and the philosophy of science: the case for a constructivist methodology', *Strategic Management Journal*, **21** (9): 941-953.

Mishra, C. and Zachary, R. (2014), *The Theory of Entrepreneurship: Creating and Sustaining Entrepreneurial Value*, New York: Palgrave Macmillan US.

Moberg, K. (2020), *An Epic Literature Review – prepared for the EU/OECD Evaluation of Entrepreneurship Education Programmes in Higher Education Institutions and Centres* (EPIC Project) Demark: Fonden for entreprenørskab.

Moon, J. (2004), *A Handbook of Reflective and Experiential Learning: Theory and Practice*, London, New York: RoutledgeFalmer.

Morçöl, G. (2001), 'Positivist Beliefs among Policy Professionals: An Empirical Investigation'. *Policy Sciences*, **34** (3/4): 381-401.

Morgan, G. and Smircich, L. (1980), 'The Case for Qualitative Research', *Academy of Management Review*, **5** (4): 491-500.

Morselli D. (2019), 'The Assessment of Entrepreneurial Education. In: The Change Laboratory for Teacher Training in Entrepreneurship Education'. *SpringerBriefs in Education*. Springer, Cham, Available on-line, https://doi.org/10.1007/978-3-030-02571-7_2, accessed 4 January 2021.

Müller, R. and Thoring, K. (2012), 'Design Thinking Vs. Lean Startup: A comparison of two user-driven innovation strategies'. *Leading Innovation Through Design, International Design Management Research Conference*, Boston. August 8-12.

Nabi, G., Liñán, F., Fayolle, A., Krueger, N., and Walmsley, A. (2017), 'The impact of entrepreneurship education in higher education: A systematic review and research agenda'. *Academy of Management Learning & Education*, **16** (2): 277–299.

National Centre for Entrepreneurship in Education (2019), 'Changes and Challenges Facing University Leadership', *The 2019 NCEE Leadership survey*. Report for National Centre for Entrepreneurship in Education.

National Endowment for Science Technology and the Arts (2018), *Creative nation: How the creative industries are powering the UK's nations and regions*. London: NESTA.

Neck, H.M. and Corbett, A. (2018), 'The Scholarship of Teaching and Learning Entrepreneurship', *Entrepreneurship Education and Pedagogy*, **1** (1): 8-41.

Neck, H. M. and Greene, P. G. (2011), 'Entrepreneurship education: Known worlds and new Frontiers'. *Journal of Small Business Management*, **49** (1): 55–70.

Nielsen, S. L. and Stovang, P. (2015), 'DesUni: University entrepreneurship education through design thinking'. *Education + Training,* **57** (8/9): 977–991.

Neumann, T. (2020), 'The impact of entrepreneurship on economic, social and environmental welfare and its determinants: a systematic review'. *Management Review Q.* Available on-line, https://doi.org/10.1007/s11301-020-00193-7, accessed 4 January 2021.

Newman, L. W. (2000), *Social Research Methods: Qualitative and Quantitative Approaches,* (4th Ed.) USA: Allyn and Bacon.

Norman, D. A. (2014), *Why DesignX? The role of designers in complex problems*. December 5th. Available on-line, http://www.jnd.org/dn.mss/why_designx.html, 1 April 2021.

Norman, D.A. and Verganti, R. (2014), 'Incremental and radical innovation: Design research VC. Technology and meaning change', *Design Issues*, **30** (1): 78-96.

Norton, P. and Hathaway, D. (2015), 'In search of a teacher education curriculum: Appropriating a design lens to solve problems of practice', *Educational Technology*, **55** (6): 3–14.

OECD, (2018), *The Future of Education and Skills Education 2030: The Future We Want*, Organisation for Economic Cooperation and Development, Available on-line https://www.oecd.org/education/2030/E2030%20Position%20Paper%20(05.04.2018).pdf, accessed 4 January 2021.

OECD, (2019), *PISA 2021 Creative Thinking Framework (Third Draft) April 2019*. Organisation for Economic Cooperation and Development, Available on-line,

https://www.oecd.org/pisa/publications/PISA-2021-creative-thinking-framework.pdf, accessed 4 January 2021.

Olteteanu, A. M. (2014), 'Two general classes in creative problem-solving? An account based on the cognitive processes involved in the problem structure - representation structure relationship,' in *Proceedings of the International Conference on Computational Creativity*,

eds T. Besold, K.-U. Kühnberger, M. Schorlemmer, and A. Smaill (Osnabrück: Publications of the Institute of Cognitive Science).

Onwuegbuzie A.J., Dickinson W.B., Leech N.L. and Zoran AG. (2009), 'A Qualitative Framework for Collecting and Analyzing Data in Focus Group Research'. *International Journal of Qualitative Methods*. 1-21

Owens, J and Tibby, M. (2014), *Enhancing employability through enterprise education: Examples of good practice in higher education*. York: Higher Education Academy, Available on-line https://www.heacademy.ac.uk/sites/default/files/resources/enhancing_employability_through _enterprise_education_good_practice_guide.pdf, Accessed 4 January 2021.

Oxman, R. (2001), 'The mind in design: a conceptual framework for cognition in design education', in C. Eastman, W. Newsletter and M. McCracken (eds.) *Design Knowing and Learning: Cognition in Design Education*, Oxford: Elsevier Science Ltd. pp. 269–295.

Parker, M. (2018a), *Why we should bulldoze the business school: There are 13.000 business schools on Earth. That's 13.000 too many. And I should know- I've taught in them for 20 years*. The Guardian, April 27, Available on-line,

https://www.theguardian.com/news/2018/apr/27/bulldoze-the-business-school, accessed 4 January 2021.

Parker, M. (2018b), *Shut Down the Business School: What's Wrong with Management Education*. Pluto Press: London

Penaluna, A, Brown, S. Gibson, D. Jones, C. and Penaluna K. (2008), 'Entrepreneurial Education needs Entrepreneurial Educators: Assessing our Performance', *31st National Conference of the Institute for Small Business and Entrepreneurship*, Nov. Belfast

Penaluna, A, Coates, J and Penaluna, K. (2009), 'Seeing Outside the Box: Creativity Based Assessment and Neural Understanding', *32nd National Conference of the Institute for Small Business and Entrepreneurship*, November, Liverpool

Penaluna, A., and Penaluna, K. (2005), 'Entrepreneurship for Artists and Designers in Higher Education', *Internationalizing Entrepreneurship Education and Training Conference, Guildford*, Surrey

Penaluna, A. and Penaluna, K. (2006a), 'Stepping back to go Forward: Alumni in Reflexive Design Curriculum Development', *Internationalizing Entrepreneurship Education and Training Conference,* Sao Paulo Brazil

Penaluna, A. and Penaluna, K. (2006b), 'Cox Review of Creativity in Business: Implications for Entrepreneurship Educators'. *29th National Conference of the Institute for Small Business and Entrepreneurship*, Cardiff.

Penaluna, A. and Penaluna, K. (2006c), 'Business Paradigms in Einstellung: A Creative industries perspective on enhancing entrepreneurship education'. *Internationalizing Entrepreneurship Education and Training Conference*, Sao Paulo, Brazil.

Penaluna, A. and Penaluna, K, (2008), 'Business Paradigms in Einstellung: Harnessing Creative Mindsets for Entrepreneurship Education', *Journal of Small Business and Entrepreneurship* **21** (2): 231-250.

Penaluna, A. and Penaluna K. (2009), 'Crossing the bridge: Insights into enabling strategies for creative business development'. *HEA.BMAF Conference*, April, Cardiff.

Penaluna, A. and Penaluna, K. (2015), *Entrepreneurial Education in Practice, Part, 2 – Building Motivations and Competencies, Entrepreneurship 360 Thematic Paper*, Organisation for Economic Co-operation and Development (OECD, LEED Programme) and the European Commission (DG Education and Culture). Available on-line http://www.oecd.org/cfe/leed/Entrepreneurial-Education-Practice-pt2.pdf?TSPD_101_R0=39f3f2062b1dd5db8e5a6467c07391f9cwL00000000000000070256d58ffff0000000000000000000000000005a89cbe6008e223a8b, accessed 4 January 2021.

Penaluna, A and Penaluna, K. (2019a) 'I'm a designer, get me out of here: can entrepreneurial education advance through learning from design education?' in A. Fayolle, D. Kariv, and H. Matlay (Eds) *The Role and Impact of Entrepreneurship Education: Methods, Teachers and Innovative Programmes*, Cheltenham UK and Northampton, Massachusetts, USA: Edward Elgar Publishing, pp. 13- 34.

Penaluna, A. and Penaluna, K. (2019b) New frontier? The changed face of Welsh schooling integrates enterprise. *Institute for Small Business and Entrepreneurship Conference,* 14-15 November. Available on-line, https://isbe.org.uk/isbe-2019/bpa/) accessed 1 April 2021.

Penaluna, A. and Penaluna, K. (2020), 'In search of entrepreneurial competencies: Peripheral vision and multi-disciplinary inspiration', *Industry and Higher Education,* Available on-line, https://journals.sagepub.com/doi/full/10.1177/0950422220963796, accessed 1 March 2021.

Penaluna, A., Penaluna, K., McCallum, E., Brentnall, C., Jones, C., Brown, S., Polenakovikj, R., Sutevski, D., Stankovska, I. Polenakovikj, L., Jovanovski, B. and Velkovski, T. (2015) *How to Teach Entrepreneurship, What, Why, When and who?* Available on-line, https://www.uwtsd.ac.uk/media/uwtsd-website/content-assets/images/iiced/How-to-teach-entrepreneurship-ENG-MK-web.pdf, accessed 4 January 2021.

Penaluna, A, Penaluna, K and Polenakovik, R (2020), 'Developing entrepreneurial education in national school curricula: lessons from North Macedonia and Wales', *Entrepreneurship Education*. 3: 245-263 Available on-line, https://doi.org/10.1007/s41959-020-00038-0, accessed 1 March 2021.

Penaluna K. (2005), 'The Ethical Dilemmas of the Lonely Decision Maker – A Graphic Design Case Study', *MBA Dissertation*, University of Wales.

Penaluna K. (2013) 'Enterprise Education versus Design Education: Friends or Foes?' *MA in Enterprise Education Dissertation*, University of Coventry.

Penaluna, K, Evans, R. and Draycott, M. (2010) *Shaping a qualification to develop entrepreneurial educators,* International Entrepreneurship Educators Conference, Best Practice Workshop, Sept, Cardiff.

Penaluna, K, Penaluna, A, Jones, C and Matlay, H. (2017) ' I still love IP: a spotlight on 10 years of designing the student experience', International Conference, Institute for Small Business and Entrepreneurship, Belfast, 8-9 November, Available on-line, https://repository.uwtsd.ac.uk/id/eprint/802/, accessed 1 March 2021.

Penaluna, K., Penaluna, A. and Jones, C. (2012), The Context of Enterprise Education: Insights into Current Practices, *Industry and Higher Education*, **26** (3): 163-175.

Penaluna, K., Penaluna, A., Usei, C. and Griffiths, D. (2015), 'Enterprise education needs enterprising educators', *Education + Training*, **57** (8/9): 948-963.

Perényi, Á. and Losoncz, M. A. (2018), 'Systematic Review of International Entrepreneurship' Special Issue Articles. *Sustainability*, 10, 3476.

Pfeffer, J. and Fong C. T (2002), 'The end of business schools? Less success than meets the eye' *Academy of Management Learning and Education* **1** (1): 78-95.

Phan, P. (2004), 'Entrepreneurship theory: Possibilities and future directions', *Journal of Business Venturing*, **19** (5): 617–20.

Piaget, J. (1995), *Sociological studies* (T. Brown, R. Campbell, N. Emler, M. Ferrari, M. Gribetz, R. Kitchener, et al., Trans.). London: Routledge.

Pittaway, L. and Edwards, C. (2012), 'Assessment: Examining Practice in Entrepreneurship Education. Education + Training', **54** (8/9): 778-800.

Polenakovikj R. (2015) *The methodology matrix for entrepreneurship education in primary and secondary schools*. The Ministry of the Republic of Macedonia, The World Bank, developed as part of the 'Skills Development and Innovation Support Project'. Available on-line,

http://ee-hub.eu/component/attachments/?task=download&id=37:Matrix_Macedonia, accessed 4 January 2021.

Polenakovik, R. Stankovska, I., Penaluna, A., Penaluna, K. and Jovanovski, B. (2019) '*A methodology for closing the gap between the competences of students and recent graduates and labour market needs. The case of the Republic of North Macedonia. International Conference of Education Research and Innovation*, 11 - 13th November 2019, Seville. Available on-line, https://repository.uwtsd.ac.uk/id/eprint/1131/ accessed 4 January 2021.

Ponce, O. A. and Pagan-Maldonado, N. (2015), 'Mixed Methods Research in Education: Capturing the Complexity of the Profession', *International Journal of Educational Excellence*, **1** (1): 111.135.

QAA (2012), *Enterprise and Entrepreneurship Education: Guidance for UK Higher Education Providers*. Gloucester: The Quality Assurance Agency for Higher Education.

QAA (2018), *Enterprise and Entrepreneurship Education: Guidance for UK Higher Education Providers*. Gloucester: The Quality Assurance Agency for Higher Education, Available on-line,

http://www.qaa.ac.uk/en/Publications/Documents/Enterprise-and-entrpreneurship-education-2018.pdf, accessed 4 January 2021.

Qutoshi, S. B. (2018), Phenomenology: A Philosophy and Method Inquiry. *Journal of Education and Education Development*, **5** (1): 215-222.

Rae, D. (2007), *Entrepreneurship from Opportunity to Action*, New York: Palgrave Macmillan

Rae, D., Matlay, H., McGowan, P. and Penaluna, A. (2014), Freedom or prescription: the case for curriculum guidance in enterprise and entrepreneurship education, *Industry & Higher Education*, **26** (6): 387-398.

Rai, P.C. and Lama. R. (2020), 'Pragmatism and Its Contribution to Education', *International Journal of Creative Research Thoughts*, **8** (3). Available on-line, https://ijcrt.org/papers/IJCRT2003258.pdf accessed 1 March 2021.

Ramey, H. and Grubb, S. (2009), 'Modernism, Postmodernism and (Evidence-Based) Practice'. *Contemporary Family Therapy*, **31** (2): 75-86.

Raskin, J. (2008), 'The Evolution of Constructivism', *Journal of Constructivist Psychology*, **21** (1): 1-24.

Ratten, V. (2017), Entrepreneurial universities: The role of communities, people and places. Journal of Enterprising Communities: People and Places in the Global Economy, **11**(3): 31–315.

Ratten, V. and Usmanij, P. (2021) Entrepreneurship education: Time for a change in research direction? The International Journal of Management Education, **19** (1) Available on-line, 10.1016/j.ijme.2020.100367, accessed 1 April 2021.

Remenyi, D., Williams, B., Money, A. and Swartz, E (1998)*, Doing Research in Business and Management. An Introduction to Process and Method*, London: SAGE

Rideout, E. C. and Gray, D. O. (2013), 'Does Entrepreneurship Education Really Work? A Review and Methodological Critique of the Empirical Literature on the Effects of University-Based Entrepreneurship Education', *Journal of Small Business Management*, **51** (3): 329-351.

Ries, E. (2011), *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses*. New York: Crown.

Rittel, H. and Webber, M. (1975), 'Dilemmas in a General Theory of Planning', *Policy Sciences*, **4** (2): 155-169.

Rose, S. (2014), 'What is Design Thinking? Is This Innovation's Panacea?' *Strategy and Information* 16 January, Available on-line, https://informaconnect.com/what-is-design-thinking-is-this-innovations-panacea/, accessed 4 January 2021.

Roulin, N. and Bangerter, A. (2013), 'Students' use of extra-curricular activities for positional advantage in competitive job markets'. *Journal of Education and Work*, **26**(1), 21–47.

Rowe, P. G. (1991), *Design Thinking*, Boston: Masachusetts Institute of Technology.

Ruben, R. and Dierdorff, (2013), 'Building a Better MBA: From a Decade of Critique towards a Decennium of Creation', *Academy of Management Learning & Education*, **12** (1): 125–141.

Rutgers, J, Ling Chu, M, Fass, J (2017), *Design Competencies Future: How do we REDO Design Education?* REDO biannual Cumulus 2017 Conference, Koldng. Available on-line, https://ualresearchonline.arts.ac.uk/id/eprint/11044/1/Design%20Competencies%20Futures%20How%20do%20we%20REDO%20Design%20Education%20.pdf, accessed 4 January 2021.

Salvi, C., Costantini, G., Bricolo, E., Perugini, M., and Beeman, M. (2016), 'Validation of Italian rebus puzzles and compound remote associate problems, *Behaviour Research Methods* **48**, 664–685. doi: 10.3758/s13428-015-0597-9

Sanders, L. (2008), 'An Evolving Map of Design Practice and Design Research'. *Interactions*, **15** (6), 13. Available on-line, doi:10.1145/1409040.1409043, accessed 4 January 2021.

Sanders, E. B. N. (2017), 'Design Research at the Crossroads of Education and Practice'. *The Journal of Design, Economics, and Innovation*. **3** (1): 3-15.

Sarasvathy, S. (2008), *Effectuation: Elements of Entrepreneurial Expertise (New Horizons in Entrepreneurship,* Cheltenham and Northampton, Massachusetts: Edward Elgar.

Sarooghi, H., Sunny, S., Hornsby, J. and Fernhaber, S. (2019), 'Design Thinking and Entrepreneurship Education: Where Are We, and What Are the Possibilities?', *Journal of Small Business Management*, **57** (S1): 78-93.

Schlee, R. P. and Harich, K. R. (2014), 'Teaching Creativity to Business Students: How Well Are We Doing?', *Journal of Education for Business*, **89** (3): 133-141.

Schon, D. (1983), *The Reflective Practitioner: How Professionals Think in Action*. London: Temple Smith.

Schroeder, M. (2016), 'Value Theory', in Zalta, N. (Ed) *The Stanford Encyclopedia of Philosophy,* Available on-line, https://plato.stanford.edu/archives/fall2016/entries/value-theory, accessed 4 January 2021.

Schumpeter, J. A. (1934), 'The theory of economic development: an inquiry into profits capital credit, interest and the business cycle'. *Harvard economic Studies 46*, Harvard University Press.

SEECEL (2016), Entrepreneurship Education in the European Union: An Overview of Policies and Practice. Zagreb: The South East European Centre for Entrepreneurial Learning, available on-line,

https://uwtsd.ac.uk/media/uwtsd-website/content-assets/images/iiced/SEECEL_Entrepreneurship_education_EU-28_2016.pdf, accessed 1 April 2021.

SEECEL (2018), Developing Entrepreneurial Societies: The Entrepreneurial Learning Effect

The SEECEL Story in Numbers. Zagreb: The South East European Centre for Entrepreneurial Learning, Available on-line,

https://www.uwtsd.ac.uk/iiced/publications/, accessed 1 April 2021.

Shen, T., Osorio, A. E. and Settles, A. (2017), 'Does family support matter? The influence of support factors an entrepreneurial attitudes and intentions of college students'. Academy of Entrepreneurship Journal **23** (1): 23–43.

Shepherd, D. (2015), 'Party On! A call for entrepreneurship research that is more interactive, activity based, cognitively hot, compassionate, and prosocial'. Journal of business Venturing, **30** (4): 489-507.

Shepherd, D. (2019), 'Researching the dark side, downside, and destructive side of entrepreneurial action: It's the compassionate thing to do', *Academy of Management Discoveries*, **5** (3): 217–220.

Sikes, P. and Potts, A. (Eds) (2008), *Researching Education from the Inside: Investigating Institutions from Within*, London: Routledge/Falmer.

Sirelkhatim, F., Gangi, Y. and Nisar, T. (2015), 'Entrepreneurship education: A systematic literature review of curricula contents and teaching methods', *Cogent Business & Management*, 2,1. Available on-line, doi: 10.1080/23311975.2015.1052034, accessed 4 January 2021.

Solomon, G. (2007), 'An examination of entrepreneurship education in the United States'. *Journal of Small Business and Enterprise Development*, **14** (2): 168–182.

Starkey, K and Thomas, H (2020), 'The future of business schools: shut them down or broaden our horizons?' Available on-line, https://mays.tamu.edu/wp-content/uploads/2020/09/The-future-of-business-schools-Starkey-Thomas.pdf accessed 1 April 2021.

Steyaert, C. (2003), 'Entrepreneurship: In Between What? – On the 'Frontier' as a Discourse of Entrepreneurship Research'. *Academy of Management*. Conference Published on-line December 2017 https://journals.aom.org/doi/10.5465/ambpp.2003.13793090, accessed 4 January 2021.

Stokes, D.E. (1997), *Pasteur's Quadrant: Basic Science and Technological Innovation*. Washington, DC: The Brookings Institution.

Swann, C. (2002), 'Action Research and the Practice of Design', *Design Issues*, **18** (1): 49-61.

Turner, J. (2011), 'Logic and Ontological Pluralism'. *Journal of Philosophical Logic* **41** 419–448

Turner, T. and Gianiodis, P. (2018), 'Entrepreneurship unleashed: Understanding entrepreneurial education outside of the business school'. *Journal of Small Business Management*, **56** (1): 131–149.

Tynan, M. (2017), *An exploration of the suitability of design education approaches in enabling enterprise and entrepreneurship educators to enhance undergraduate students' opportunity recognition attributes, behaviours and skills in Higher Education in Ireland*. PhD thesis. Available on-line, https://repository.uwtsd.ac.uk/id/eprint/875/1/Tynan,%20Margaret%20(2017)An%20exploration%20of%20the%20sustainability%20of%20design%202.pdf, accessed 4 January 2021.

Ucbasaran, D., Westhead, P. and Wright, M. (2001), 'The focus of entrepreneurial research: contextual and process issues'. *Entrepreneurship Theory and Practice*, **5** (4): 57-80.

UK Commission for Employment and Skills (2020), *The Future of Work: Jobs and Skills in 2030*, Available on-line, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/303335/the_future_of_work_key_findings_edit.pdf, 4 January 2021.

UKIPO (2014), Baroness Neville-Rolfe: Creating IP Savvy Graduates, Bristol, 2015. *Intellectual Property Office blog*. Bristol, 12 March 2015. Available on-line,

https://ipo.blog.gov.uk/2015/03/12/baroness-neville-rolfe-creating-ip-savvy-graduates/, accessed 4 January 2021.

United Nations (2012), *Entrepreneurship Policy Framework and Implementation Guidance*. United National Conference for Trade and Development: Geneva. Available on-line, http://unctad.org/en/PublicationsLibrary/diaeed2012d1_en.pdf, accessed 4 January 2021.

Urban B. (2010), 'Entrepreneurship as a discipline and field of study', in Urban B. (Ed) *Frontiers in Entrepreneurship. Perspectives in Entrepreneurship*. Berlin, Heidelberg: Springer-Verlag.

Val, E., Gonzalez, I., Iriarte, I., Beitia, A., Lasa, G. and Elkoro, M. (2017), A design thinking approach to introduce entrepreneurship education in European school curricula. *The Design Journal, 20* (sup1): 754–766.

Valero, A. Parton, B. and Robb, A. (2014), *Entrepreneurship Education and Training Programs around the World: Dimensions for Success, Directions in Development*, Washington: World Bank.

Vallaster, C., Kraus, S., Lindhl, J. and Nielsen, A (2019), 'Ethics and entrepreneurship: a bibliometric study and literature review. *Journal of Business Research*. **99**: 226–237

Varaki, B. S. and Earl, L. (2005), 'Epistemic Fallacy in Educational Research', *Massalah Pendidikan*, **28**: 279-288.

Vesper, K. H. and Gartner, W. B. (1997), Measuring Progress in Entrepreneurship Education. *Journal of Business Venturing*, **12**: 403-421.

Vester, F. (2012), *The art of interconnected thinking: ideas and tools for a new approach to tackling complexity*, Norderstedt: BoD-Books on Demand.

Visser, W. (2006), 'Designing as Construction of Representations: A Dynamic Viewpoint in Cognitive Design Research', *Human–Computer Interaction*, **21**(1): 103-152

Volkmann, C., Wilson, K., Mariotti, S., Rabuzzi, D., Vyakarnam, S. and Sepulveda, A. (2009), *Educating the next wave of entrepreneurs: Unlocking entrepreneurial capabilities to meet the global challenges of the 21st Century*, World Economic Forum, Davos, Switzerland.

von Graevenitz, G., Harhoff, D. and Weber, R. (2010), 'The effects of entrepreneurship education', *Journal of Economic Behavior & Organization*, **76** (1): 90–112

Vyakarnam, S. and Barakaat, S. (2016), 'Facilitating Entrepreneurship as a Catalyst for Change', in N. Rizk and H. Azzazy, *Entrepreneurship and Innovation in Egypt*, Cairo: The American University in Cairo Press.

Waddock S. and Lozano, J. M (2013), 'Developing more holistic management education: Lessons learned from two programs', *Academy of Management Learning and Education*, **12** (2): 265-284

Wang, S. M., Yeeh, H. P. and Chang Wen, P. (2019, 'How the New Type of Entrepreneurship Education Complements the Traditional One in Developing Entrepreneurial

Competencies and Intention', *Frontiers in Psychology*, September 2019. Available on-line, https://doi.org/10.3389/fpsyg.2019.02048, accessed 4 January 2021.

Walters, P.B., Lareau, A. and Ranis, S (2008) (Eds), *Educational Research on Trial: Policy Reform and the Call for Scientific Rigor. London*, New York: Routledge.

Webster-Wright, A. (2009), 'Reframing professional development through understanding authentic professional learning', *Review of Educational Research* **79** (2): 702-73.

Weicht, R. (2018), *Education systems can stifle creative thought. Here's how to do things differently*. World Economic Forum. Available on-line,

https://www.weforum.org/agenda/2018/04/education-systems-can-stifle-creative-thought-here-s-how-to-do-things-differently/, accessed 4 January 2021.

Welsh Government (2010), *Youth Entrepreneurship Strategy: An Action Plan for Wales*. Available on-line, https://businesswales.gov.wales/bigideas/sites/bigideas/files/documents/YES-%20An%20Action%20Plan%20for%20Wales%202010-15%20_Eng_1.pdf, accessed 4 January 2021.

Welsh Government (2019), *Prosperity for All: economic action plan.* Available on-line, https://gov.wales/sites/default/files/publications/2019-02/prosperity-for-all-economic-action-plan.pdf, accessed 4 January 2021.

Welsh Government Hwb (2020), *Curriculum for Wales*, Available on-line, https://hwb.gov.wales/curriculum-for-wales, accessed 1 April 2021.

Welsh Joint Education Committee, (2015), *Welsh Baccalaureate National/Foundation Key Stage 4: Accredited by Welsh Government, Teaching from 2015*. Available on-line, https://www.wjec.co.uk/qualifications/welsh-baccalaureate-national-foundation/#tab_overview, accessed 4 January 2021.

Welsh, D. H., Tullar, W. L. and Nemati, H. (2016), 'Entrepreneurship education: Process, method, or both?', *Journal of Innovation & Knowledge*, **1** (3): 125-132.

Westhead, P. Wright, M. and McElwee, G. (2011), *Entrepreneurship: Perspectives and Cases*. Harlow UK: Pearson Education.

Wieland, A. M., Kemmelmeier, M., Gupta, V. K., and McKelvey, W. (2019), 'Gendered cognitions: a socio-cognitive model of how gender affects entrepreneurial preferences'. *Entrepreneurship Regional Development*, **31** (3/4): 178–197

Wilson, T. (2012), *A review of Business-University Collaboration*, London: UK Government.

World Economic Forum, (2016), *The Future of Jobs: Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution*. Global Challenge Insight Report. Available on-line,

http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf, accessed 4 January 2021.

World Economic Forum, (2020a), *Universities should support more student entrepreneurs. Here's why-and how,* Blog Post. Available on-line, https://www.weforum.org/agenda/2020/10/universities-should-support-more-student-entrepreneurs/, accessed 4 January 2021.

World Economic Forum, (2020b), *Schools of the Future: Defining New Models of Education for the Fourth Industrial Revolution*, Available on-line,

https://www.weforum.org/reports/schools-of-the-future-defining-new-models-of-education-for-the-fourth-industrial-revolution, accessed 4 January 2021.

APPENDICES

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