

Teaching Approaches and Student Learning: Personality type and design studio

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Report review

This is a thorough review of the literature on learning styles, personality types and teaching in a design studio. The 'Mind Maps', in conjunction with the Tables, provide a useful visual overview of each individual aspect supported by a comprehensive literature review. I agree with the conclusion in Chapter 3 that there's really no evidence that trying to teach to someone's learning style leads them to learn better. The report suggests exploring personality type as an alternative approach since there is currently little in the literature on this aspect of student learning.

Teachers who are aware of the diversity of personality types, learning styles and cultures can develop diverse approaches that better meet the needs of a wider range of students. This report is a useful contribution to continued discussion on how students learn best in a variety of learning situations.

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Part 1

Learning Styles and Personality

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Chapter 1

Introduction

This research report has been assembled to document some of the thinking that led to an investigation into one of the factors that might influence the ways in which students learn best. The investigation was undertaken during a landscape design studio at Lincoln University in Semester 2, 2014.

Teaching in a landscape architecture design studio is intensive, involving a great deal of one-to-one interaction between student and tutor, as well as between tutor and small groups or review sessions with a whole class. Under these conditions, students and tutors begin to catch a glimpse of each other's temperament or personality; slowly, patterns of an individual's particular character or preferences can become evident. Indeed, class cohorts, as well as individual students, are often described by tutors as having a discernible character, or 'flavour'. This character has the potential to inform the ways in which studio projects might be delivered, or how tutors might vary the types of instruction they may choose to use. For example, a class with several dominant or more extroverted characters may need to be structured to allow their quieter and more introverted classmates to also actively engage with visiting critics, providing an opportunity for all students to express their perspective on the studio topic or question and allowing multiple views to be explored with equal probability and given equal weight.

Another example of individual student difference becomes apparent when some students express a preference for a relatively 'open' brief in design studio, while others prefer to know exactly what they need to do at each stage to successfully complete a project. There are cultural differences too, of course, where students from an educational system which encourages questioning, exploration and challenge in the classroom will have different preparation for design studio when compared with students from a system which encourages rote learning and where a teacher's opinion/judgement is rarely questioned.

Individual differences in personality and preparation for design studio means that each student could potentially express a preference about how they would like to learn or how they think they learn best. Reflection on how to provide a range of learning opportunities to appeal to different individual preferences led to the question at the centre of this literature review: "How might we identify the class character or individual personalities so that we can maximise the learning opportunities for the greatest number of students in each design studio class?"

There is a great deal of literature on student learning, much of it based around the notion of 'learning styles' (Ashraf, Fendler, & Shrikhande, 2013; Fowler & Thomas, 2015; Kim, Gilbert, & Ristig, 2015; Kozhevnikov, 2007). Research on 'learning styles' continues to be published across a wide range of discipline areas, including journals which focus on education, teacher training and commerce. However, work by Pashler, McDaniel, Rohrer, and Bjork (2008), Pashler and Rohrer (2012), and more recently by Willingham, Hughes, and Dobolyi (2015) and Cuevas (2015) has highlighted that little if any of this published research provides any evidence to support the effectiveness of adopting a pedagogical approach based on learning styles: "The contrast between the enormous popularity of the learning-styles approach within education and the lack of credible evidence for its utility is, in our opinion, striking and disturbing" (Pashler et al., 2008, p. 117).

It is clear that different people express different preferences for their learning, but if 'learning styles' are unhelpful, then how might we investigate these preferences so that we can aim to provide appropriate models of teaching in design studio that will best support the range of students in each

class? An initial investigation revealed that exploring 'personality type' rather than 'learning styles' may be helpful in this regard, although it is still useful to review the case for learning styles.

Chapter 2

Research Approach

A literature search of peer-reviewed articles was undertaken during a four-week summer scholarship in the School of Landscape Architecture, Lincoln University, during February and March 2015 to inform an investigation about the potential influences of personality on the ways in which students learn. The focus of the research was to review current literature around student learning, in particular looking at design education, learning styles, and creativity and design thinking in studio. Research on personality types and traits was also reviewed, as potential indicators of preference in student learning approaches.

The purpose of the review was therefore to determine whether or not a valid and reliable system for determining 'personality' was available, and to then establish if there were any established links between project design, student performance and a particular personality. Books and articles on theories about human personality, and assessment instruments to establish what those personalities might be, abound. However, an early decision was made during this research project to focus on the Myers-Briggs Type Indicator (MBTI) and the Neuroticism-Extraversion-Openness Personality Inventory Revised (NEO-PI-R) because they were found to be the two most widely used, researched and critiqued instruments reported in the literature, in regard to student learning and learning preferences.

Findings were summarised in a series of tables adapted from an approach suggested by Hart (1999), with general conclusions and connections assembled as mind maps for each section. Additionally, 'relevant publications' lists work that may be relevant, but time constraints during the research period precluded their full review, and 'other resources' lists work which may not be peer-reviewed but may be of interest to those seeking to build upon this current study.

Chapter 3

Learning styles

The field appears to be strongly divided in terms of the correlation between learning style-influenced instruction and enhanced levels of learning, otherwise known as "...the meshing hypothesis, according to which instruction is best provided in a format that matches the preferences of the learner" (Pashler et al., 2008, p. 105). As well as supporters of this theory, some researchers are critical of existing research and argue against this correlation, discussed further below. Peterson, Rayner, and Armstrong (2009) offer a summary of this ongoing dissonance in their questionnaire to 94 global researchers in the field. Pashler et al. (2008) argue that currently there is not enough substantiated evidence for arguments to prove the meshing hypothesis, suggesting a specific experimental format for research results to be considered valid. Other researchers who deny the existence of this correlation include Rogowsky, Calhoun, and Tallal (2015) and Scott (2010). Criticism with regard to specific instruments include Platsidou and Metallidou's (2009) study on Kolb's Learning Style Inventory and Furnham's (2009) study on a self-report measure of Multiple Intelligences.

Regardless of this ongoing critique of the meshing hypothesis, research in support of the hypothesis continues. This includes Holley and Jenkins' study on learning styles and differing exam formats (1993); Mokhtar, Majid, and Foo's (2008) study on Multiple Intelligences in Singapore schools; Arthurs' (2007) article about balancing learning styles in the classroom; and Lee's (2015) article on learning styles and EFL materials preference. Some researchers have looked into measures for implementing learning styles' instruction, including De Boer, Donker, and Van der Werf (2014), and Arthurs (2007). Earlier research in regard to landscape architecture education includes a study to determine students' MBTI type (Brown, Hallett, & Stoltz, 1994). Kyan and Yunyan (2005) and Demirbas and Demirkan (2003, 2007) both found statistically significant correlations for the meshing hypothesis in a design setting. Nussbaumer and Guerin (2000) studied the correlation between learning styles and visualisation skills in interior design students. Aside from Kolb's Experiential Learning Theory, most articles appear to have different views on the most popular or well-researched learning styles instruments. Hsu (1999) questions whether learning styles are due to nature or nurture in education.

The influence of culture on learning and learning approaches is commonly reported in the literature, but to a lesser extent than the meshing hypothesis. Perhaps the most comprehensive review was undertaken by Joy and Kolb (2009), in their study of participants of the Kolb Learning Style database. Other studies include those by Charlesworth (2008), who found cultural differences between international students, and Ngwainmbi (2004), who explored stereotypes around Chinese students and learning styles.

While the existence of individual learning preferences appears to be generally accepted, the validity of the meshing hypothesis continues to be contested. While some studies support the correlation (including those within a design environment), others are more critical. Many of these critical studies highlight the ongoing commercial use of learning style instruments as well as research, in apparent disregard of other studies which question the validity of instruments used. As previously noted, while the idea of learning styles may not be a valid approach to use for this investigation, the notion of personality type shows some promise.

Chapter 4

MBTI and NEO-PI-R

The MBTI inventory was developed by Katharine Cook Briggs and Isabel Briggs Myers in 1943 to "make the theory of psychological types described by C. G. Jung (1921/1971) understandable and useful in people's lives" (Myers, McCaulley, Quenk, & Hammer, 2009, p. 3). The inventory uses a questionnaire format to establish participant responses to a series of word or phrase choices in regard to the ways in which people focus their attention and engage with the world, take in information, and process that information to make decisions. The results establish a basic four-letter code to describe each of 16 potential type groupings. The MBTI has undergone continued development and refinement, with Step II introduced in the 1980s. Step II added a further five facets to each of the established 16 types to uncover a finer level of detail about how each type can vary in the ways in which individual personality is expressed.

The NEO-PI-R uses a questionnaire to establish a personality profile for participants based on the Five-Factor Model (FFM) which basically considers five major domains of personality. This instrument further divides each domain into six traits, giving 30 criteria for evaluation. The instrument was developed by Costa and McCrae in 1985 as an outcome of their research which began in the 1970s, on observed personality changes with age during geriatric care. Further work by Costa and McCrae in 1992 affirms their belief in the usefulness of the FFM, and the value of the NEO-PI-R in clinical psychology practice.

4.1 Personality Trait or Type

There is a fundamental difference between the MBTI and the NEO-PI-R instruments, in that the former measures aspects according to type theory while the latter measures aspects according to trait theory. Type-based instruments measure preferences expressed by people for one or other pole of a dichotomous pair, while trait-based instruments are used to establish the level of a particular characteristic possessed by people. Quenk (1993) clarifies the differences between trait psychology and type psychology, noting in particular that trait [such as height or weight] is based "on the assumption of a normal distribution and continuous scores" (p. 9) whereas type is "not normative; there is no 'normal' or 'best' score to obtain or type to be" (p. 11).

Thus, there is an important distinction between these two approaches to personality assessment, one that is frequently misunderstood by researchers, particularly when critiquing either approach; for example Ashraf, Fendler, and Shrikhande (2013) incorrectly refer to "MBTI traits" (p. 50) when describing their work on the MBTI and learning styles. While trait approaches appear to be preferred by personality theorists (Quenk, 1993), the inherent value ascribed to particular traits such as IQ for example may introduce a bias in the perception of what the findings mean; it would "...be better to be more rather than less intelligent!" (Quenk, 1993, p. 10). Raggatt and Weatherly (2015) express a concern that trait theory can also mask dynamic processes and thus trait instruments do not necessarily provide an accurate picture of human complexity. This would seem to question the usefulness of the FFM when assessing the implications of personality on student learning, since the point of this current study is not to 'rank' students as being better or worse, but to understand how to maximise the benefits to students of incorporating different approaches to student learning in design studio instruction.

4.2 Validity and reliability

Both the MBTI and the NEO-PI-R have been subject to critique, in regard to their validity and reliability. The first significant articles to review the MBTI instrument are Carlyn (1977) and Carlson (1985), where the MBTI is given general support. Other articles in general support of the MBTI are Tzeng, Outcalt, Boyer, Ware and Landis (1984) and Capraro and Capraro (2002). While overall there is support for the validity of the instrument, there are also ongoing critiques, especially in McCrae and Costa's (1989) article, which was highly critical of the MBTI instrument and instead in favour of instruments based on the Five-Factor Model (FFM). McCrae and Costa themselves developed the NEO-PI, and the NEO-PI-R (Revised) in 1990, which is now considered the predominant instrument in testing the FFM. The main criticism of the MBTI and other 'type' instruments is the forced bipolar scale which values are converted to, argued to result in a loss of information and homogenisation of the diversity of personalities (Boyle, 1995; Costa, Herbst, McCrae, Samuels, & Ozer, 2002; Girelli & Stake, 1993; Lloyd, 2012; Pittenger, 2004).

The fundamental basis for the NEO-PI-R instrument, which measures traits expressed by the FFM, has been subject to critique in particular by Block (1995, 2010) and Juni (1995), and more recently Gurven, von Rueden, Massenkoff, Kaplan, and Lero (2013). It has also been noted that the NEO-PI-R is data-driven, not theory-driven (Block, 1995). Dated critique of the MBTI by McCrae and Costa (1989), authors of the NEO-PI-R instrument, may have been superseded by Lloyd (2012), while Capraro and Capraro (2002) support MBTI reliability.

Regardless of these critiques, the MBTI appears to have gained widespread support, especially in terms of its ability to be used and understood by laypeople. This is explored in Lloyd (2012), who writes about the dichotomy between professional 'disdain' of the instrument since the dismissal by McCrae and Costa (1989), yet widespread use. Evidence for 'disdain' was not uncovered elsewhere in the literature summarised in this report. While advantages and disadvantages of both instruments are commented upon by Lloyd, his conclusion is that the preference given to the MBTI may be due to the inherent negative correlation with some personality qualities in the Five-Factor Model, using the example of its preference for extraversion over introversion.

Overlap found between these two instruments has also been considered, with Furnham, Moutafi, and Crump (2003) arguing that the overlap is so significant that separate research on each instrument should be brought together, with Lloyd (2012) going further and suggesting that the overlap may allude to the validity of both instruments. Interestingly, there appears to be little research exploring the implications of personality type for educational instruction method; research considering correlation between education and learning styles is far more common even though the basic concept of learning styles has been disputed by Pashler et al. (2008), Willingham et al. (2015), and Cuevas (2015). There appears to be a large body of work around the relationship between culture and personality, especially in terms of causation (McCrae, 2004). Similarly, the inter-cultural validity of both the NEO-PI-R and MBTI have been well researched with general findings of support (McCrae, 2004).

On balance therefore, the MBTI appears to be the most suitable instrument to use in investigations of learning preferences in the design studio.

Chapter 5

Summary of Part One

5.1 Outline of the key findings

Chapter 1 introduces the rationale for conducting this literature review. The design studio is a particular type of learning environment; it has a strong focus on one-to-one critique and individual feedback from tutors. This very personal instruction and learning mode is a useful forum in which to establish whether or not tailoring approaches to teaching delivery based upon an assessment of student type will improve learning outcomes.

Chapter 2 outlines the research approach taken of summarising the findings from a literature review on design education, learning styles, and creativity and design thinking in studio. Research on personality types and traits was included in this literature review.

Chapter 3 discusses in more detail arguments for and against the notion of 'learning styles', noting that the evidence is slim at best for any positive benefits to student learning by tailoring instruction to individual 'learning styles'. However, people do express different preferences for learning instruction; the idea of personality type may be a more fruitful avenue to pursue in regard to establishing whether or not there are benefits to students from structuring learning opportunities in particular ways.

Chapter 4 notes that there appears to be little research exploring the implications of personality type for educational instruction method, although the correlation between education and learning styles is explored more commonly. The Chapter reviews the two key personality assessment instruments identified by the literature review: the Myers-Briggs Type Indicator (MBTI) and the Neuroticism-Extraversion-Openness Personality Inventory Revised (NEO-PI-R). The Chapter concludes that the MBTI is the best option for establishing personality type and building interaction ideas around class or individual profiles. This is partly because there are no 'better' or 'worse' types in the MBTI, unlike the NEO-PI-R which as a trait-based instrument has at its core an in-built judgement about the relative value of some attributes. The NEO-PI-R is based on the premise that some characteristics are 'better' than others. Chapter 4 further notes that the foundations of the Five-Factor Model, the basis for the NEO-PI-R, is questioned by some authors.

The findings from the literature review could not establish that responding to personality type is an appropriate approach to learning in the design studio, but given the creative nature of design it is an area of enquiry worth pursuing, given that little work has been published in this area.

Chapter 5, this summary, further notes the value in representing key ideas from the literature review as a series of diagrams, or 'mind-maps' (e.g. see Fig. 1). Part One of the report concludes with a reference list.

The following Chapters (Chapters 6 - 9) comprise Part Two of this report and present the findings from the literature review as a series of tables, including a detailed commentary about each article. Some of these articles have been used to support discussion points in the first four chapters of this report; other references in Part One which specifically contribute to the argument about trait, type and student learning have not been reviewed in detail and thus are not included in the tables.

The report concludes with a consolidated reference list of all works considered in Part Two in the review tables. It also lists other material which may be helpful or relevant but that was not available during the research period, as well as other resources which may be useful to this area of study.

5.2 The 'mind map'

Each of the following sections of the detailed literature review is preceded by a 'mind map', a diagrammatic representation of the relationships between aspects of each topic under review. This summary diagram provides a brief overview of the various aspects considered in each chapter.

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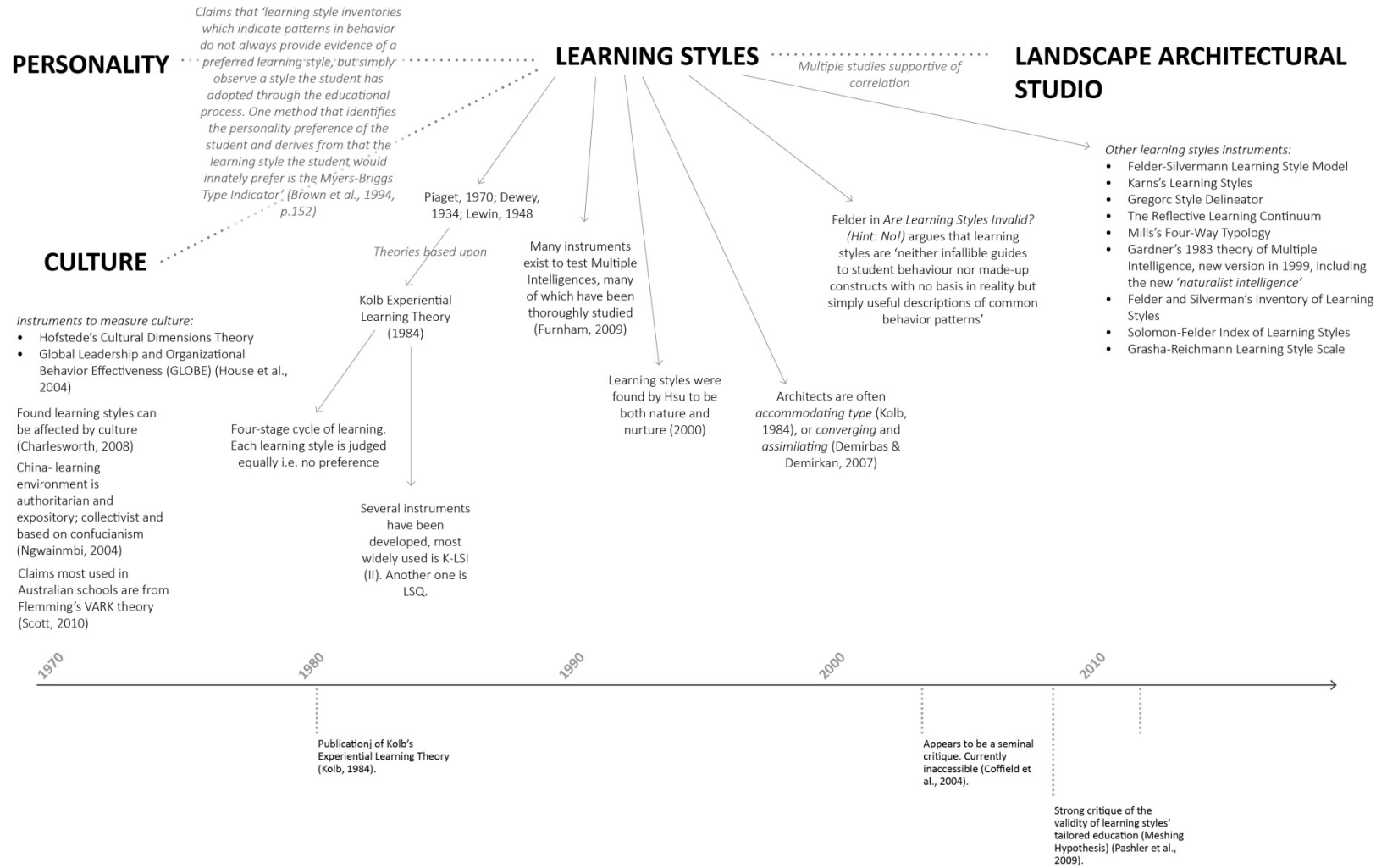
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Part 2

Literature Review Findings

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Chapter 6 Learning Styles

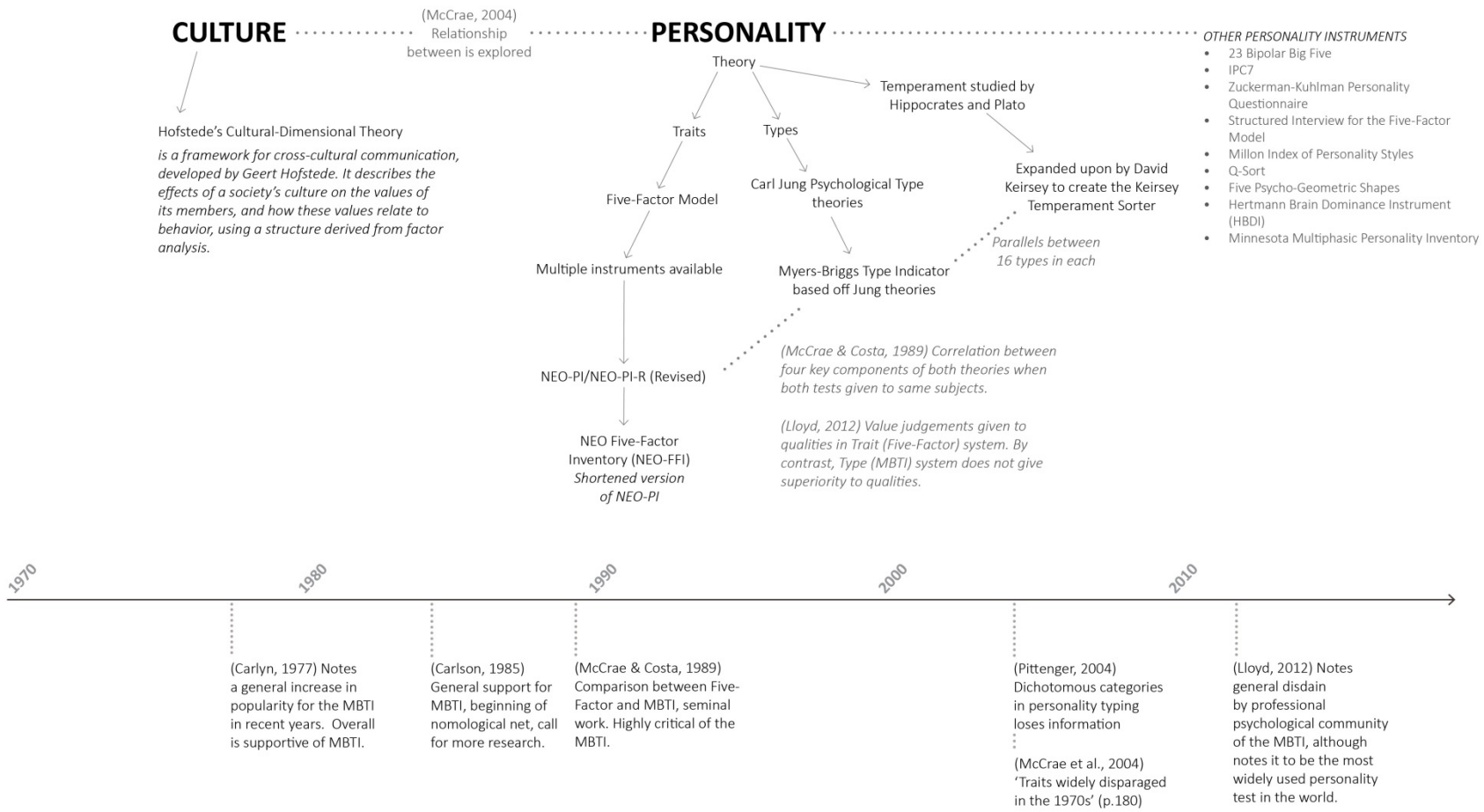


#	Reference	Argument	Evidence	Core Citations	Relevance
1	De Boer, H. Donker, A. S., & Van der Werf, M. P. C. (2014). Effects of the attributes of educational interventions on students' academic performance: A meta-analysis. <i>Review of Educational Research</i> , 1-37.	Examines the influence of attributes related to the implementation of learning strategy instruction interventions on student academic performance, as well as how the effect of the method of testing the intervention effects affected actual effects measured. Most existing studies focused on effect of instruction on performance, however in this analysis, they also address the ways in which the instruction is offered as well as the study method.	It was found that interventions implemented by researchers or assistants were more effective than by teachers or computers, and session duration was also found to have a small relationship with effectiveness, with longer interventions having a slightly lower effect than shorter ones. Intensity (ie. number of sessions per week) had no correlation with performance. Cooperative learning was found to have a negative effect on performance. Standardized tests of effect of learning strategies yielded a lower effect than unstandardized tests.	Donker et. al, 2014	Possibly relevant to experiment if learning strategies are used, to find where unexpected bias may occur within experiment method.
2	Demirbas, O. O., & Demirkan, H. (2003). Focus on architectural design process through learning styles. <i>Design Studies</i> , 24(5), 437-456.	Also uses Kolb's theory to research correlation between learning style, performance, and success of students in the design process. Claims there are few studies on learning styles of designers. Hypothesize that different stages of design studio learning require different learning styles, and as such performance scores of students with different learning styles according to stage of design process. Claims design combines all stages of experiential learning cycle, and different stages of process better suited to different learning styles, hence design instructions in a way which responds to different learning needs.	Statistically significant differences between performance scores of students with diverse learning styles at different stages of process. <i>Assimilating</i> learners found to have highest, where <i>Accommodating</i> learners the lowest. First-year students were chosen so that profession had not affected learning styles. Two out of four stages of the design process found correlation between learning style and performance.	Kolb, 1999	May provide another good model for experiment, whereby stronger time constraints are given compared to experiment by Kyan & Yunyan (2005). Two instructors were used to eliminate bias, creating mean of both scores together. Differences in scores given were tested, with no statistically significant difference found.
3	Demirbas, O. O., & Demirkan, H. (2007). Learning styles of design students and the relationship of academic performance and gender in design education. <i>Learning and Instruction</i> , 17(3), 345-359.	Study explores effects of learning styles and gender on performance scores of freshman design students in three successive years. Claims instructors should provide strategy relevant to each learner in design studio. Hypothesized that all different learning styles may be effective in different stages of design process, due to studio being combination of all other	Use of Kolb's Experiential Learning Theory also, regardless of admitted criticisms. Freshman students used again due to research on movement from reflective to active orientation during higher education (Kolb & Kolb, 2005). Design students found to be more <i>Assimilating</i> and <i>Converging</i> . No relationship found between learning	Kolb, 1984	Method may be relevant. Also calls for design educators to conduct review on curriculum to ensure all students are catered for. 'The design studio projects should provide the opportunity to employ different learning styles in design process... to provide various learning experiences that emphasize different learning styles during design

Teaching Approaches and Student Learning: Personality type and design studio

#	Reference	Argument	Evidence	Core Citations	Relevance
		courses. Suggests different learning styles could be brought together into teams.	style and gender, however some correlations found between performance and gender.		process' (p. 357). Call for similar experiments at different institutions, with larger sample size; should start from first year and go through to end of degree, and also, there may be cultural differences affecting results.
4	Hale, J. E. (2014). Thirty-year retrospective on the learning styles of African American children. <i>Education and Urban Society</i> , 1-16.	Literature review on cognitive, learning, behavioural and cultural styles of African American children. Critique of middle class.	Reference to other literature.	Hale, 1982; Hilliard, 1989,1999	Interesting writing style, however there doesn't appear to be strong relevance. The article is more of a call to stronger and more valid science around African-American education to influence pedagogy.
5	Kyan, T., & Yunyan, J. (2005). Students' learning styles and their correlation with performance in architectural design studio. <i>Design Studies</i> , 26(1), 19-34.	Experiment with learning styles (based on Kolb Experiential Learning Theory) and performance within an architectural studio, finding some correlations such as <i>Converger</i> and <i>Assimilator</i> learning styles achieving higher scores in separate studios. Suggests that studio program as well as required presentation types can disadvantage some learning types.	Use of study comparing learning styles with academic performance. Statistically significant correlations between learning styles and grades in both studio projects given. However sample size is small. A comparison is also given with a similar study undertaken by Demirbas & Demirkan, 2003.	Demirbas & Demirkan, 2003; Kolb, 1984; Hofstede, 2001	Good example of design briefs. Possibly relevant: argument from Hofstede (2001) that learning styles develop from culture and as such, western design theory and training may be unsuitable in China. Chinese students have lower individual and higher long-term orientation. Call for more research at end of conclusions.
6	Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. (2009). Learning Styles: Concepts and Evidence. <i>Psychological Science in the Public Interest</i> , 9(3), 105-119.	This study focuses on the validity of the argument that education should cater and be tailored to different learning styles, and whether this is supported by scientific evidence. Rather than creating a meta-analysis of existing evidence, they instead created a minimal criterion, and then searched for evidence which satisfied this criterion (p. 106).	The study concluded that any credible validation of learning-styles-based instruction requires 'robust documentation of a very particular type of experimental finding with several necessary criteria' which are outlined in the summary (p. 105). The authors conclude there is no adequate evidence base to justify incorporating learning styles into general educational practice, i.e. in support of the 'meshing hypothesis' (p. 105).	-	The 'necessary criteria' for a valid experiment (p. 105), outlined by the authors, may be useful in structuring comparative studies.

Chapter 7 Personality Types



Myers-Briggs Type Indicator					
#	Reference	Argument	Evidence	Core Citations	Relevance
1	Boyle, G. J. (1995). Myers-Briggs Type Indicator (MBTI): Some psychometric limitations. <i>Australian Psychologist</i> , 30, 71-74.	A critical review of the psychometric adequacy of the MBTI. The article argues for an urgent need for development of valid and comprehensive local norms, in order to increase its validity and utility in the Australian context. Additionally, the author raises concerns about psychometric limitations of the instrument, advising caution for users (p. 1). These concerns include: a lack of norms based on continuous scores: the claim that supporting evidence in the manual is claimed to be of questionable validity; that dichotomous preference scores unduly restricts level of accuracy; and, issues of test-retest and overall stability (p. 5).	The article is made up of a discussion regarding Boyle's critiques of the MBTI. The author claims that previous factor analyses which support the MBTI are unsatisfactory in procedure (Sipps, Alexander, & Friedt, 1985; Thompson & Borrello, 1986a, 1986b; Tzeng, Outcalt, Boyer, Ware, & Landis, 1984), and that more satisfactory research in this area needs to be undertaken (p. 4).	-	A relatively brief review. The author's argument regarding the specific Australian context is not expanded past a general statement. The article provides a succinct list of concerns around the instrument; however the discrediting of generally accepted supporting evidence requires more justification.
2	Capraro, R. M., & Capraro, M. M. (2002). Myers-Briggs Type Indicator score reliability across studies: A meta-analytic reliability generalization study. <i>Educational and Psychological Measurement</i> , 62(4), 590-602.	A descriptive reliability generalization (RG) analysis testing measurement error in the MBTI, based on differing administration of the test. Studies relating to the Version M, thus studies between 1998-2001 were included (p. 592-593). Reliability is defined (cited) as 'an artefact of both the sample selected and the items contained on the instrument' (p. 591).	Overall, the MBTI is found to yield acceptable score reliabilities across studies (p. 596). It is also suggested that a more heterogeneous sample often yields higher reliability coefficients (p. 596). Average score reliability was found on the <i>Thinking-Feeling</i> dimension, which is below an acceptable reliability (p. 596). 'The most relevant reliability estimate for a study is the reliability coefficient computed on the data in hand' (p. 599).	-	Thorough introduction to reliability and its importance in research (p. 590-592). The authors urge researchers to include reliability data in their studies, with research otherwise falling to 'sloppy practice' (p. 597-599). The study overall supports the reliability of the MBTI, with few anomalies found (p. 599).
3	Carlson, J.G. (1985). Recent assessments of the Myers-Briggs Type Indicator. <i>Journal of Personality Assessment</i> , 29(4), 356-365.	A literature review on the reliability data within published studies from 1975-1985 that examined reliability and validity of the MBTI in clinical, counselling, and research settings (p. 356). The article includes clear summaries of the reliability data of reviewed articles (p. 357-359). However it is noted the widest use of the	Reliability found to be generally stable; however authors outline a need for reliability assessment with a greater diversity of test conditions and populations (p. 363-364). Validity found to be in greater question than reliability. Studies on validity at this point considered just the 'beginnings' of establishing a nomological net, with few	Carlyn, 1977	Article begins with a very clear description of type indicators in MBTI in relation to Jung's system (p. 356). It is clear that while the MBTI is generally supported by findings, at this point in time research findings were not strong enough to entirely point in one direction as to reliability and validity of test. Validity in terms of the

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		MBTI is likely in education (p. 357). The article also includes a review on the relationship between the MBTI and other assessment devices and to behaviours in treatment and research settings (p. 359-363).	focusing outside of <i>Extraversion/Introversion</i> scale. Authors are unable to make large conclusions due to need for more research.		scales which are not <i>Extraversion-Introversion</i> , were commented to remain in greater question than reliability (p. 364). While an important point in MBTI's evolution, the age of this article gives it less relevant status than those more recently written.
4	Carlyn, M. (1977). An assessment of the Myers-Briggs Type Indicator. <i>Journal of Personality Assessment</i> , 41(5), 461-473.	Comprehensive assessment of the MBTI, including a review of intercorrelation, reliability, and validity studies (p. 461). Carlyn notes an increase in popularity over recent years prior to article (p. 461).	The review found that MBTI is an adequately reliable self-report inventory (p. 461). The instrument's content validity, i.e. its relationship with Jung's original theory, is generally consistent (p. 467-468). The review finds moderate predictive validity in certain areas, with additional studies needed (p. 468-469). Studies around construct validity suggests reasonable validity (p. 469-471).	-	The review gives generally positive support for the MBTI across the three types of studies. While another keystone article in the evolution of MBTI research, the age of this article gives it less relevant status with those articles reviewed being quite outdated.
5	Girelli, S. A., & Stake. J. E. (1993). Bipolarity in Jungian Type Theory and the Myers-Briggs Type Indicator. <i>Journal of Personality Assessment</i> , 60(2), 290-301.	The MBTI was formed to measure bipolar dimensions in 'forced-choice format' (p. 291), which was implemented due to Jung's argument that the dimensional opposites cannot be used simultaneously (p. 291). However this assumption of bipolarity has been challenged in multiple studies, which also challenges Jung's original theories (p. 292).	The sample is tested with a Likert form of the MBTI, as well as the original MBTI, and answers compared (the first study which uses such a comparison) (p. 293). Evidence for bipolarity of the <i>Extraversion/Introversion</i> dimension was weak, and the findings did not suggest the bipolarity of the <i>Sensing/Intuition</i> or <i>Thinking/feeling</i> dimensions. This supports the argument that high negative correlations within MBTI dimensions are an artefact of its forced-choice format (p. 296). Results indicated that contrary to Jung's claim, scoring high on one attitude did not significantly reduce the probability of scoring high on its counterpart (p. 295).	Loomis & Singer, 1980; Cowan, 1989	Another criticism of the MBTI, which adds to arguments around the forced-polarity of the instrument's structure and the issues that this may cause.
6	Lloyd, J. B. (2012). The Myers-Briggs Type Indicator and mainstream psychology: Analysis and evaluation of an unresolved hostility. <i>Journal of Beliefs & Values: Studies in</i>	Article intends to explore usage and trust in MBTI 20 years after seminal work by McCrae & Costa who criticized the system (1989) and long-term 'disdain' of the MBTI by the professional psychological community (p. 24). The Five-Factor Model	A new convergence between trait and type theories is described and hence an evolution in personality type theory (p. 28). Similarities are found between qualities described by the two models, hence the possible 'identification of fundamental truth	McCrae & Costa, 1989	Relatively recent article. Useful explanation of differences between Five-Factor Model and MBTI, as well as recent critique of the MBTI. As suggested in the article, The Five-Factor Model's surprising moral judgement of personality

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	<i>Religion & Education</i> , 33(1), 23-34.	is noted as being then and still the dominant model of personality in academic psychology (p. 24-25). Evaluates similarities and differences between Five-Factor Model and MBTI (p. 25-27), with a major difference being value-judgements given to qualities in the Five-Factor Model (p. 27).	about human personality' and possibly alluding to the validity of both models (p. 28). Explains the continuing popularity of the MBTI over Five-Factor Model due to negative labelling within the Five-Factor Model (p. 33). Calls for further empirical testing of MBTI theory and re-think of system in which polar opposites of qualities are used (continuum vs. polarities) (p. 33).		characteristics surely questions its validity as a useful instrument, for example in its preference of extraversion over introversion (whereas the MBTI does not judge specific characteristics as preferential). The critique of both models is useful.
7	McCrae, R. R., & Costa, P. T. (1989). Reinterpreting the Myers-Briggs Type Indicator from the perspective of the Five-Factor Model of Personality. <i>Journal of Personality Studies</i> , 57(1), 17-40.	The MBTI is evaluated from the perspective of Jung's psychological types and offer an alternative conceptualization of the MBTI scales in terms of the Five-Factor Model of personality (p. 18). The relation between the MBTI and Jung's theory is questioned (p. 19-20). Three key dilemma are explained using relevant research of the period (p. 20-22). Their study aims to question the MBTI and the utility of the <i>Judging/Perceiving</i> scale, as well as relations between the MBTI continuous scale and the five factors of personality/NEO-PI (p. 24).	Experiment with a sample of 468 people, leading to a mixed evaluation and no support for the MBTI, including no evidence that preferences formed true dichotomies (p. 32). Internal consistency and retest reliability is adequate (p. 25). The evidence suggests that Jung's theory is either incorrect or the MBTI does not operationalize it correctly, with the authors advising it should be 'avoided' and the Five-Factor Model to be used in its place (p. 32).	Myers & McCaulley, 1985; Stricker & Ross, 1964a; Hicks, 1985	It was suggested by Lloyd (2012, p. 24) that this publication may explain apparent dismissal of MBTI from serious consideration by professional psychological community over past two decades. The authors provide an interesting discussion of the MBTI with relation to Jung's theories. The article offers a strong critique of the instrument, and while a useful keystone publication about the MBTI and its comparison to the Five-Factor Model/NEO-PI, it may be deemed less relevant than more recent publications.
8	Sears, S. J., Kennedy, J., & Kaye, G. L. (1997). Myers-Briggs personality profiles of prospective educators. <i>The Journal of Educational Research</i> , 90(4), 195-202.	Empirical research. Personality profiles of students aiming to become teachers. Found S-F-J most common. E- I not found to have correlation. Differences are found between different types of teachers.	Empirical study. 4,483 participants of students intending to become teachers. 886 students who had completed certification.	Lawrence, 1979; Hinton & McCutcheon, Schmidt, & Bolden, 1991.	May be useful in understanding personality types of most teachers, and their fit with students in a studio environment.
9	Tzeng, O. C. S., Outcalt, D., Boyer, S. L, Ware, R., & Landis, D. (1984). Item validity of the Myers-Briggs Type Indicator. <i>Journal of Personality Assessment</i> , 48(3), 255-256.	The authors note a lack of psychometric evidence for the MBTI, and a requirement for further research in this area (p. 255). A brief summary of four extensive psychometric analyses of the MBTI items, including 'a) the reliability and internal consistency of the MBTI items, and b) the congruent relationship between the empirical factor structures of the items	A sample of 444 college students and clerical employees. Positive empirical evidence supports the MBTI item validity, including reliability (p. 255). Consistency between psychometric dimensions and theoretical constructs are found to be consistent, thus providing new validity at the item level, with previous research focusing on validity at the scale level (p. 255-256).	-	While somewhat dated, this study provides overall positive support for item validity within the MBTI, concluding that 'the major implication of this finding is that the MBTI can be used with confidence to distinguish separate personality types in terms of the four dichotomous dimensions' (p. 256).

#	Reference	Argument	Evidence	Core Citations	Relevance
		and the theoretical formulations of the MBTI scales' (p. 255).			
10	Zamir, S., Shahzad, S., Hukamdad, Badshah, S. N, & Mohammad, N. D. (2012). Gender based analysis of Myers-Briggs personality profiles and stress coping styles of academic manager's occupational stress. <i>International Journal of Asian Social Science</i> , 2(6), 965-971. (Note: Website of this journal claims it is peer-reviewed however Lincoln library excludes article when peer-reviewed journals only parameter used in search)	Aim of study is to analyse MBTI personality profiles and copying styles of academic managers in higher education institutions.	Significant differences found in the responses between male and female academic managers regarding personality types and coping styles. The sample consisted of 60 females and 60 male heads of degree colleges in Punjab, Pakistan, using the MBTI and Occupation Stress Inventory-Revised, as indicators of stress and personality. ESTJ is most common type found, with differences in personality type between male and females academic managers also found. Differences in coping styles are apparently also found.	-	Very oddly written article, with unclear methodology and use of language. While it outlines some findings, authors fail to interpret figures or given reasoning for them, making the conclusions very unclear ie. they give 'mean' figures for male and female coping styles and claim there is an apparent difference, however the differences and what they mean are not elaborated upon.
Five-Factor Model					
1	Chang, C., Wang, J., Liang, C., & Liang C. (2014). Curvilinear effects of openness and agreeableness on the imaginative capability of student designers. <i>Thinking Skills and Creativity</i> , 14, 68-75.	Personality traits are critical in influencing design performance and working styles, and play a role in stimulating imagination. It is argued that to date, research has been based on linear relationships rather than curvilinear between design personality and design imagination. The relationship between <i>Openness and Agreeableness</i> with imaginative capability is tested in this study, using a sample of 454 multimedia students in Taiwan (p. 68).	Strong linear relationship found between <i>Openness</i> and initiating imagination; and direct linear correlation between <i>Openness</i> and conceiving and transforming imagination. <i>Agreeableness</i> does not affect initiating imagination, but predicts conceiving imagination (p. 71-72).	Durling, 2003	These findings add to studies which consider personality traits in conjunction with performance as a designer, in this case in terms of imagination with regard to the Five Factor's <i>Openness</i> and <i>Agreeableness</i> . The dynamics with which these two traits affect imaginative ability may be useful in predicting the capability of landscape architectural design students.
2	McCrae, R. R., Costa, P. T., Martin, T. A., Oryol, V. E., Rukavishnikov, A. A., Senin, I. G., Hrebickova, M., & Urbanek, T. (2004)	In this study, available literature on cross-observer agreement on traits of the Five-Factor Model are explored, including new data from Russia and the Czech Republic (p. 179). The authors argue that cross-	In general, studies to date show that NEO-PI-R functions much the same in all cultures (although it is noted that standard deviations are found to be consistently smaller in Asian countries than in the West)	-	One paper among many regarding the cross-cultural applicability of personality traits/typologies. McCrae and Costa appear to be a strong voice in this area, especially in support of the NEO-PI-R/Five-

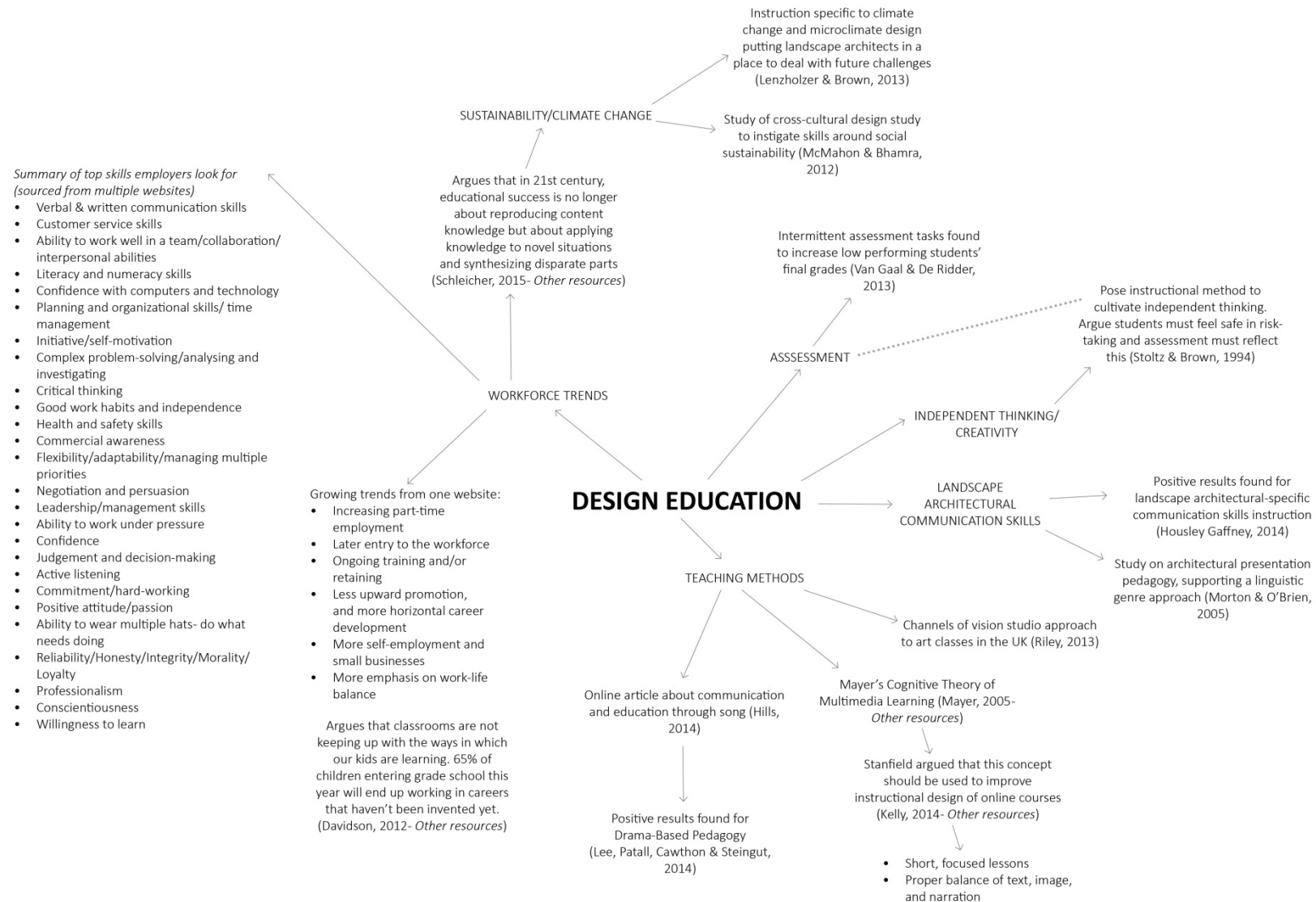
#	Reference	Argument	Evidence	Core Citations	Relevance
	Consensual validation of personality traits across cultures. <i>Journal of Research in Personality</i> , 38(1), 179-201.	observer agreement played a major role in the acceptance of the Five-Factor Model, and a wide range of cross-cultural replicated studies have been undertaken with positive results. Gender differences and maturational trends have also been widely replicated (p. 180).	(p. 180). Russian and Czech versions of the NEO-PI-R show internal consistency and replicated American patterns. Excluding cultural differences around <i>Individualism/Collectivism</i> , the findings show evidence for the existence an operation of personality traits on an inter-cultural level (p. 197). It is noted that traits may not necessarily serve identical functions in all societies, and that the language of personality traits varies somewhat across cultures (p. 198).		Factor Model. The cross-cultural validity of the trait theory may be useful in future research, however certain cultural nuances may need to be further explored so as to allow for this within experimentation.
3	Widiger, T. A., & Trull, T. J. (1997). Assessment of the Five-Factor Model of Personality. <i>Journal of Personality Assessment</i> , 68(2), 228-250.	The authors claim that the Five-Factor Model of Personality (FFM) is obtaining more recognition and that its principal attraction has been its 'empirical foundation' (p. 229). As such an array of instruments are being developed and modified to assess the FFM. Their article presents an overview and critique of five of these instruments, including: The Goldberg Big Five Markers, the revised NEO-PI-R, the Interpersonal Adjective Scales- Big Five, the Personality Psychopathology- Five, and the Hogan Personality Inventory. The article is focused on the translation of the FFM within these as well as practical application (p. 228).	The advantages and disadvantages of the NEO-PI-R are discussed on pp. 233-236. It is claimed by the author to the predominant measure of the FFM, with a substantial amount of reliability and validity research conducted around it (p. 233; Costa & McCrae, 1992c, as cited in Widiger & Tull, 1997). The article ends in specific conclusions regarding comparisons of advantages and disadvantages between the models. The article concludes in a comparison between the different instruments, however does not outline any as being more viable than others (p. 245-247).	-	The article goes into an in-depth discussion of Goldberg's original FFM scales, (p. 231-233). It is interesting to note that the author claims that there still remains disagreement regarding the theoretical underpinnings of the FFM (p. 230). It offers an interesting comparison of the chosen FFM instruments with regard to the original model.
Keirsey Temperament Sorter					
1	Kelly, K. R., & Jugovic, H. (2001). Concurrent validity of the online version of the Keirsey Temperament Sorter II. <i>Journal of Career Assessment</i> , 9(1), 49-59.	The KTS-II measures of psychological type; however there is little information to support its validity (p. 49). This study aims to measure its validity, in relevance for the use of career counsellors. At the time of writing, this was one of the most popular online personality assessments, as a free alternative to the MBTI (p. 50).	203 first-semester college students were measured with both the KTS-II and the MBTI, with moderate to strong positive correlations between results yielded by the two instruments (p. 55). Highest correlations between <i>Thinking/feeling</i> for women and <i>Extraversion/Introversion</i> for men. Lowest correlations were still moderate. These results indicate that the	-	Good further references to support the MBTI (p. 50). This study acts on the assumption that the MBTI is accurate, even given the considerable studies which question its validity. From the tone of the article, it appears the validity KTS-II is still to be thoroughly studied.

#	Reference	Argument	Evidence	Core Citations	Relevance
		Prior to this study, there was no existing validity evidence for the KTS-II (p. 50).	KTS-II has satisfactory concurrent validity (p.55). Also included is a review of other studies comparing MBTI results with other personality type instruments (p. 56). Interpretative information on KTS-II remain to be substantiated by research at time of publication (p. 57).		
Comparisons Between Instruments					
1	Furnham, A. (1996). The big five versus the big four: the relationship between the Myers-Briggs Type Indicator (MBTI) and NEO-PI Five Factor Model of Personality. <i>Personality and Individual Differences</i> , 21(2), 303-307.	Study intends to examine the relationship between the two personality measures, a part replication of two earlier studies (p. 303). A concise and useful summary of support and criticisms for both instruments is discussed (p. 303-304).	The results showed a clear overlap between the two measures (p. 306). NEO-PI <i>Agreeableness</i> score was significantly correlated with the <i>Thinking/Feeling</i> dimension; <i>Conscientiousness</i> with <i>Thinking/Feeling</i> and <i>Judging/Perceiving</i> ; <i>Extraversion</i> strongly correlated with <i>Extraversion/Introversion</i> dimension, while <i>Neuroticism</i> negatively related to <i>Introversion/Extraversion</i> and <i>Thinking/Feeling</i> . <i>Openness</i> correlated with all four dimensions (p. 304).	McCrae & Costa, 1989a; MacDonald, Anderson, Tsagakis & Holland, 1994	The overlap found between the NEO-PI and MBTI may suggest validity of both instruments. The article's early discussion of support and criticisms of both instruments may also be useful (p. 303-304).
2	Furnham, A., Moutafi, J., & Crump, J. (2003). The relationship between the revised Neo-Personality Inventory and the Myers-Briggs Type Indicator. <i>Social Behaviour and Personality</i> , 31(6), 577-584.	A study of the relationship between two of the most widely used measures, the NEO-PI-R and the MBTI, replicating the findings of McCrae and Costa (1989) and McDonald et al. (1994) (p. 577). There is a discussion of criticisms of the MBTI including no reality of bimodal distribution, and lack of support of the typological theory on which the MBTI is based, and a low construct validity (p. 578). Criticisms of the NEO-PI-R are not discussed.	Sample of 900 participants given both tests. Findings are in agreement with those of two replicated studies, with findings supporting hypothesized correlations between dimensions on either test (p. 580). The results illustrate a significant overlap between the NEO-PI-R and MBTI in a large sample. The authors advise that due to this, research conducted on to the two tests separately can be joined to provide a comprehensive image of the construct of personality (p. 583-584).	McCrae & Costa, 1989; McDonald et al., 1994	Useful in supporting the validity of both instruments, given the overlap found. A succinct article with relation to both instruments, with possible relevance in the findings of overlapped personality dimensions.
3	Tucker, I. F., & Gillespie, B. V. (1993). Correlations among three measures of personality type. <i>Perceptual and Motor Skills</i> , 77, 650-650.	Correlational comparisons made between MBTI and Keirsey Temperament Sorter and its online version 'Please Understand Me.'	Study of 103 undergraduate students of psychology. The study findings suggest that the three instruments were measuring the same constructs. Informal observations suggest that 'Please Understand Me' may reflect more accurately true type as	-	Extremely brief article, however interestingly parallels are found between the two instruments. The KTS may provide another possible instrument to be used in future studies.

#	Reference	Argument	Evidence	Core Citations	Relevance
			opposed to self-reported type than either of the other tests.		
General					
1	Emerson, T. L. N., & Taylor, B. A. (2007). Interactions between personality type and the experimental methods. <i>The Journal of Economic Education</i> , 38(1), 18-35.	The study aims to examine the effectiveness of using experiments in the classroom, relating student achievement to personality type (MBTI is used) (p. 18). Experimental methodology in economics is an active involvement of students rather than a passive learning (traditional lecture style approach) of teaching (p. 18).	A sample of 225 microeconomics students. The experimental vs. traditional pedagogical approach appears to benefit or be neutral with respect to most personality types and learning styles (p. 18). The <i>Sensing/Intuitive</i> dimension appeared the most important in giving either a negative or positive reaction to the experimental method, with <i>Intuitive</i> types more likely to react more positively to the method, which was the only pattern to emerge (p. 32). ESTJs and ISTJs appeared to perform better in traditional lecture-oriented sessions (p. 33).	-	The type findings may be relevant to further intended research, and the experiment design may also have some use.
2	Luse, A., McElroy, J. C., Townsend, A. M., & DeMarie, S. (2013). Personality and cognitive style as predictors of preference for working in virtual teams. <i>Computers in Human Behaviour</i> , 29(1), 1825-1832.	A study of the personality and cognitive styles which prefer working in virtual teams. A virtual team is defined as 'a group of people with unique skills who work interdependently but are separated geographically which necessitates their interacting using technology' (p. 1825). The author refers to personality types with the NEO-PI-R, and cognitive styles with the MBTI (p. 1826-1827).	Results support the use of both personality and cognitive styles as predictor variables of virtual team preference (p. 1829). They also found personality explains a higher level of variance, primarily due to the effect of <i>Openness</i> . Also, cognitive style explained a similar amount of variance, with the <i>Extraversion/Intraversion</i> and <i>Judging/Perceiving</i> dimensions resulting in a preference for working in virtual teams over working alone (p. 1829).	-	Little relevance may be gained from this article, except for the parallel of applying personality/cognitive styles to preference for a team format. This may be relevant in guiding class format and not purely assignment brief/instruction.
3	McCrae, R. R. (2004). Human nature and culture: A trait perspective. <i>Journal of Research in Personality</i> , 38(1), 3-14.	McCrae argues that aggregate levels of traits may lead to features of cultures, such as <i>Individualism/Collectivism</i> (p. 3). Claims that the FFM has reached general consensus (McCrae & John, 1992, as cited in McCrae, 2004, p. 4). His 'working hypothesis' states that culture does not affect personality, but that in some circumstances personality may affect culture (p. 4).	The articles discussion around advances (and an argument for the re-emergence in this field) of trait psychology, existing cross-cultural tests of the Five-Factor theory. Interestingly, this includes the argument that traits are not affected by culture, but are a sole product of biology (p. 7). 'Although the causal ordering suggested here is arguable... it does appear that there are meaningful associations between mean	-	This article's premise may be of use in further research around this topic, especially in terms of the argument for the causal relationship between personality and culture. This may be relevant in any further research exploring a parallel of this relationship.

#	Reference	Argument	Evidence	Core Citations	Relevance
			personality traits and dimensions of culture' (p. 10).		
4	Pittenger, D. J. (2004). The limitations of extracting typologies from trait measures of personality. <i>Personality and Individual Differences</i> , 37(4), 779-787.	The purpose of study is to examine the risk of creating a typology using common measures of a personality assessment tool designed to measure personality traits (p. 780). Argues that while there may be advantages of using personality types or typologies (i.e. distinctive groups), there may be conceptual and statistical limitations to dichotomizing continuously/interval scaled personality scales whereby a loss of information and diversity occurs (p. 779).	In this study, Pittenger repeated a previous study relating Big Five personality dimensions with coping strategies (Volrath & Torgerson, 2000). Pittenger hypothesized that great variance would occur by using an unaltered NEO-FFI score (instrument of Big Five) (p. 781). The study's evidence suggests that there is a considerable loss of information due to this, with these findings not limited to Big Five or normal personality dimensions (p. 786).	Volrath & Torgerson, 2000; Cohen, 1983	While not necessarily able to be directly applied to other tests without further research, Pittenger's argument around the loss of complexity of information may be valid with regard to design studio studies. This appears to be further explored by Pittenger (1993; below) with specific regard to the MBTI.

Chapter 8 Design Education



#	Reference	Argument	Evidence	Core Citations	Relevance
1	Donker, A. S., De Boer, H., Kostons, D., Dignath van Ewijk, C. C., & Van der Werf, M. P. C. (2014). Effectiveness of learning strategy on academic performance: A meta-analysis. <i>Educational Research, 11</i> , 1-26.	The metacognitive knowledge component adds to academic performance. By including this component in the intervention, students are not only taught which strategies to use and how to apply them (declarative knowledge) but also when and why to use them (procedural and conditional knowledge) (p. 15).		-	Marginal relevance to design studio.
2	Donnelly, D. F., Linn. M. C., & Ludvigsen, S. (2014). Impacts and characteristics of computer-based science inquiry learning environments for precollege students. <i>Review of Educational Research, 84</i> (4), 572-608.	Literature review on Science Inquiry Learning Environments (ILE's) to characterize current platforms and analyse their impact on science learning gains, to identify opportunities, and to seek evidence that the field is developing a cumulative, generative set of platforms. It is also found that often teachers have difficulty enacting inquiry learning without ILE.	Researchers generally agree that ILE's guide students to develop inquiry skills by a) exploring meaningful and authentic scientific contexts, b) using powerful visualizations which would be difficult in a classroom setting, c) encourage collaboration and d) develop autonomous, metacognitive learning.	Borgmann et. al, 2008; Blanchard et. al, 2010	-
3	Filimowicz, M. A., & Tzankova, V. K. (2014). Creative making, large lectures, and social media: Breaking with tradition in art and design education. <i>Arts and Humanities in Higher Education, 14</i> , 1-17.	Article challenges the notion of small design studio format with research finding a large enrolment lecture format finding comparable results. The objective was to introduce a case-based approach to learning and teaching, and a multitiered feedback model, which can be extended to include Massive Open Online Courses (MOOC'S). This strategy is relevant to large-enrolment creative production-oriented courses. Their argument is that the small-style studio is useful in some settings but not an absolute necessity.	This strategy is based on social media and pedagogy which optimizes acquisition of tacit knowledge through use of practical case problems or 'case-based knowledge,' whereby students develop intimate knowledge in their field of study through exploration of cases, leading to expertise. They manipulate general large-format studio structures to meet their objectives. Compared to previous years there was an increase in grades, and student feedback on the quality of the course was positive.	-	Interesting discussions on studio formats, and the benefits and downfalls of different types. There may be relevance of this method to similar larger format classes where intensive instructor-student interaction is not required.
4	Grossman, P., Cohen, J., Ronfeldt, M., & Brown, L. (2014). The test matters: The relationship between	Teaching efforts in the US are being assessed by use of Value Added Measures (year-to-year student improvement in assessment) and observation measures.	Examines the relationship between one observation protocol, the Protocol for Language Arts Teaching Observation (PLATO), and value-added measures shift	-	Depending on the means of teacher evaluation already in place in NZ/Lincoln University and the relationship between this and the

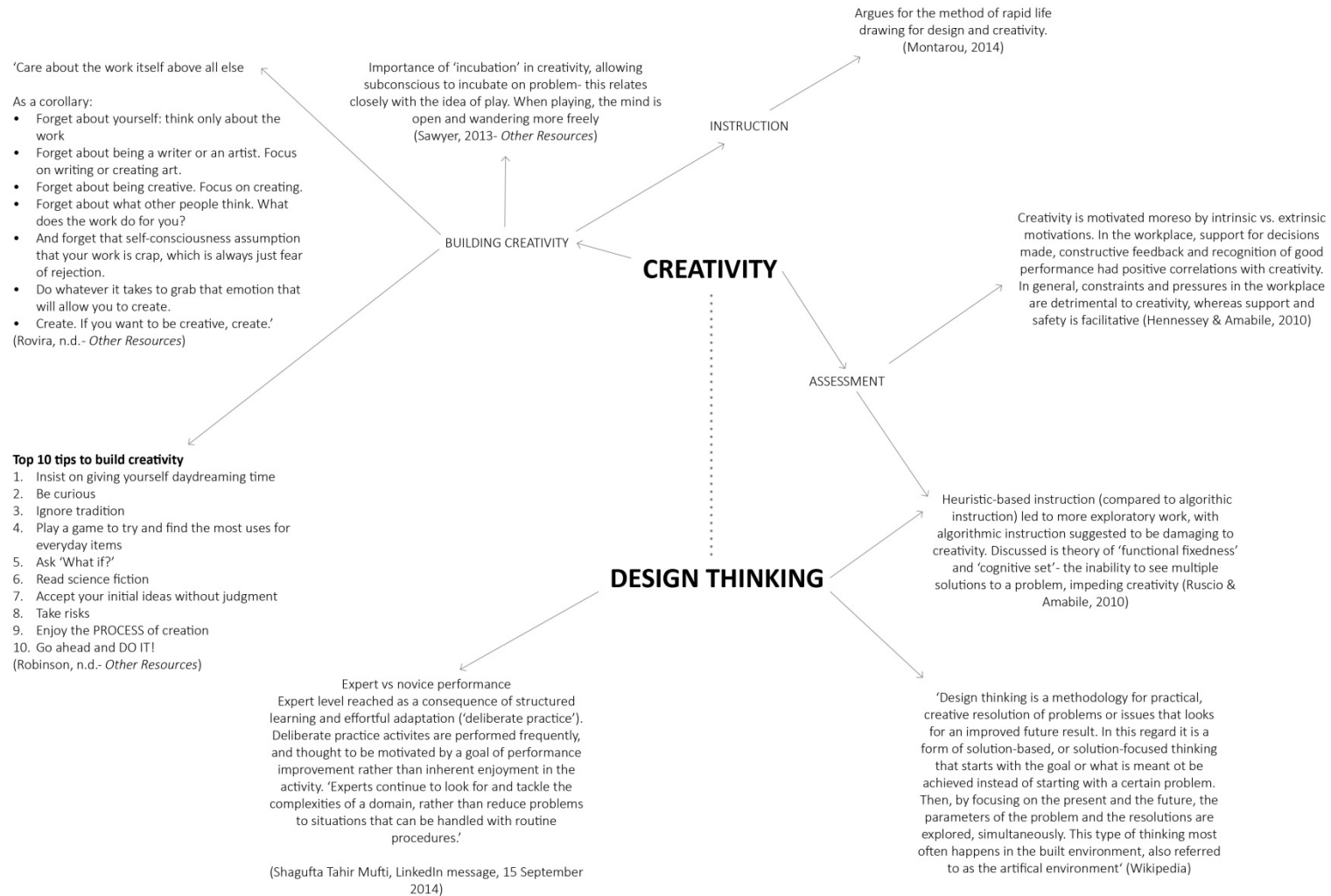
#	Reference	Argument	Evidence	Core Citations	Relevance
	classroom observation scores and teacher value added on multiple types of assessment. <i>Educational Researcher</i> , 43(6), 293-303.	The authors attempt to explore the issue of low correlation between measures of teaching practice and student outcome measures by exploring the nature of student assessment with relation to one observation teaching practice instrument.	with the use of different student achievement tests (VAM's), each constructed differently. Data from 1,300 fourth-through-eighth graders and 839 teachers. It was found that the relationship between PLATO and VAM scores varies based on outcome measure used to construct Value-Added scores.		American system, there may be parallels between the assessment instruments which are discussed in the article and those that are in use at Lincoln University to create a more accurate testing schedule. As found in the article, the facets that each measure is designed to capture will determine the relationship between multiple instruments, and care should be taken when creating such assessment methods, especially due to the diversity of teaching styles which exist.
5	Gunn, W., & Logstrup, L. B. (2014). Participant observation, anthropology methodology and design anthropology research inquiry. <i>Art and Humanities in Higher Education</i> , 13(4), 428-442.	That there needs to be a better understanding of the way in which anthropology is used within the engineering fields (focused on interaction design engineering), and that there is potential for more knowledge to be passed between the two professions, including participant observation. It is questioned whether anthropological methods can be taught to interaction design engineer students, especially for use in collaborative designing.	Two courses are discussed in the article, both explored the way that a brief can be answered through both 'designing and using', and students were taught to combine participant observation, anthropology methodology and design anthropology research inquiry when answering a design problem. Researchers were also involved in the courses. It is also discovered that the design studio is an extension of the field site, with emphasis on doing a study 'with' them, not 'of' or 'about' them.	Ingold, 2000, 2008, 2011	While the arguments within this article are somewhat obtuse, theories of including anthropological methods into design may have merit within a design curriculum, termed as 'design ethnography.' The intention is stated to build towards relations between designing and using, rather than build towards a final product.
6	Kiger Lee, B., Patall, E. A., Cawthon, S. W., & Steingut, R. R. (2014). The effect of drama-based pedagogy on PreK-16 outcomes: A meta-analysis of research from 1985 to 2012. <i>Review of Educational Research</i> , 1-47.	One report in the US on arts and education heavily supported the use of arts integration, within which Drama-Based Pedagogy (DBP) is deemed promising. Article intends to synthesize 25 years of research to ask the impact of DBP on student outcomes, and what factors make up this direction of effect? DBP aligns with social constructivist theory, which has been proven to lead to multiple student improvements.	Literature showed that DBP has a positive, significant impact on achievement outcomes, especially when led by classroom teacher or researcher over teaching artists, included more than five lessons, and integrated into English language arts or science curriculum vs. other areas. It is found to have a positive effect on achievement and a variety of related psychological and social outcomes, and should be considered a viable pedagogical method for teachers to raise outcomes.	-	Great overall introduction to DBP, using case studies with support from an extensive literature review. Also, many varying positive outcomes were found, for example an average student who had undergone DBP would report more positive attitudes than 55% to 59% of non-DBP students towards academics. Stronger effects were also found in interventions that lasted from 12-weeks to a year. These positive findings may provide grounds for

#	Reference	Argument	Evidence	Core Citations	Relevance
					incorporating this type of pedagogy into landscape architectural education.
7	Klassen, R. B. & Tze, V. M. C. (2014). Teachers' self-efficacy, personality, and teaching effectiveness: A meta-analysis. <i>Educational Research Review</i> , 12, 59-76.	Intends to analyse existing research on correlations between two psychological characteristics: self-efficacy and personality, and measures of teaching effectiveness. It is discussed that research shows teaching effectiveness having more influence than other factors in student achievement. However existing research on the characteristics of effective teachers has not led to strong conclusions.	Findings show a strong association between evaluated teaching practice and psychological characteristic of self-efficacy within teachers, and modestly yet significantly related to the achievement levels of students. There is also a modest level of correlation between personality type and evaluated teaching performance. Hence the 'malleable' self-efficacy has more influence than 'crystallized' personality.	Bandura, 1997	The lesser correlation between personality type and an effective teacher is interesting, with self-efficacy showing itself as a stronger characteristic.
8	Peterson, K., DeCato, L., & Kolb, D. A. (2014). Moving and learning: Expanding style and increasing flexibility. <i>Journal of Experiential Education</i> , 1-17.	Introduction of ways in which movement can enhance understanding of how to use Experiential Learning Theory (ELT) concepts of Learning Styles and Learning Flexibility, especially with regard to LMA's 'Effort' factors, and ELT's 'Action-Reflection' and 'Experiencing and Thinking'. They suggest that by increasing an individuals' movement repertoire, they may also be able to increase their learning flexibility, allowing one to evolve from habitual patterns.	The article intends to find the relationship between ELT and Laban Movement Analysis (LMA) framework, exploring relationship between individual learning styles and movement preferences in movement education. Relationships are theoretically hypothesized on within the article based on workshop observations, participant reflections, and interviews with respondents to KLSI 4.0. However, the argument needs further empirical validation.	Kolb, 1984; Kolb & Kolb, 2011; Kolb & Kolb, 2005	The argument is very interesting in embodying movement within education. While only hypothesized at this stage, there may be value within this sort of method, as reflected in other theoretical frameworks such as Feldenkrais which is referred to in the article, and the linkages between learning and the sensorimotor system. Correlations with movement styles may 'shortcut' cognitive processes to reach other learning styles, hence reaching learning flexibility. Could such theories link with the design process also? The discussion and conclusion in this article is especially interesting.
9	Riley, H. (2013). Channels of vision and the poetics of drawing: Strategies for teaching. <i>Arts and Humanities in Higher Education</i> , 13(3), 201-216.	Author argues for a pedagogy within art schools that synthesizes communication and perception theories, so as to equip students with criteria for quality or "an intelligence of seeing" or to break through culturally determined "channels of vision." This strategy is suggested to inform teaching of drawing.	This pedagogical structure is based on the understanding that the greater degree to which a student realizes the subjectivity of vision, the greater to which they will be able to develop an awareness of their "channels of vision" and produce innovative work by harnessing these channels. "Poetic function" can thus be a driver of perceptual	Gibson, 1973; Witkin, 1995; Halliday, 1978; Jakobson, 1960	This amalgamation of communication and perception theories is provided as a means to structure a studio with drawing as a focus, in order to understand and move past subjectivities of perception. This may be comparable to Meinig's "The Beholding Eye", whereby different

#	Reference	Argument	Evidence	Core Citations	Relevance
			intrigue. This theory is mapped into a matrix.		perceptions of one scene were explored.
10	Van Gaal, F., & De Ridder, A. (2013). The impact of assessment tasks on subsequent examination performance. <i>Active Learning in Higher Education, 14</i> (3), 213-225.	The authors hypothesize that assessment tasks have a positive effect on the performance of students in their examination. This is supported by other studies which show the positive benefits of assessment tasks, including lower failure rates and higher motivation to complete work, less procrastination, and the motivation to create better learning habits.	An empirical study on the effect that small assessment tasks prior to examination will lead to higher examination performance. The sample was made up of 401 students in an accountancy class. It was found that students performed significantly better when assessment tasks were used. Many other studies support this finding as well as tangential theories.	-	Relevant in assessment methods, in teaching consistent learning habits, and decreasing procrastination. While the study is based in accounting, the theory may also apply to large design projects where the final submission may be deemed equal to as an examination i.e. it may be more beneficial to break up submissions.

Chapter 9

Creativity and Design Thinking



Teaching Approaches and Student Learning: Personality type and design studio

#	Reference	Argument	Evidence	Core Citations	Relevance
1	Hennessey, B. A., & Amabile, T. M. (2010). Creativity. <i>Annual Review of Psychology</i> , 61, 569-598.	A long review of findings in the psychology of creativity. Argument that research topics have diverged into subtopics however now need to converge so that all relevant professions may benefit from findings within other areas.	Substantial references to other work highlighting the many facets of creativity research.	-	Great review of creativity findings, with most relevant areas around directives, motivations, and group work vs. individual work, and cross-cultural studies.
2	Montarou, C. (2014). Flow, mindfulness and creativity: Making a case for introducing rapid life drawing into the design curriculum. <i>Studies in Material Thinking</i> , 11, 1-15.	Reflective account of one educator's teaching philosophy based on other philosophies, based on flow and mindfulness in the production of rapid life-drawing sketches. Montarou argues for the importance of bringing these concepts into design education curriculums to form tacit knowledge.	Montarou's key learning objective is for students to become more conscious of an inner dialogue when life drawing, or when doing rapid design sketches, thus providing an opening to differing levels of consciousness creating new insights and ideas. Thus he argues, this theory is applicable to design, in reaching a place of 'flow' and doing away with the analytical ego.	Csikszentmihalyi, 1991; Komagata & Komagata, 2010	The table on p. 4 may be useful in creating drawing exercises. This technique of bringing eastern meditation techniques into drawing practice may certainly have merit in shutting off the analytical part of the personality in landscape architecture, and may have linkages with design intuition.
3	Rodgers, P. A., Green, G., & McGown, A. (2000). Using concept sketches to track design process. <i>Design Studies</i> , 21(5), 451-464.	Study first investigates sketching activity in early stages of student design process, as well as to explore methods to improve the efficiency of this activity. It goes on to describe a technique based on here types of transformations between designer's sketches, which can be used to track the designer's thinking mode, increasing the efficiency of the activity.	Three students' sketching activities were observed at work on their projects in the ethnographic model, based on Goel's model of transformations, in terms of their number of sketches and types of transformations on a week-by-week basis. Findings show that freehand sketching is prevalent in the conceptual stage of design and that activity has peaks and troughs of lateral and vertical transformations over time.	Goel, 1995	Gives insight into a designer's point of thinking at some time in the design process. Educating students on the types of shift in sketching may help them in being more reflective of their own design process, as well as in giving an educator an insight into where students are in design thinking towards a resolved solution.
4	Scrivener, S. A. R., Ball, L. J., & Tseng, W. (2001). Uncertainty and sketching behaviour. <i>Design Studies</i> , 21, 465-481.	Students' drawings are studied to explore 'part-by-part' (i.e. drawing an object component by component) drawing vs. 'non part-by-part' drawing and the relationship with these sketching types to uncertainty, and when and why designers skip between these two drawing types.	It is argued that uncertainty is a primary determinant of the cognitive shifts which give rise to non-part-by-part production of sketches, i.e. a lack of information in memory necessary to satisfy the needs of the task.	-	
5	Van der Lugt, R. (2000). Developing a graphic tool for creative problem solving in design groups. <i>Design Studies</i> , 21, 505-522.	Effects of visual means of expression in creative problem solving meetings (used to generate wide variety of design directions) in product design context. Creativity Problem Solving (CSP)	Four creative problem solving meeting experiments including students of product design. Intended to explore graphic variation in brainstorming techniques used, including; <i>visual brainstorming</i> ,	Goldschmidt & Weil, 1998	Interesting for taught studio process, however findings do not necessarily point towards using visual expression in brainstorming. Different techniques of

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		methodology is largely based around written or verbal means of expression, counteractive to designer's use of sketching. Differences are analysed using <i>Linkography</i> , developed by Goldschmidt et. al. (1998).	<i>brainstorming with graphic facilitator</i> , <i>brainstorming with sketches added</i> and <i>classic brainstorming</i> . Results suggested a change of process when including visual expression into meetings. The study found that sentential variations in early idea generation is more effective than graphic variations. Including visual expression into the CSW changes the process substantially. <i>Braindrawing</i> may provide an alternative to existing graphic variations of brainstorming tool.		brainstorming are briefly compared, which may have interest.
6	Yi-Luen Do, E., Gross, M. D., Neiman, B., & Zimring, C. (2000). Intentions in and relations among design drawings. <i>Design Studies</i> , 21, 483-503.	This article explores a) if it is possible to infer meaning from a designer's preliminary drawings, b) the transformations between drawings, and c) examine one set of conceptual drawings, intending to understand design process, thus developing a notation system for documenting these transformations. These were intended to inform the development of drawing software.	A pilot study was taken with 62 architectural students, and then a study with two students and two instructors. They found that several patterns of design drawing behaviour were common among all who were involved. In the second study broadened researchers understanding of the role of drawing in design, to that of projection and exploration. A coding system to find relationships between drawings was also created.	-	Introduction has a great literature review on sketching theory and methods used in the past.
7	Zhang, Y. (2013, May 14-17). <i>A new way to improve design students' creativity- based on thinking style</i> . Paper presented at the 2nd International Conference for Design Education Researchers, Oslo, Norway.	Re-energization of design in China, due to lack of Chinese designers with a global reputation and an industry based on production vs. innovation. Explores new approaches to improve design students' creativity, and aims to develop a teaching method which supports a range of thinking styles and is promotional of students' creative thinking, to find an 'alternating teaching method.'	Observation and analysis of teaching practices and studio sessions to find if the proposed 'alternating teaching method' enhances creative thinking of students with both legislative and executive thinking styles. Results are difficult to understand, however potentially some correlation is found between this teaching method and student performance.	Sternberg, 1997	Interesting in its account of the character of Chinese students' learning. Parts are somewhat difficult to understand with English translation lacking in areas. Some useful definitions.

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