

# Enhancing teaching and learning through design practice



Professor Lori Lockyer  
University of Technology Sydney

*Lori Lockyer is Dean of the Graduate School of Research and Professor in the Faculty of Arts and Social Sciences at the University of Technology Sydney. As Dean, Lori is responsible for leading the strategic direction and policy development for research training across the university. Lori researches learning technology, learning design and teacher practice. Lori has led and collaborated on research projects supported by \$20m+ funding from government and industry sources in Australia and internationally. Her work has been disseminated through over 100 peer-reviewed publications and numerous professionally-focused presentations and workshops. Lori is a Chief Investigator in the ARC Science of Learning Research Centre in which her team is researching learner confusion in digital learning environments. Lori is investigating primary school teacher design thinking through an ARC Discovery-funded project 'Designing effective learning experiences: Investigating novice and expert teachers' design processes'.*

## Abstract

Design is part of a teacher's practice on a daily basis. Teachers are constantly designing and redesigning learning experiences for their students. However, the notions of the teacher as designer or 'teacher design practice' are rarely used as frameworks within teacher education or continuing professional learning. In fact, 'teacher design thinking', that is, how school teachers think about and engage in design practice has been an under-researched area. Design thinking has the potential to provide teachers with a scaffold to reflect upon contextual and evidence-based factors when designing learning experiences for their students. However, we need to know how teachers engage in design and how their practice might be better supported. This paper will provide an overview of design thinking, and how it fits within teachers' work. Results of a recent Australian study, which investigated early career and experienced teachers' design practices will be detailed with a view to considering a model of teacher design thinking that may be integrated into teacher education and development to ultimately make a difference for student learning.

## Introduction

Design is part of a teacher's practice on a daily basis. Teachers are constantly designing and redesigning learning experiences for their students. However, the notions of the teacher as designer or teacher design practice are rarely used as frameworks within teacher education or in continuing professional learning. In fact, teacher design thinking, that is, how teachers think about and engage in design practice has been an under-researched area. Design thinking has the potential to provide teachers with a problem–solution scaffold to reflect upon contextual and evidence-based factors when designing learning experiences for their students. However, we need to know how teachers engage in design and how their practice might be better supported.

## Investigating teacher design practice

In order to better support teachers' design practice, we first need know how teachers currently engage in design. The challenge here is in the predominately cognitive nature of this aspect of a teacher's work. We have conducted 48 in-depth case studies with experienced (teaching for 10 or more years) and early career (five years since completion of teacher education degree) Year 5 and 6 primary school teachers. We were particularly interested in how primary school teachers design because they are responsible for the majority of a student's learning experiences across disciplinary boundaries.

Our study was qualitative in approach and involved four phases (Figure 1). We invited teachers to participate in a study in one of two research environments. In Phase 1, participants engaged in a design task in the simulated setting of a university laboratory setting (n = 21). In Phase 2, teachers participated in the naturalistic setting of their school context (n = 11). In both settings, the design task focused on creating a unit of work for the Australian Curriculum. The goal here was to use this task as a mechanism to explore teachers' cognitive processes as they engaged in the pedagogical design of a coherent set of lessons that should have made connections across the curriculum and cumulatively built students' knowledge and skills. We interviewed teachers about their usual design practice, administered a video-recorded, think-aloud protocol while participants designed the unit of work, asked them to reflect on their design and collected their design artefacts. For Phase 2 teachers, we also examined their design practices while they taught the unit to their students through records in a teaching diary and follow-up interview. In Phase 3, we analysed the collected data to understand how the teachers designed, with a particular focus on comparing how early career and experienced teachers approached design. We used these preliminary findings to develop

a teacher design thinking model, which we tested in Phase 4 with early career teachers (n = 16).

While acknowledging that design thinking is an individual cognitive act, design work is undertaken in context. Teachers work is influenced by social norms, government policy, school strategy, rules, resources, and interactions with fellow teachers (Hargreaves & Fullan, 2000). To engage with both the psychological and sociological influences of teacher design work, we used an activity theory (AT) framework (Engeström, 2001) to guide the questions we asked of participants and the analysis of data. Thus, in the study, we conceptualised the teacher (subject) designing a teaching program (object/ive) within a system comprised of rules, community, division of labour and tools. This allowed us to elicit the individual and contextual influences on design thinking and practice through both deductive and inductive approaches.

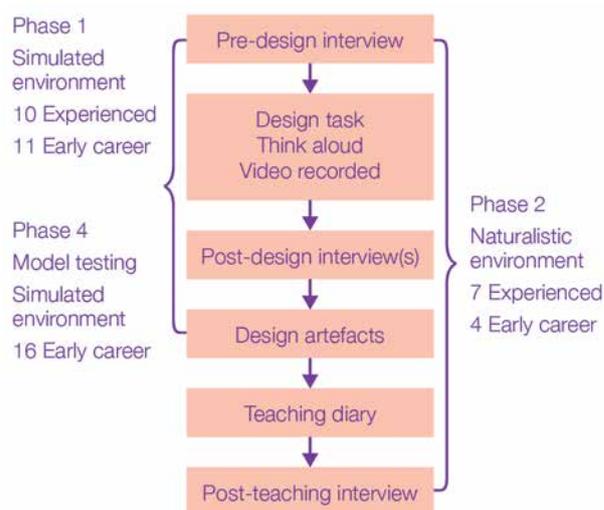


Figure 1 Four-phase research approach

## How teachers design

We found some consistencies in the ways all our teacher participants designed and their design considerations. Most teachers explained that their usual approach to design involved others in their school (AT: division of labour) with many describing a cooperative approach to design. When we observed them in their design task, most teachers took an iterative approach to their design work moving between thinking about high level aspects of the overall unit of work to specific design elements of lesson activities or teaching resources. Most teachers initiated their design work by identifying the syllabus outcomes to be addressed by the unit. Most took inspiration from others referring to sample units of work, with experienced teachers often

taking a case-based reason approach (AT: psychological tools) by referring to their past experiences. Our teacher participants used a range of resources to support their design work (AT: physical tools) such as paper and pencil brainstorming, online searching for sample units and teaching resources, and templates for recording their unit of work, sometimes these were school-mandated (AT: rules).

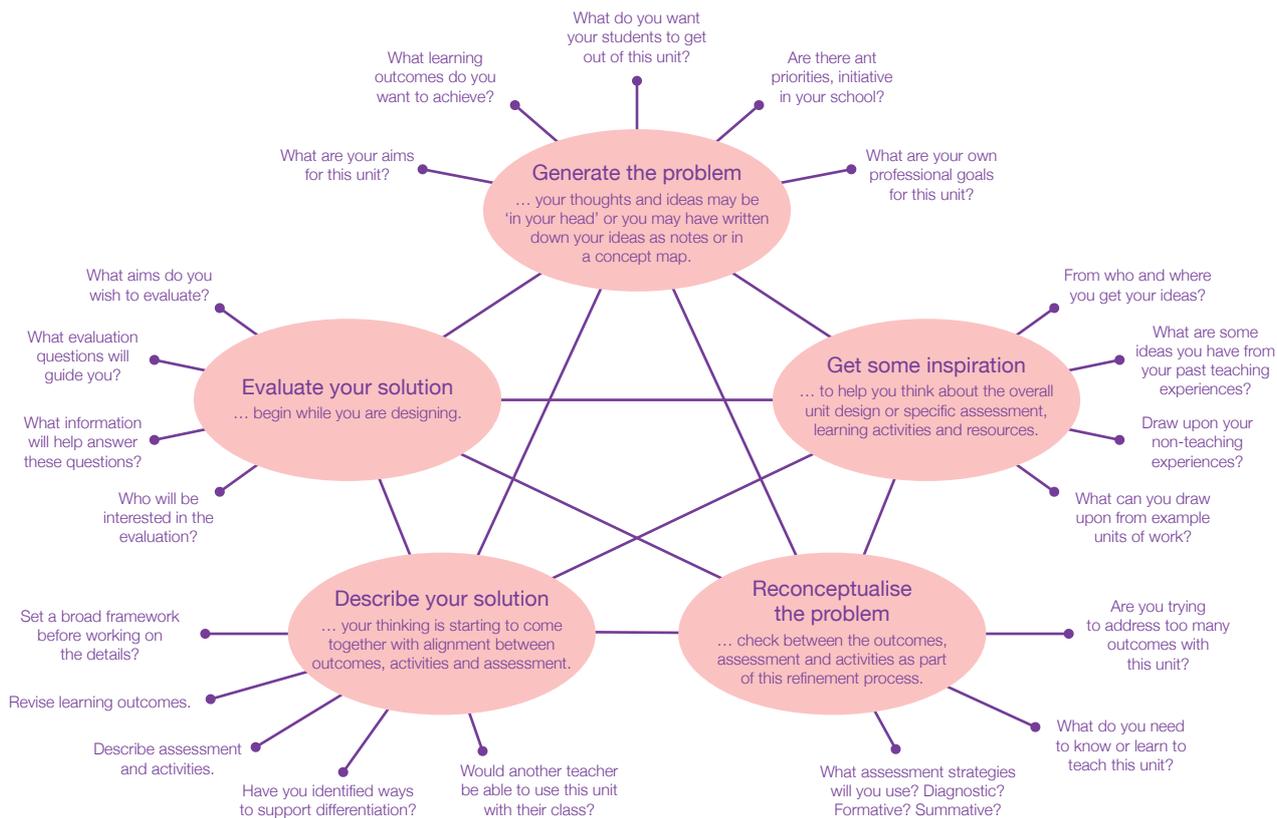
We also identified clear differences between the way experienced teachers and early career teachers engaged in design and thinking about their designs. While both initiated their design work by defining the syllabus outcomes they needed to address, early career teachers tended to refer more closely to the syllabus documents and document their chosen outcomes verbatim at the outset of the design process. While both early career and experienced teachers started with syllabus outcomes, experienced teachers tended to spend time considering issues for the whole unit while early career teachers often moved directly to begin defining specific lessons. Experienced teachers' consideration of the design problem was wider ranging than early career teachers. It often included a more explicit attention to student needs and interests but often also considered the teacher's own professional interest and learning opportunities (AT: objectives). Unlike experienced teachers, early career teachers tended not to refine the scope of their unit of work as their design progressed. As such, they often maintained the initial set of syllabus outcomes to be addressed. Experienced teachers' solutions (units of work) often reflected their considerations for differentiation for the range of learners in their class and also often included specific opportunities for diagnostic, formative and summative assessment.

Our findings were consistent with research on design thinking within traditional design disciplines such as engineering, graphic and industrial design. Razzouk and Shute's (2012) review provides a helpful understanding of characteristics, processes, and differences between

novice and expert design thinkers. They identified the iterative nature of the design process across design disciplines; experts' tendency to draw upon their past problem-solution experiences; expert (breadth) versus novice (depth) approaches to design. This literature base and our empirical evidence provided us with a platform to develop a model aimed to specifically support teacher design thinking.

## An evidence-based model to support teacher design thinking

There is no one model of design thinking that can be directly adopted from other design disciplines to fit teacher practice. In fact, within design disciplines there is not one standard model. Models, or tools, that are used to promote design thinking variably include stages of identifying a problem to be addressed, researching the audience and context in which the problem exists and ways the problem has been addressed in the past, proposing, testing, refining and evaluating solutions to the problem. Drawing from the many models available, the literature from other design disciplines and our analysis of data from the first two phases of our study, we defined an evidence-based model to support teacher design thinking. Importantly, our model needed to account for how teaching differs from other design professions and disciplines in two key ways. First, teachers have a very different relationship with the 'audience' who is involved in the problem. While an engineer or industrial designer experience a more removed relationship with a client, a teacher experiences a high level of interaction with their students and has access to wide-ranging information about those students. Also, other designers may be involved in developing and testing their proposed solutions, teachers go further with responsibility to enact the solutions and thus bring their own individual and professional knowledge and needs to the implementation of a solution.



**Figure 2** Initial teacher design thinking model

Our initial model (Figure 2) defined five interconnected action-oriented stages focused on problems and solutions:

1. Generate the problem.
2. Get some inspiration.
3. Reconceptualise the problem.
4. Describe the solution.
5. Evaluate the solution.

The model aims to:

- highlight the iterative process of design
- emphasise both defining and refining the design problem
- stress the importance of an evidence-based and evaluative approach to design.

Each stage in the model provides guidance on how to approach design and takes a key question approach with an aim to help stimulate design considerations.

## How teachers engage with design thinking support

The design thinking model developed in our study aims to provide early career teachers with both prompts for what to consider when designing learning experiences for their students and prompts for how they might approach the design process and what tools might support them in that process. The final phase of the research project (phase 4) focused on investigating how participants engaged with the model. In this phase, our 16 early career teacher participants were introduced to, but not trained or required, to use the model when undertaking the design task. We presented a visualisation of the model in paper-based form displaying the interconnected stages as well as further detail for each stage. We explained that the model had evolved from our prior work with teachers. We advised participants that the model was available to them through their design task but not necessary for them to use. Subsequently, we observed if and how they interacted with the model when designing and then asked them to provide feedback on the model after they completed their design task.

All early career teacher participants engaged within the model in some way during their design tasks. The participants indicated that they did struggle with

problem-solution terminology within the model as this was not how they conceptualised developing a unit of work. Many indicated that they wished they had access to such a model during their teacher education program. They noted its value in 'prompting' their thinking. A number of participants mentioned some specific questions that stimulated their thinking. They indicated that it helped them take a 'step back' from the detail that they were working on and consider the whole unit and whether they had 'missed anything' in their design.

## Conclusion

While design work is a key part of teaching, we often do not conceptualise the design thinking activities teachers engage in when they develop learning experiences for their students. There are both similarities and differences in the contexts, approaches and considerations teachers engage in to that of other design disciplines. Our research has highlighted that a design-thinking approach may be helpful way to support early career (and pre-service) teachers to develop their design practices in a problem-solution frame but this needs

further evidence-based refinement to account for the specialised nature of teaching.

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