



## From Personal Passions to Teaching for Innovation

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### Abstract

*This twenty-five-minute oral presentation will describe a school's ten-year journey in pursuit of teaching for innovation. Beginning with Personal Passion Projects in 2007 embracing student choice and empowered learning, students in their final year of Junior School were challenged to explore questions of their design. Over the years since, students have benefitted from this experience and developed the skills and disposition required for innovation. With continuing shifts in educational imperatives the evolution of this programme today allows students to engage in a learning experience that enhances communication, critical thinking, creativity and collaboration. This extensive experience of teaching for innovation has allowed teachers of this programme to refine and develop their understanding of the skills required for innovation and allows them to provide scaffolds and learning supports. Students apply an iterative design thinking approach as they develop and implement their project ideas. Thinking skills are developed through the use of 'Making Thinking Visible' and positive dispositions for learning are promoted through 'Habits of Mind'. Students engage with the design of multiple projects throughout the year beginning with a research based topic to lay foundational skills for project management. Subsequently students investigate the design and construction of every day items before considering creative modifications that may enhance them or bring new utility. The culminating activity is a semester long project of each student's own design exploring concepts of their choice and presented as they desire. Past projects have included laser engravers, novels, computer games, sporting equipment and concepts for small businesses. The impressive diversity of learning is showcased at an end of year gallery walk attended by parents and members of the school community. This presentation will share the learning from this experience and offer suggestions for teachers and schools wishing to include teaching for innovation in their programmes. If the future our students will inherit requires the capacity to find and solve novel problems a strong foundation in innovation is essential.*

For the past ten years, students in Year Six at Redlands have participated in a Personal Passion Project. Over the years this has evolved into a learning experience that encourages an innovative disposition. It is a project and programme of learning that aims to prepare students for a world where their ability to learn new skills, adapt what they know to new situations and pose and solve questions of their own will be critical to success. It has proven to be a highlight of the year for students and has produced amazing results. In its present iteration students engage in a year long programme that develops their skills for creativity, collaboration, critical thinking and communication based on problems that they identify and engage with.

The idea of a 'Personal Passion Project' was not unique in 2007 but was less common than it is now. Ideas like 'Google's 20% Time' were not well known in Education nor was the term 'Genius Hour' commonly used. How to best structure and support a Personal Passion Project was not something I had given much thought to as I really did not think many students would take the option. The result was that the class and I sort of fell into the project and learned as we went along. A key to the success at this point was the collaboration that took place between the students. Without prompting from me they were encouraging and supporting each other through the projects. This collaboration ensured that deadlines were met and that individuals never felt overwhelmed by the scale of what they had taken on.

The Personal Passion Projects have produced an enormous variety of projects, too many to list, projects like these:

One student decided he wanted to build a laser Computer Numerical Controlled (CNC) engraving machine from old printers. What impressed me from the outset was that he knew exactly how he would make it work and what difficulties he would encounter along the way including how he would control the movement of his laser in two axis and how he would program it. In the end it worked almost as expected and if not for some last minute issues with the laser being fried by excessive voltage, would have been perfect.

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Another student decided he would make a guide to creating an 'Internet Start Up' company. His final product was exceptionally well produced and based on detailed research into the strategies that would allow a company to grow rapidly and adapt to unseen circumstances. His work impressed me but more importantly it impressed the many parents with a business background who could fully understand the quality of his recommendations. Other students have produced elegant pieces of music using live instruments and digital composition tools, others have published novels, pieces of fashion and art.

For some students the Personal Passion Project has been their first taste of real success at school. One boy who was passionate about surfing set to the task of making a surfboard using traditional methods of foam and fiberglass. This was a student who had struggled to produce quality work in the classroom but on this project he set and achieved the highest standards for quality. He learned that by taking a risk and giving attention to every detail he could achieve success.

Over the years we have continued to refine the processes we apply to the Personal Passion Project. It is now a part of the students' learning all year with a 'Genius Hour' programme occupying part of their time during Terms One and Two ahead of a 'Personal Passion Project' spanning Terms Three and Four.

The role that choice plays in motivating learners is well founded and it is essential for engagement in all aspects of schooling and for encouraging students to become the drivers of innovation that we hope they will be. Ryan & Decci<sup>[1]</sup> (2000) refer to numerous studies that show increased levels of self-regulation can be fostered by providing autonomy (choice), secure connections to carers and supporting perceptions of competence. Their research points to a clear role for choice and autonomy in developing intrinsic motivation and in moving learners from highly controlled extrinsic motivation to what they term 'integrated regulation' where the goals and objectives of the learning are in alignment with the individuals. 'To integrate a regulation, people must grasp its meaning and synthesize that meaning with respect to their other goals and values. Such deep, holistic processing is facilitated by a sense of choice, volition, and freedom from excessive external pressure toward behaving or thinking a certain way.' (Ryan & Decci p74, 2000)<sup>[1]</sup>.

The Personal Passion Project has been enhanced through reference to the Design Cycle and many students are able to fluidly move from one phase of this cycle to another as appropriate to their investigation. Stanford University has been a pioneer of 'Design Thinking' since founding its dSchool in 2005. Founder David Kelley explains that 'the central tenet of Design Thinking, isn't one of aesthetic or utility, but of empathy and human observation'<sup>[2]</sup>. It is much more than a process of design and it provides a structure in which critical thinking, reflection and evaluation is the key. Seen in this way it is what 21st century teaching and learning is all about.

## Creative Process Planner

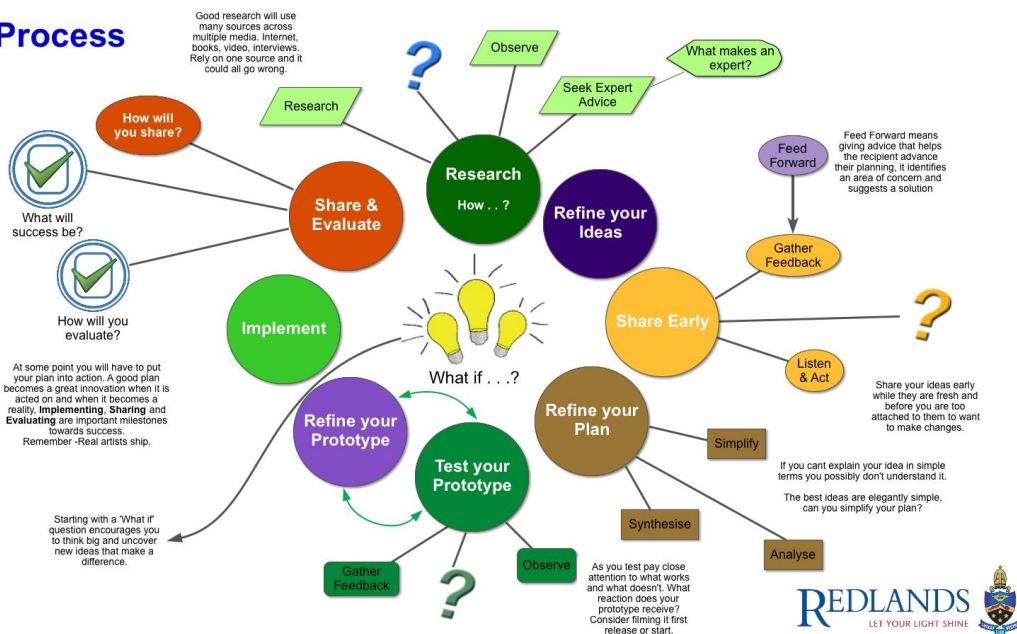


Fig.1. The Creative Process Planner – a design thinking process



In a traditional problem solving model the solution is derived to solve the problem that has been presented, most likely by the teacher and from the syllabus. 'Design Thinking' begins a step before this with the identification of the problem a subtle but important difference. The problem identification process is critical as it is at this point that we begin to evaluate why problems need a solution and which problems are worthy of our efforts. According to David Kelley of IDEO this requires empathy and this is the starting point he suggests.

'Design Thinking' provides a structure and language for collaborative problem solving that allows teams to be more powerful than they would without it. Ewen McIntosh (2015) of 'NoTosh' describes it as the box that gives you a place to work within. 'You want to think creatively, you NEED the box to think inside of. You need a common process to go into new places.'<sup>[3]</sup> Rather than throwing out the box, 'Design Thinking' turns the box into a worthwhile process that facilitates problem solving and ideation. In this model the box is not a constraint but a structure that enhances creativity.

'Design Thinking' engages learners in a highly iterative process grounded in evaluation and critical reflection, both highly valued processes. Research by Looijenga, Klapwijk and de Vries (2014)<sup>[4]</sup> titled 'The effect of iteration on the design performance of primary school children' explored the benefits of a highly iterative design process for young students. Looijenga et al (2014)<sup>[4]</sup> found that 'Effective knowledge expansion comes by thinking about already acquired knowledge and also by searching for definitions and explanations of not yet understood knowledge. Both activities are practiced during design activities.' This study used simple design tasks with young learners, not the more involved and student driven tasks typical of a 'Design Thinking' process and yet the results showed that the iterative process of design tasks required high order thinking skills that could be transferred to other learning contexts. 'Design concepts emerge and become complete through iteration of analysis, synthesis and evaluation'. Allowing students to experience an environment where learning occurs from self-identification of what works and what does not has great value. In 'Design Thinking' failure is part of the process that leads to learning. Each time an idea is found to be lacking the learner moves one step closer to a plan that has a chance of working. If our goal is to develop a 'Growth Mindset' where failure is viewed as a positive learning experience 'Design Thinking' provides an ideal process.

Making has become an important component of both the 'Genius Hour' projects of Term Two and for many students in their self designed 'Personal Passion Projects'. The latest version of this movement comes from the emergence of new tools that elevate the options available to makers above what was previously possible into a realm of quasi-production. Digital tools, small-scale computers and open source software combined with 3D printers, laser cutters and CNC machines bring new options and exciting possibilities. However, even without the fancy new tools students can learn a great deal when they are offered opportunities to explore a makers mindset. Seymour Papert, seen by many as the father of the modern Maker Movement, had it right when he wrote 'The role of the teacher is to create the conditions for invention rather than provide ready-made knowledge' (Papert, 1993<sup>[5]</sup>). This captures the nature of the challenge we have faced as a group of teachers in designing a project where students would explore every-day objects as they do in Term two.

During Term Two students explore the design and manufacture of an everyday item and then use that as the starting point for their innovative designs. Students work in small design teams for this project developing their skills for collaboration within the 'Design Thinking' process. The iterative nature of the design process requires frequent, timely feedback. This is the point where the immediacy of feedback inherent to making tasks comes to the fore. Imagine a strategy, test it, does it work? If not try a different strategy. This immediacy of feedback not from a teacher but from the task itself allows for rapid iteration and with no value judgement associated with the feedback fear of failure rapidly dissolves; either your plan works or it doesn't. The second element that ensured success was that the students were highly engaged by the challenges they faced. They had been given choice in the items they explored, choice in how they would explore the items and choice in how they would share their learning. They were working collaboratively with their classmates but also with their teachers. Realising your teacher is just as stuck as you are turned out to be a powerful motivator towards resilience. The true learning has been linked to how we might approach new learning situations in the future, how we might solve problems we have never encountered before and that we can trust in our ability to cope when we are stuck. If as Jean Piaget claims 'Intelligence is what you use when you don't know what to do' then we have all made good use of ours.

The key elements for the success of these programmes and developing 21st Century skills and a disposition for innovation are the combination of choice, the design cycle as a scaffold and structure for learning, opportunities for collaboration with peers and teachers and the inclusion of maker based learning experiences. Taken individually each of these elements is a powerful antecedent for learning and personal growth, combined they provide students with learning that mirrors closely the conditions



they will engage with beyond school. Through this programme students discover that they can find and solve problems that matter and they have the potential to be innovators now and tomorrow.

### References

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