Design in time.
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Ann McGlashan
Faculty of Education
The University of Auckland
a.mcglashan@auckland.ac.nz

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Abstract
Effective teaching still instinctively tries to keep a creative spark at its core while managing an increasing tide of quantitative data collection on student learning and a focus on words and numbers. The creative element however, is seen by some to take time away from the serious business of learning. I see creative learning experiences as those that engage, empower and value learning and the learner often providing the context for the learning. This paper looks at the timing and placement of the development of creative, innovative and curious minds in the New Zealand curriculum. I also look to the creative designer's daily notebook to affirm and provide guidance towards creative teaching practice.

Every child is an artist. The problem is how to remain an artist once he grows up.
Pablo Picasso

Introduction
Picasso noted the tempering and gradual loss of a child's purity of thought and freedom of expression through the weight of everyday happenings at global, community and personal levels. More than 70 years ago, in his role as Assistant Director of Education in New Zealand, Beeby (1939) stressed the important duty of teachers 'to act as a buffer between the world of the child and the warring world of the adult, to pass on to the child only such of the jarring and the jostling of the adult world as he feels the childish mind can cope with at each stage.' Even though Beeby spoke at a time of global war there are strong similarities with today's over-abundance of information in a world dominated by telecommunications. Beeby noted also 'it is for the skilled teacher to say what burden of knowledge the child at each stage can bear' (p.129.) Is the teacher's role even more crucial at this time to counter the loss of the childhood quality of inquisitiveness and curiosity on the journey through schooling? *The New Zealand Curriculum* (Ministry of Education, 2007) now offers educators scope to maintain these qualities as they nurture young minds to become 'lifelong learners who are confident and creative, connected and actively involved' (p.4). These ideals have always underpinned best teaching practice; they are now affirmed by our curriculum through an acknowledgement that such practice helps every child achieve their whole potential. How can we put these ideals into practice in a way that maintains the enchanment of learning that begins in early childhood? Can we stave off the seriousness of information overload learners experience in later learning environments? Regretably, creative activities, are seen by some to take up too much time or even to waste time, and in a climate where information gathering and reporting systems are expected, hours spent in imaginings are not always valued.

After extensive research into creative design practice, where imaginative interplay of ideas is deliberately planned for and encouraged, it is my contention that the teaching of design ways of *knowing through thinking and doing* Sharma and Poole (2010) wthat parallels

Cross's (2001) 'designerly ways of knowing, thinking and acting' could provide a means to meet our curriculum's vision. Such practice would preserve the childhood attributes of imaginative thought and set in context all learning in a meaningful way. Many years ago, the Thomas report for the New Zealand Department of Education (1944) recognised the importance of learning the design way in its statement that an 'appreciation of good design should grow along with the practice of designing'(p.43). More recently, Hope (2009) suggests that in the development of an informed population, 'equipping children with practical design capabilities is probably one of the most essential components of their education' and, further, that our species and planet could 'depend on their design decision-making' (p.54).

We are all participants of design decisions every moment of every day, be they made by a landscape, website, fashion, graphic, product or interior designer, or by an architect, engineer, artist, dentist, hairdresser, novelist, music composer, butcher or rugby coach. In short, all people involved in decision making to address a situation, issue or need, use design thinking to reach a solution. I believe that if students become familiar with this designer role across a range of situations they will experience a more holistic way of learning, developing a perceptive understanding of people and the interactions with their environments, and lay a solid foundation for life long learning. Design and Technology courses still battle the reputation of being best suited to those who are not suitable for academic fields of learning. This is a redundant and insulting view for today's world and young people. Whereas, I concur wholeheartedly with Ilsa Parry's (2011) statement about Design & Technology in Brittain that the 'learner must be analytical, evaluative, entrepreneurial, technical, scientific, artistic, physically fit, philosophical, emotionally intelligent, mathematical and reflective" (p.25).

Brief historical background

Historically, attempts to introduce a design component into subject areas at the curriculum level in New Zealand has proven problematic, with issues of ownership and border disputes needing to be resolved. Design in the New Zealand curriculum was given independent status in the late 80s, at senior levels of learning, that saw Practical Art divided into five separate subjects with Design being an area that requires students to define, refine and communicate their designs using design practice based on the Art inquiry model. Design & Technology evolved from Workshop and Home Economics subjects to better replicate the world of design-and-make in Hard Materials, Textiles and Food Technology. This subject further evolved into *Technology In the New Zealand Curriculum* (Ministry of Education,1995) The subject Graphics was developed in the late 80s to address the changing world of design practice and visual communication. The subject comprises *design thinking and methodology* at the core of design practice, with the relevant visual communication modes of the broad range of design practice. At present, Graphics is driven by a design brief approach, and has been re-named Design & Visual Communication. It stands with its own autonomy under the umbrella of Technology. These developments indicate a growing awareness of the place of design thinking in learning areas such as Visual Arts, Design & Visual Communication (Graphics) and Technology.

It would seem appropriate then to accept and celebrate the contribution to learning of *design knowing through thinking and doing* applications. Furthermore, the design component could also be seen as a thread to break through the 'silo' segregation of secondary school (senior) learning to provide some continuity with the more holistic approach to learning that students know well from early childhood and primary learning experience.

How to teach design thinking and knowing through doing?
What should a course look like that will encourage young people to become proficient in the ways of design thinking and communicating, and where should it be housed?
Debate about the way to go about designing is broad ranging and complex, with early theorists suggesting a prescribed approach to design processing. Writing some 45 years ago, Gregory (1966) argued that "The process of design is the same whether it deals with the design of a new oil refinery, the construction of a cathedral or the writing of Dante's Divine Comedy" (cited in Lawson, p.30), suggesting that each practice follows a similar set and sequence of activities, regardless of the intrinsic nature or purpose of each task. A number of writers have documented these activities and the order in which they perceive them to occur in an attempt to strike the definitive model for design practice. For example, in an attempt to capture the activities within design practice as a guide to designers and educators of design, Johnsey (1998) compared design process models from a broad range of design-related communities of practice, identifying fourteen common process stages, prioritized from initial investigation through to final evaluation. Spendlove (2010) in his work on the *concept of unknowing* cautions against the reliance on the use of set models 'that merely proliferate the illusion of progression and understanding,' (p.4). How then do we encourage learners towards an openness and freedom of thought and the confidence to follow their own natural progression that twists and turns to suit the people and task in hand?

Alternative views of designing
From work with doctoral design students, Scrivener (2000) identifies two distinctly different approaches to solving a design task, depending on the nature of the task. One a linear approach he calls *problem-solving,* the other a more iterative approach he calls *creative-production*. Scrivener observed that 'the thinking processes employed in *creative-production* types of design may be considered in terms of Schön's theories of professional practice thinking as reflection on emerging practice' (p.7). This identifies a key activity in design processing that should be at the core of design pedagogy. The design student is provided with opportunities to develop pertinent questioning and thinking skills to drive their problem setting and solving of the task in hand. Schön's (1983) writing confirms the iterative nature of creative problem solving as: 'something that …recurs throughout the process in response to difficulty or uncertainty encountered during the task' (p.7). Schön's emphasis is on the person at the centre of the process, drawing on exploration and opportune import from past, personal experience. He emphasizes the key role of tacit knowledge developed over time and experience through competent design practice.

What can we learn from contemporary design practice?
Given that the design profession constantly examines and reflects on its own dynamic practice, research into contemporary design practice provides much to inform design pedagogy, for example, the IDEO company vision and approach to practice. IDEO is hailed as the world's most celebrated and innovative design firm. They promote 'a collaborative and continually evolving approach' to design thinking that is transferable to other situations and varies according to the task in hand. Kelley (2001) explains the design methodology employed by IDEO as a well-developed and continuously refined model with five basic steps:

- Understand the market, the client, the technology, and the perceived constraints (often challenged later in the project).
- Observe real people in real-life situations to find out what makes them tick, what confuses them, what they like, what they hate, where they have latent needs not currently addressed.
- Visualise new-to-the-world concepts and customers who will use them. This the most brainstorming intensive stage, is seen by some as predicting the future. Visualization

may take the form of computer-based rendering or simulation. IDEO builds many models, including illustrative storyboards, to prompt useful dialogue and visualize the customer experience. Video clips may be prepared to portray life with the future product before it exists.

- Evaluate and refine prototypes in a series of quick iterations, not getting too attached to first models, as they will change. Input at this stage may be from internal or client teams with input from knowledgeable people who are not directly involved with the project. We look for what works, what doesn't and what confuses people, to inform the next round incrementally.
- Implement the new concept for commercialization. This is the longest and most technically challenging phase, building on all that has gone before (p.4).

Prompted by Lawson's (1997) suggestion that 'it would be much more interesting to know how very good designers actually do work than to know what a design methodologist thinks they should do (p.39), I approached the design community to establish how designers actually design. My research into the practice of three prominent New Zealand designers (Table 2) has provided much that can be transferred to learning for Design and Technology. The research gave valuable insight into designers' underlying philosophies, and the nature of their daily practice that has developed through a wealth of design experiences, a way of seeing, perceptive reflection-in-action and constantly challenging the familiar.

Designs	Designer
	David Trubridge has established a successful internationally acclaimed design practice and has won awards for his work on sustainable design. He has been instrumental in establishing a design incubator to support young designers in their early practice.
	Dean Poole is a director of Altgroup at the cutting edge of graphic design who secured work for Trade New Zealand that included the marketing package to showcase NZ fashion at the Paris fashion awards and *Better by Design* a government lead initiative to emphasise the place of design to the NZ business world. Recently Altgroup received four Red Dot awards in Germany for design excellence.

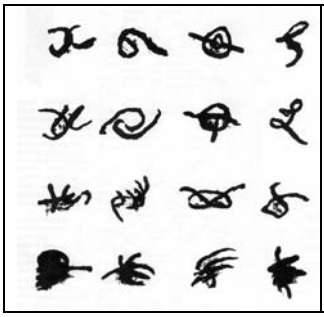	Carin Wilson is a celebrated New Zealand furniture maker and designer who has practised his craft for 30 years. A design lecturer in Maori Architecture and Appropriate Technologies programme at Unitech, Auckland. Wilson's recent work sets out to find a material expression for the marks inscribed on the Treaty of Waitangi by some of its Maori signatories in a work entitled *Nga Tohu o Te Tiriti.*

Table 2: Introduction of Designers

Research

My methodology followed an interpretive approach to research via case studies. Focus was given to the design practice of each designer, viewing them as unique practitioners of design, actively involved in creating solutions within their own complex reality. The purpose of the interviews was to understand the world of design practice from the designers' points of view and to faithfully represent their experiences. The emphasis of the interviews was on stimulating recollection and reflection. It seemed that the most opportune time to discuss design processing was immediately after a project had ended, when the residual influence of that project was still foremost in the designer's mind.

This research is best described as an heuristic approach. Heuristics, from the Greek word 'heuriskein' meaning 'to discover,' is a qualitative approach involving intuitive questioning as a means of discovery. Heuristic research (Moustakas, 1900) takes a flexible approach to the gathering of data, with an openness and the freedom to change as the preliminary question or preconceptions shift direction. The flexible nature of data gathering allowed each interview to take and follow its own direction, depending on the designer's interpretation of the question. Even the lead question was different in each case because the three designers happened to be at different stages of a design project. My opening prompt was: *Think back to one of your most memorable design projects.* The question that followed was: *Can you describe, talk me through the process/journey that you undertook in the realization of the project?*

A range of recording methods was used, including observation, note taking, audio and digital video camera recording of interviews, still camera capturing of images, journals (research and conceptual), models, facilities and environments. Two of the interviews were held in the design studio of the designer where their planned, creative environment spoke for itself as a place that nurtured and inspired a creative response. Reflective questioning in line with the conversation was employed as prompts, when needed. This method of research enabled me to build complex, multi-layered profiles of verbal and non-verbal data. Participants were given a copy of the interview transcript and supporting collected material to verify the content. They were also assured that they had the right to retract or change comments they did not want included in the research analysis. Case study findings were then compared and contrasted to identify the key elements within each practice.

Findings

The designers' stories gave insight into the way they approach creative design projects. It was interesting to note that the designers did not refer to any one way to go about design. Rather, the nature of each project dictated the way ahead.

Significant elements evident in the designers' practice include becoming immersed in the situation, framing the question, developing better questions, internal and external dialogue,

sentiency and being aware of the human interrelations with their environments, a sense of play, making observations, decision making, unexpected outcomes, modeling, testing and serendipitous connections. Those elements of the designers' s practice that I have compared to classroom practice (See Table 4) stem from the following excerpts of their stories. In speaking of his working environment, David Trubridge observed that he actively seeks places to inspire or support creative thought; he uses the outdoors and the mountains to "empty out," as he said, and to extract himself from the everyday cares of life and business in order to begin afresh. Dean Poole spoke of a thoughtfully planned physical work environment that supports and encourages broad debate and risk taking, that has a 'family feel.' Carin Wilson deliberately plans his 'safe' yet dynamic work environment as 'a place where he can think, a temple.' His studio walls, vibrant with selected images, trigger creative thought and responses. He spoke of the need for times of total *immersion* in the design theme when he 'uses music to fill himself with imagery and inspiration from many sources, including nature.' David Trubridge spoke of a similar state where 'design thinking requires a relatively unstructured approach to time; one needs 'to be prepared to wait for a solution to present itself' and to allow time to '*just be with the idea.'* He added that there are periods of incubation, in his practice, where he allows the ideas to sit. During this time there are often 'moments of illumination and discovery.' Wilson also observed that he 'believes that the work comes through me not from me. Often I think that it is spiritual.' He concluded that a feature of his practice is times of total immersion where he is open to and takes on board all influences. He allows himself the freedom to encourage a slow unfolding of thoughts. When asked to elaborate on the approach used to capture the real intent of a new project, Poole spoke of his team's approach as a planned-for strategy, where members of the company work together to clarify the project or to *frame the question*. He noted that 'When you need to find a new idea, you need to find better ways of having conversations, by asking better questions.' He added that 'Most design ideas come from people having conversations with themselves or each other or even with an artifact, business or experience.' Poole and Wilson often referred to the part of dialogic journals that are always ' there to catch ideas as they occur.' When discussing ideas with others, the journal is where they record points of interest or manipulate the next thoughts. All three designers spoke of the ongoing internal dialogue that is always present to guide their design journeys. Newbury (2001) stresses also the important place of immediate capture in dialogic journals, Schon and Wiggins (1992) speak of the importance of sketching/thinking where 'as a designer draws, she makes discoveries…features and relations that cumulatively generate a fuller understanding, or feel for [the focus] configuration...' (p.155).

These attributes and activities need to be taught and can be fostered from an early age. They are readily transferable to classroom situations at all levels of learning to nurture curiosity, encourage creativity and enhance learning. To set aside time for students to become fully immersed in the theme of a design task through role-play, digital imagery and music will enrich classroom sessions, aid student motivation and engender ownership in students (see Table 4 for examples).

Reflecting authentic practice in the curriculum

Early learning environments where teachers celebrate and utilise children's natural inquisitive nature and imaginings to introduce key principles of observation, interpretation and communication by encouraging them 'to ask better questions' will inspire and enhance all learning. It is imperative, however, to maintain a separate creative learning environment where young designers at senior levels of learning can enter and know that their ideas will be supported and nurtured as they develop and utilise their own design methodologies and visual literacy. I envisage a learning environment as an *incubator* where young designers

may be steeped in the ways of design thinking and work towards developing their own design persona. Learning experiences will complement other curriculum learning areas, principally the learning area of Technology. A separate subject will ensure undiluted, faithful coverage of the ways of design, where students may develop tacit knowledge through practice. The incubator approach will avoid the dilution that occurs when a subject is subsumed into another. If learning about the ways of design is not given its own autonomy, it will suffer the same fate that has plagued other learning areas by invisibility through integration. To convey design knowing through thinking and doing, we need to assist the learner to acknowledge, develop an understanding of, and utilize essential human interaction considerations in creative decision-making. Learning to observe the world and to ask better questions of it can be introduced and developed from an early childhood level, at the *right time* in their learning when curiosity and inquisitiveness are second nature, so that by the time they become senior students they will have developed an understanding through 'a wealth of design experiences, a way of seeing and perceptive reflection-in-action' Mc Glashan (2010).

At a time when the New Zealand Ministry of Education is reviewing curriculum learning area assessment alignment it is crucial that the part of design thinking and methodology be recognized and safely placed with its own autonomy in the New Zealand curriculum.

Design community of practice activity	**Classroom practice activity**
Deliberate planning of an environment that encourages creativity	Create a space where young designers feel safe and appreciated. Every class sets, displays and adheres to codes/rules that encourage self-expression without fear of put downs, all people and their ideas are acknowledged. Look at and adjust where possible: the natural and artificial lighting, wall and fitting colours to enhance the immediate environment. Post on walls relevant images and information for the theme or topic in hand. Arrange the room layout to include areas of comfort for student-selected times of withdrawal to gather ideas from contemporary publications and internet. Music sound system to inspire or soothe.
A state of *immersion* in the situation or theme.	Age and interest appropriate music, images and role-play, both at the onset of a design task or throughout to maintain creative focus. Learners are encouraged to 'live in' the narrative or moment in their imagination. Plan for and welcome back the daydream.
Framing the question	Provide learning experiences in which students learn to prepare questions using pedagogical taxonomies to ask deeper or different questions of an object, person, idea or environment. It is important that they frame initial questions about a task rather

	than be handed the thinking already done for them. Use resources such as cards with generic prompts so that questions may be asked in a range of applications.
Encourage reflective practice through a dialogic journal	Encourage the skill of quick capture of all ideas as they arise, through rapid visualization (words and rough images) from an early age. This not only provides the student with an outcome to describe and discuss with others through out their design thinking but it becomes a valuable tool for the construction and manipulation of thought. Students are encouraged to keep their journal near-by for immediate capture of thoughts. Simple sketching 2D & 3D skills to begin a learning experience familiarize the student with this form of communication and also help the student to better observe and interpret their world.

Table 3: Four examples of classroom activities informed by design practice. Age appropriate adaptations to these activities will enhance all levels of learning.

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