Chapter 7

# The Challenge of Teachers' Design Practice

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## Editors' Introduction

In this chapter Masterman addresses the real-world design practices of teaching staff and other professionals working alongside them. Starting from an understanding of design as both creative and systematic, she identifies two intersecting models in which curriculum design practice can be situated. She goes on to explore how teachers conceptualise design for themselves, and the different factors they take into account. Drawing on her evaluation of the *Learning Designer* project, Masterman reviews the evidence for digital tools supporting teachers as designers. While these tools have had a complex history of adoption and impact, she considers what their development and evaluation can teach us about the design process itself.

## Introduction

A major strand in research into design for learning has been the development of supportive digital tools that guide teachers' thinking through the process of planning and constructing new learning experiences, and revising existing ones. These tools have the twin aims of simultaneously supporting teachers' current design practice and stimulating them to innovate, both in their overall approach to design and in the use of digital technologies in their teaching where these are appropriate. Their design and deployment thus hinge on an understanding of teachers' design practice and the settings in which they carry it out. This chapter maps, and critically analyses, that problem space through a review of empirical work in which researchers at the University of Oxford been involved over a period of 14 years. Specifically, the chapter addresses:

- teachers' conceptualization of, and their approach to, the activity of design;
- four factors that may bear on their design practice: students' needs and preferences, the nature of the discipline, educational theories and frameworks, and the tension between teaching and research; and

- the influence of the institutional context in which design practice takes place.

The chapter concludes by identifying some problematic implications for developers of digital tools to support teachers' practice as they seek to marry the constraints of a structured design with the unpredictable, and often unruly, nature of design practice at the chalkface.

## Researching Design in the Real World

Studying teachers' design practice yields two benefits. First, it allows the principles of educational design to be held up against real-world processes and heuristics, and second, it can inform the development of tools and processes to support those practices. In focusing on the latter benefit, this chapter draws on knowledge accumulated from a range of projects, with reference also to the broader body of research.

The initial projects were focused on design for learning. The *Learning Design Tools* project (Masterman 2009) explored teachers' use of generic tools such as word processing, presentation and mind-mapping software in their design practice. The findings from this study informed two follow-on projects, *Phoebe* (Masterman and Manton 2011) and the *Learning Designer* (Masterman and Craft 2013), which developed and evaluated two prototype 'pedagogy planner' tools to support the design process. The more recent work referred to in the chapter comprises institutional research into the student digital experience (Masterman 2015) and open educational practices (Masterman 2016), which additionally addressed aspects of academics' design practice related to these themes.

Conducting research into a process which is often tacit, incremental, and distributed poses methodological challenges, particularly a reliance on participants' self-reports. Each of the above studies adopted one or more of the following techniques: online questionnaires; interviews with academics, educational developers and learning technologists; workshops in which specific instances of practice were recorded; and inspection of artefacts such as lesson plans and VLE course areas.

## Teachers' Conceptualization of Design

Broadly speaking, the literature distinguishes two dimensions to design for learning: i) the planning and facilitation of structured sequences of learning activities to meet the learning objectives at hand, and ii) a way to describe, or represent, those learning activities so as to facilitate the sharing of teaching ideas and, thereby, improve students' learning (Dalziel *et al.* 2016). The research reported in this chapter concentrates on the first dimension, which

we explored in interviews with participants in the *Learning Designer* project in particular.

It was immediately clear that teachers do not treat design as a prescribed, step-by-step process. Rather, structure is considered as a property that emerges from fluidity and negotiation: as one lecturer expressed it, 'the interplay of aspects of learning and how together they would come up to […] an optimal situation which would enable learning'.

Some interviewees made a distinction at the conceptual level between 'design' and 'planning'. Planning is associated with laying out constraints: for example, time, location, number of students, learning outcomes and content (i.e. a mixture of logistical and pedagogic factors). Design pays attention to what can be achieved within those constraints that will engage and activate the students, and have an impact on both the educational and affective experience of learning: for example, 'problematising learning opportunities, building in choice and challenge for students, [and] anticipating [their] needs and responses' (Bennett, Lockyer and Agostinho 2018: n.p.).

In this way, contextual constraints can function as a spur to creativity. For example, although a session might be designated as a 'lecture' in the timetable, one of the lecturers whom we interviewed designed whatever activities she felt were most conducive to students' learning. Indeed, this perception of a creative aspect to design reflects a duality inherent in some conceptions of design. It can be simultaneously the application of 'systematic principles and methods' and 'a creative activity that cannot be fully reduced to standard steps' (Winograd 1996: xx, xxii) – or, both an art and a science (Mor, Craft and Maina 2015; see also Beetham and Sharpe Introduction).

## Teachers' Approach to the Practice of Design

The overarching practice of design for learning has been operationalized by Dalziel *et al.* (2016) both in a hierarchical model operating at different levels of granularity and in a cyclical (process) model. Our research into teachers' design practice has largely addressed the 'session' level of the hierarchy: that is, individual lectures, seminars, practicals and other classes that are typically one to three hours in duration and either stand alone or belong to a superordinate layer such as a module or course (the 'meso' level: Jones, Chapter 4). In terms of the four interrelated activities in Dalziel *et al.*'s teaching cycle – design and planning, engagement with students, reflection and professional development – our interviews with teachers have focused on design and planning.

In reality, teachers' approach to design is considerably more complex than these two models. For example, different levels of the hierarchy can overlap as a teacher juggles interrelationships, dependencies and multiple actors:

> I mean, that's a module, um, and that links in … so you've got six of those across or whatever and it links down from … but the problem then is your programme design has to go from [year one to] year three.

At the session level, some teachers start with pre-defined learning outcomes, while others structure their plan around a set of activities negotiated with their learners. Teachers may also take different routes through the task, some mapping out learning materials while creating the plan while others create all such learning materials afterwards. For example, one lecturer interviewed for the *Learning Designer* project visualized the early stages of the design process as a circle, with the topic in the middle and the other factors to be considered around the edge. Only when she had obtained her 'big picture' did she switch to the linear (time-based) approach imposed by the VLE. Another person employed a picturesque horticultural metaphor: 'the "compost heap" approach where you throw stuff in and you've got a very big pile and then you can start throwing, taking things out of it […] But then you've got to structure what remains'.

Design and planning can never be wholly dissociated from the other stages in Dalziel *et al.*'s teaching cycle, since a design may need to be adapted in response to contingencies that arise during the learning session itself (engagement with students, or the micro level: Jones, Chapter 4), or reflection may lead to components of the design being added, modified or dropped.

## Factors Bearing on Teachers' Approach to Design

Entwistle *et al.* (2000) and Bennett *et al.* (2011) have noted a propensity among lecturers to reproduce the teaching that they themselves experienced. This was echoed by at least one lecturer interviewed for the *Learning Designer* project: 'you either think they're great and emulate them, or you think they're terrible and try and do something else. Or, you have no idea what to do other than to imitate'. The next four sections address factors that, to varying extents, can influence academics against this propensity: students, discipline, educational theories and frameworks, and research-informed teaching. The factors are intertwined, making it difficult to focus on each one in isolation.

## Student-Centred Factors

In contrast to outcomes-based and curriculum-led approaches to design, a student-centred approach begins with students' needs and preferences (Beetham, Chapter 2). This approach can influence teachers' design practice in three ways:

- Cognitive – focusing on students' learning progress: 'The students would say, "OK, we do not find it easy to understand this and this in

the nervous system." So … when you develop your materials you have your major emphasis on those areas'.
- Agentic – empowering students by designing opportunities for active learning: 'I designed some poster activities over weeks of study … it went down really well because they were active, … they weren't just passive receivers'.
- Humanist – knowing students as individuals and taking account of, for example, their individual interests, aspirations, life situations and culture: 'one reason I very much moved away to online discussion is it gives [a voice to students who] don't like to speak in public'.

(Starkey 2017; quotations from the *Learning Designer* project)

In terms of technology-enhanced learning, in all of the projects we noted that a desire to improve students' learning experience, fuelled also by natural curiosity, may impel teachers to explore new techniques and technologies using one or more of the above approaches. Successful experimentation with a new technique or technology may lead to its incorporation into one's regular teaching repertoire. Regarding pressure from students to innovate, evidence from our digital experience studies suggests that they are primarily interested in online access to readings and lecture materials: they are not necessarily proactive in urging teachers to use new teaching technologies. Furthermore, students' demands for technology use can actually militate against innovative teaching practice and, even, propagate conservative pedagogies. Lecture recordings are a case in point, lending themselves more naturally to a transmission model of learning than to an active model (O'Callaghan *et al.* 2017). That said, students do respond appreciatively to the creative use of technology by academics: for example, where it facilitates breakthroughs in their understanding of complex concepts or opportunities for independent learning.

The emphasis on developing graduate attributes to ensure that students are fit for the labour market has also come to the fore in recent years. Designing requisite skills and technologies into one's teaching may be more straightforward in some disciplines than others. For example, in applied science subjects, students can readily be introduced to the approaches typically adopted in industry. However, transferable skills such as logical thinking, argumentation, background research, and persuasive writing can be a by-product of students' intellectual formation, regardless of discipline.

## Nature of the Discipline

The extent to which discipline differences determine lecturers' academic practice is unclear (cf. Young 2010), but the interviews conducted for the *Learning Designer* project indicated some durable influences. One educational developer suggested that social scientists may have less time for

concepts such as learning styles because of a perceived lack of empirical evidence. Furthermore, modelling professional practice within their teaching may, for example, lead law lecturers to adopt an element of formality and sociology lecturers to adopt a more observational position.

Another educational developer commented that the dominant research methodology within a particular discipline may influence lecturers' attitudes towards re-using materials created by other teachers:

> … if people are stuck on 'Will this [be] better?', the definition of 'better' depends on what your research background is and 'Does there have to be an experiment in which a control group did this and X was applied in this situation and equalled Y?' […] That's quite different from what you might read in a case study from somebody from the social sciences who is talking about a number of factors working together to bring about this change and no requirement for [an] experimental model.

Content can act as another barrier to the cross-disciplinary fertilization of learning designs and design ideas, although this is not inevitable (Agostinho *et al.,* Chapter 6). To surmount it, one must discern something of relevance to one's own teaching in terms of structure or approach. Sometimes, the crossover comes from an unexpected source: a humanities lecturer interviewed for the *Learning Designer* project recalled perceiving the relevance to her own discipline of the pedagogy underlying a reusable learning object developed for physics.

## Educational Theories and Frameworks

Researchers now widely consider that educational theories and theory-informed frameworks play a key role, not merely in contributing to 'good pedagogical design' (Mayes, Chapter 1), but also in countering tendencies towards 'technological determinism', where the use of tools for learning is driven by the technology rather than by sound pedagogic practice (Conole 2008).

In relation to education we can distinguish between:

- *theories of learning*: explanatory theories of how people come to learn (e.g. behaviourism, constructivism), and
- *theories, or models, of teaching*: prescriptive or analytical frameworks for implementing teaching and learning (e.g. Bloom's taxonomy, Kolb's learning cycle), which are derived from practice but may have their roots in theories of learning or cognition.

Interviews with lecturers in the *Learning Designer* project revealed a spectrum of relationships to theory. At one extreme, theory was actively eschewed in favour of pragmatic know-how: '[theory] simply isn't the way

that I orientate to those things […] what's going to inform my decisions are time, number of students, […] the things that they have to get done'. At the other extreme, lecturers displayed a considered intellectual engagement with, say, Kolb's learning cycle or Laurillard's Conversational Framework 'in order to better understand what it is you're doing, or probably to validate […] or extend what you are doing'.

Although theory can inform their practice, lecturers do not necessarily set out to implement a specific approach. Rather, theories tend to become interwoven into their general world view:

> … it's not as simple as saying, 'Oh yes, I'm a, you know, I'm a constructivist or a social constructivist, or a this, or a that, or […] I look at Piaget' […] I think they all do influence, but I don't think there's one correct one.

For some lecturers, the primary function of theory in design for learning is to provide a context for *post facto* critique:

> I'd regard theories as ways of critiquing something that I'd built in the first place, which would then possibly lead me to redesign it quite a lot, but […] I don't see the theories as being […] sufficiently constraining to actually generate a design.

More specifically, theory can fulfil an explanatory, even a transformative, function when one is reflecting on the actual learning session:

> What the reflection can lead you to is the point where you go, 'Well, this is not working but I don't know how to fix it', which then needs to be – you need to be able to head into the theory behind it to work out why it's not working and then you could fix it yourself.

This example is redolent of Lawes' belief in the contribution of 'sound theoretical knowledge' to reflection by providing 'a framework of understanding that ultimately improves the quality of practice and leads to the transformation of subjective experience' (2004: 199) – in other words, to the professional development that constitutes the fourth element of Dalziel *et al.*'s (2016) teaching cycle.

## Research-Informed Teaching

Arguably, a research-intensive university should be at the leading edge of both pedagogy and technology, and respond to students' changing competence and expectations. In our more recent institutional studies of the digital experience and open educational practices, we explored, through interviews,

a fourth factor in academics' design practice: namely, how they can bring scholarly research into their teaching. As one interviewee in our digital experience study commented, this can be difficult in the face of a constant tension between their two roles: 'either you have to have a curiosity about pedagogical methods or you have to really care about your students. That can be hard if what's brought you to [the University] is the exciting research that you can do'.

Applying a framework derived from Spronken-Smith, Mirosa and Darrou (2014, cited in Masterman 2016) to the data from our investigation into open educational practices, we distinguished four ways in which academics can inform their teaching practice with the methods and outputs of scholarly research:

- Research-led – structuring learning around content drawn directly from research, including one's own: 'The teaching is driven by research, and […] they're coming to participate in that';
- Research-oriented – teaching the processes of knowledge construction in the subject: '… guiding a student through your own interpretation of a discipline in order to help them learn their own techniques';
- Research-based – designing activities such as inquiry-based learning that involve research skills and methods: 'Learning how to be a good learner is learning how to do research'; and
- Research-tutored – supporting students to learn through writing and discussing papers or essays: 'The student leaves the tutorial with a different perspective on the essay which they brought to it'.

Approaches such as these may help students to grasp 'the complex and provisional relationships between research and knowledge' (Zamorski 2002, quoted in Masterman 2016: 39).

## The Sociocultural Context

Design is an inherently social act, even when carried out in isolation. Every teacher is part of at least one community, whether this is formally constituted (e.g. an institution or professional body) or an informal grouping of people who share a common interest. Communities can overlap (in that someone may belong to both a university and a scholarly society), or be nested within each other (e.g. a department within an institution). They may be long-lived (as in colleges and universities) or convene for a short time only (e.g. a workshop to share effective practice).

Together, communities constitute the sociocultural context for teachers' design practice: how that practice is prescribed, carried out, supported, and propagated. A panoply of policies, strategies, conventions, procedures, guidelines, and norms can be formulated for different purposes by different

groups within the community (or supra-community organizations such as governments). They act as enablers and constraints on teachers' design practice in addition to the factors already outlined, giving teachers varying levels of autonomy over their design practice (Bennett, Lockyer and Agostinho 2018).

Exploring the sociocultural context in which design for learning is practised yields two key themes: the formal and informal roles of a community's members, and the emergence of strategic initiatives at the institutional level.

In terms of formal roles, educational developers and learning technologists can play a key role in brokering innovation within and across the different communities in an institution, through cascading new ideas for practice, modelling good teaching practice to the lecturers who are studying on these courses, and helping lecturers to frame the pedagogic problems for which they seek assistance: 'you need somebody to look at it and then in a tactful constructive way point out that actually, you know, something else is going on here' (interviewee, *Learning Designer* project).

Informal communities close to the chalkface were particularly valued by *Learning Designer* interviewees, largely for the element of trust that comes from close acquaintance. Interviewees in our study of open educational practices enthusiastically endorsed the value of informal conversations with colleagues about teaching and learning. A humanities tutor described the value of informal conversations about teaching as 'massive', largely because they take place with people whom he trusts and who understand the environment in which he works. In relation to drawing inspiration from the work of others, interviewees in the same study readily admitted the benefits of looking at other teachers' resources and lecture notes: 'seeing good examples of practice might also influence your own practice, which in turn provides a better experience for everyone'.

These observations lead on to the larger question of how to effect innovation in design practice within the wider institution. One *Learning Designer* interviewee summed up the alternatives thus: 'Do you wait for the change to come from the top [or] take a sort of a guerrilla approach and maybe change one or two here, there and everywhere, and then that will feed through to committees …?'

In our early research into design for learning, the 'guerrilla' approach, exemplified by the preceding quotation, appeared to predominate. Latterly, more co-ordinated initiatives are discernible, driven at the strategic level envisaged by Masterman, Walker and Bower: 'if [academics] are to find support and resources to build capacity and to scale up their initiative across a department or faculty, then their efforts must be aligned with institutional strategy' (2013: 21). For example, at the University of Oxford the introduction of a digital education strategy in 2016, coupled with the migration to a new VLE, has provided the impetus for an initiative based on the 'ABC' Learning Design workshops developed at University College London (UCL). These

workshops were themselves instigated by the 'Connected Curriculum' initiative at the institutional level in UCL (Young and Perović 2016).

## Implications for Digital Tools to Support Teachers' Design Practice

The findings from our different research projects, supported and supplemented by the wider scholarly literature, have painted a complex, composite picture of the design process that has to do with the proclivities of individual practitioners and a range of intellectual and sociocultural influences on them, as well as the nature of the process itself (i.e. simultaneously art and science). This picture has been succinctly summarized by Bennett, Lockyer and Agostinho (2018) as 'individual cognitive acts of design thinking [occurring] within a social context […] that shapes both the design process and the design outcome'.

The idea that digital tools can support and extend these individual cognitive acts is an enduring one that has spawned a number of applied research projects since the early 2000s, leading to the development of numerous digital tools including *Phoebe* and the *Learning Designer* (for a historical overview, see Dalziel *et al.* 2016). Even so, a number of barriers to their widescale uptake remain unresolved (Dagnino *et al.* 2018), at the heart of which lies the challenge of facilitating thinking processes that may be both tacit (as noted earlier in this chapter) and idiosyncratic to individual teachers, disciplines and institutions.

A number of authors (including Jonassen 2008; Donald *et al.* 2009) have equated the thought processes involved in designing learning experiences to the solving of problems in ill-defined domains (Lynch *et al.* 2006). Such problems lack a single definitive solution, there is no set of steps for the solver to follow that will guarantee success, and the solution chosen depends largely on how the solver conceptualizes the problem. In terms of digital support, this means providing guidance that makes the design 'problem' more tractable for the teacher without overly constraining their choices. Drawing on Lynch and colleagues' work, Masterman, Walker and Bower (2013) identify five approaches that may be adopted in the design of such tools:

- A general model (ontology) of the domain, on which an expert system can be built to provide guidance to the user.
- Constraints, which either represent characteristics of a successful solution (patterns and templates) or guide the user towards successful solution of the problem (wizards).
- A 'discovery' approach, where the tool provides a digital environment in which the teacher can model different designs and/or gives guidance on demand.

- Case examples, in which the tool finds, and offers to the user, learning designs created by others to tackle the same pedagogic problem.
- Collaboration, where the tool either collaborates with the teacher or facilitates interactions between two or more teachers engaged in the design task, thereby leveraging the building of community knowledge.

Some of these approaches involve building artificial intelligence into the software. This was the case in the *Learning Designer*, where an ontology of design underpinned the functionality of the tool so that it could make suggestions and offer example learning designs to the user based on, for example, knowledge of the intended learning outcomes of the session being designed.

Whichever of the above approaches (or combination of approaches) is adopted in designing a supportive digital tool, a paradox can exist in which some users perceive the functionality of a tool as being too flexible, and others as too structured (hence, militating against creativity) (Masterman and Manton 2011; Dagnino *et al.* 2018). In addition, the problem of achieving a shared understanding between tool and user can risk either simplistic 'recipe'-style guidance, or guidance that is so vague as to leave novice teachers unsure whether their learning design is a 'good' or 'bad' one (Masterman, Walker and Bower 2013).

Furthermore, during the initial phase of planning – the 'art' dimension of design – a teacher or course team may shuffle content, learning outcomes, learning activities and other design elements in a process of rapid to-and-fro that is optimally facilitated using low-tech, pencil-and-paper tools in a real-world environment, where it is still easier to manipulate and share objects than in the restrictive virtual space of a computer screen. An analogue technique that has gained currency in recent years is storyboarding (Beetham 2012). Cards representing specific design elements are positioned and repositioned on a 'canvas', annotated with personal meanings and used as prompts for discussion in order to construct a narrative representation of a module or learning session in words and graphics. The 'ABC' model developed by Young and Perović (2016) is one example of this technique; CAIeRO (Usher, MacNeill and Creanor 2018; Sharpe and Armellini, Chapter 8) is another. Once a satisfactory storyboard has been arrived at, the design can be recorded on the computer in a more structured format.

## Implications for the Deployment of Digital Tools

Supporting individual cognitive acts through developing usable and useful tools addresses only half of Bennett, Lockyer, and Agostinho's (2018) characterization of teachers' design practice. Also to be addressed is their deployment within a social context that can both shape, and be shaped by, their use.

When exploring the sociocultural context of design earlier in this chapter we uncovered tensions between top-down and bottom-up approaches to innovation, particularly in relation to technology-enhanced learning. Unless carefully managed, the deployment of supportive digital tools for teachers' design practice may have substantial implications for relations between the institution and the individual teacher. This risk is reflected by a participant in the *Learning Designer* project, who expressed concern that the software could be imposed on lecturers as 'a measurement tool, rather than a useful organizational tool that allows some critical self-reflection on practice'.

Thus, although the institution must play a central role in exploiting the full benefit of these tools, it must do so in such a way that lecturers feel that they 'own' the tool as well. One suggested solution is to:

> position the tool within the design of a programme, department and faculty where it is used by academics on a regular basis. If it can demonstrate how it improves overall programme-level design, it is much more likely to be incorporated into a wider strategy, where its alignment with stakeholders' needs is recognized and properly interpreted at all levels of operation, including teacher education programmes.
>
> (Masterman, Walker and Bower 2013: 22)

## Conclusion

This chapter reviewed teachers' self-reported design practice in order to establish an understanding on which the development of digital tools to support that practice might be based. Starting from a conceptualization of design as a hybrid of art and science, we identified two intersecting models in which teachers' practice can be located: a hierarchical model of the curriculum structure and a cyclical model of the design–teaching process. In reality, the elements of each model overlap and interact with each other, with teachers' design behaviour further influenced by a number of factors internal and external to them, not least the social and institutional context in which they are working.

A definitive understanding of design practice, and of the factors that have a bearing on it, remains elusive, with each new study having the potential to uncover new variations. At best, the behaviours revealed in our own research and the wider literature yield a multifaceted working truth from which representative requirements (and, hence, design features) for a supportive digital tool can be elicited.

Addressing the first part of Bennett, Lockyer, and Agostinho's (2018) characterization of teachers' design thinking as individual cognitive acts within a social context, we have suggested that these acts comprise an

instance of ill-structured problem-solving, for which a range of computational supports can be applied, individually or in combination. Even so, some aspects of the design process may currently elude computational support altogether. Addressing the second part reminds us that the organizational, educational and social influences brought to bear on the deployment of cognitive digital tools within particular communities are not only as important as the functionality, look and feel of the tools themselves; they are also pivotal in achieving the innovation that the tools are intended to stimulate.

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