

## **Design Researcher Learning through and for Collaboration with Practitioners**

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### **Abstract**

Design research is a genre of inquiry in which the iterative development of solutions to problems in practice provides the setting for scientific inquiry. To conduct ecologically valid studies that also yield relevant and usable solutions, design research is carried out together with practitioners in authentic learning settings – not laboratories. Researchers and practitioners collaborate to analyze the problems being tackled, and to develop and refine solutions, which are informed by (formative) evaluation along the way. In these studies, the function of the investigator is typically multifaceted, including the roles of: consultant/facilitator, designer, and researcher. While most design researchers are afforded formal opportunities to develop their research skills (e.g. through seminars and courses on research design, interview techniques, data analysis, etc.), the consultant/facilitator and designer skills receive far less explicit attention and tend to be learned informally, at best. If design research is to realize its potential contribution to the field of learning and instruction, then explicit attention must be given to developing researcher learning of key competencies within and across each role. As role-specific guidance is already available in professional literature, this paper focuses on four foundational competencies that are needed across all three roles, in each phase of design research: empathy, orchestration, flexibility, and social competence. After briefly discussing the goals, nature and processes of design research, the roles and competencies are introduced, followed by a framework for design researcher learning that takes place through, and stands to serve, collaboration with practitioners. Implications for supporting design researcher learning are also discussed.

## **Rationale**

Design research is an increasingly important genre of research in the field of learning and instruction. In design research, practitioners and researchers work together to produce meaningful change in contexts of practice (DBRC, 2003). Through the collaborative process, empirical investigation takes place and valuable insights are gained for the development of learning theories as well as learning resources (Hoadley, 2004). Commensurate with its twin goals of meaningful change in practice and deriving theoretical understanding, design research communities are characterized with “innovativeness, responsiveness to evidence, connectivity to basic science, and dedication to continual improvement,” (Bereiter, 2002, p. 321).

The ‘social design’ of educational research in general (cf. Wagner 1997) and design research in particular (cf. Barab et al. 2007) plays an important, if not determining role in shaping design research activities (Ormel, Pareja Roblin, McKenney, Voogt, & Pieters, 2012). Researchers and practitioners take on multiple roles during design studies, and these shift over time (McKenney, in press). While most design researchers are afforded formal opportunities to develop their research skills (e.g. through seminars and courses on research design, interview techniques, data analysis, etc.), the development of other competencies required for this kind of research receive far less explicit attention and tend to be learned informally, at best. Further, cross-cutting and foundational competencies underpin the skill set affiliated with each role.

To support the development of design research capacity, this paper describes a framework for design researcher learning that takes place through, and stands to benefit, collaboration with practitioners. First, drawing on literature from design research as well as the design and implementation of instructional innovations, the tasks undertaken in each core design research process are related to three main roles: consultant/facilitator, designer, and researcher. Second, each role is described and research-based factors known to influence the performance of each role are explained. Third, in relation to the roles, four cross-cutting domains of design researcher learning are described: empathy (e.g. fostered when exploring (un)shared goals or becoming exposed to the incentives, motives and reward structures in different settings); orchestration, (e.g. developed by simultaneously attending to research framing, data collection, solution design, implementation, infrastructure woes and stakeholder ownership); creative and analytical flexibility (e.g. learned while optimizing the human and material resources available in ways that remain aligned with instructional goals); and a robust repertoire of interaction strategies (e.g. developed largely through exposure). Finally, implications are discussed for supporting design researcher learning through interactions with practitioners, including pre-interaction preparations and post-interaction reflections.

### **Multiple phases of design research**

Despite the rich variation in approaches to design research, several characteristics of this genre are defining and universal. First, design research features twin goals of deriving new scientific understanding as well as addressing real-world problems in practice. The scientific understanding produced through design research that can be used to describe, explain or predict specific phenomena. Sometimes the findings of design research are used to for more normative purposes, such as the design principles data base with research-based guidelines for technology enhanced learning in science (Kali, 2006). Design research yields varied kinds of interventions to address problems in practice, including: programs, processes, products and/or policies. Second, to achieve these goals, design studies share certain characteristics. Specifically, design studies are (McKenney & Reeves, 2012): theoretically oriented (building on as well as producing

theoretical understanding); interventionist (integrated in research and development efforts to render productive change in practice); collaborative (working with practitioners and other stakeholders); responsively grounded (steered by empirically-based insights); and iterative (featuring successive cycles of investigation over time). Third, while specific processes vary greatly, several key processes are present across design research endeavors. Shown in Figure 1, McKenney and Reeves (2012) identify four key phases: analysis and exploration; design and construction; evaluation and reflection; and – concurrent with each – implementation and spread. As discussed in the remainder of this section, each phase features different core tasks and thus requires a diverse set of researcher competencies.

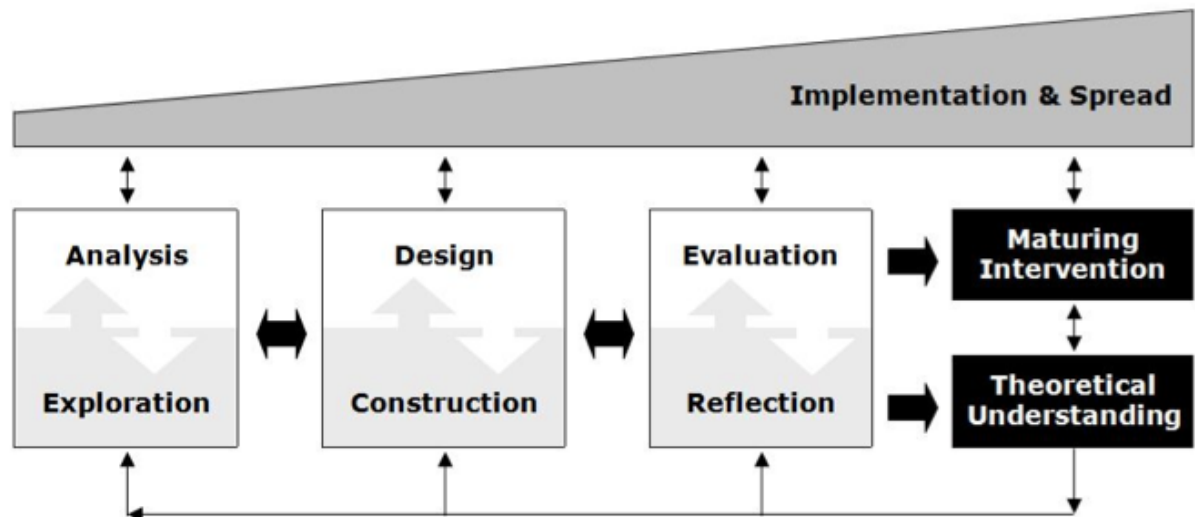


Figure 1: Generic model for conducting educational design research (McKenney & Reeves, 2012)

### **Analysis and exploration**

The analysis and exploration phase yields a better understanding of the problem to be addressed. After initial orientation to the main issues, literature review is conducted to understand and frame investigation of the problem, context, and other relevant issues. Field study is conducted to understand the root causes of the problem(s), identify elements issues worth tackling, and portray any affordances and limitations that should be taken into consideration during design (e.g. stakeholder concerns). Networking and site visits are undertaken to explore other settings in which similar problems have been tackled. The process of reaching out to practitioners, experts and researchers begins to create a network of ‘critical friends’ who may be able to inform the research. This phase yields a descriptive and explanatory definition of the problem to be tackled and a long-range goal. In addition, initial notions about potential solutions (e.g. constraints, imperatives, possibilities) may be generated. Depending on the problem, context and stakeholders involved, quest for understanding the existing situation involves the problem owners (typically practitioners) and often experts.

### **Design and construction**

Interventions to address the problem are explored and mapped out during design, then build and refined during construction. The processes of design and construction are systematic and intentional, but they also include inventive creativity, application of emerging insights, and openness to serendipity. Throughout this phase, ideas about how to address the problem tend to start off rather large and vague; and gradually they become refined, pruned, and operationalized. The work is guided by theory, as well as local expertise and inspiring examples. During design, potential solutions are explored

by: generating ideas; considering each; and checking the feasibility of ones that seem the most promising. Once a limited number of options have been identified, potential solutions are gradually mapped from a skeleton design to detailed specifications. Then, the solution is constructed, usually through a process of prototyping. Early prototypes tend to be incomplete; sometimes several are tested. Later versions are usually more detailed and functional. Often, the design and/or construction processes lead to new insights, prompting new cycles (e.g. revisiting the setting for additional context analysis). Two main types of outputs emerge from this phase: products *describing* design ideas for the intervention (e.g. key characteristics of learning activities), and products *embodying* design ideas for the intervention (e.g. learning activity worksheets). In some projects, practitioners are more active in this phase (e.g. leading or collaborating during creation), but in many projects, the role of practitioners is more reactive (e.g. providing comments on initial ideas).

### **Evaluation and reflection**

Initial ideas, partial prototypes and full designs are the objects of evaluation and reflection. Evaluation usually takes place through developer screening, expert appraisal, pilots and/or tryouts, each of which could use a variety of instruments (e.g. document analysis schemes, interview protocols, pre/post tests). Developer screening helps critique internal consistency and alignment with design goals through a formalized process of examining designs in light of initial intentions. Expert appraisal features external review to validate or improve specific aspects of the design. Pilots help understand how interventions will perform; they are typically conducted early, under semi-authentic conditions (e.g. in pull-out classes, taught by the designer, or with volunteers). Tryouts are conducted in fully naturalistic settings; they can yield insights into various aspects of design (e.g. soundness, local viability, effectiveness). Reflection pertains to retrospective consideration of the evaluation data and experiences. Practitioners sometimes participate in expert appraisals and often participate in pilots and tryouts.

### **Implementation and spread**

Throughout the three phases described above, attention is given to implementation and spread. Implementation entails adoption (deciding to engage with the intervention), enactment (the intervention takes place) and sustained maintenance (continuing the intervention in a sustainable way). Spread pertains to the diffusion and dissemination of key ideas and/or the intervention itself. Practitioners are typically key players in the processes of implementing and spreading interventions, as well as those underlying ideas that hold practical application.

### **Multiple roles**

As may be gleaned from the descriptions above, the tasks undertaken in each core design research process involve multiple roles. While additional subtle differences could easily be identified, we distinguish three different and crucial roles that design researchers play as they interact with practitioners throughout entire projects, and within specific phases: consultant/facilitator, designer, and researcher. Below, we explain what is meant by each role, relationships to the design research phases, and note key factors that are known to influence role performance.

#### **Consultant/facilitator**

This role encompasses sharing expertise with clients to help problem-solving, strategy and planning (mostly consultant), as well as supporting a group of people to achieve an outcome by providing structure, guidance or supervision (facilitator). In design research this role is especially required during analysis (helping people to expose their problems and knowledge thereof). But it is also present in design (sharing expertise, managing

people processes), evaluation (helping to understand what is happening/troubleshooting) and implementation, especially if serving as program champion who helps others get/stay in tough with their reason for being involved (often tied to sense of moral purpose). It requires empathy, flexibility and social competence.

### **Designer**

A designer is one who plans the appearance, form or workings of something that does not yet exist. Educational designers plan and typically help construct innovations in the form of programs, processes, products or policies. This role is of course heavily present during the design and construction phase (influencing the design process as well as the designed products), but also in other phases, as foundational knowledge for design continues to develop. It requires empathy, orchestration and flexibility.

### **Researcher**

The role of researcher pertains to conducting systematic investigation to develop new knowledge (facts, principles, theories, etc.). This role is most clearly present during the phases of empirical investigation: analysis and exploration, and evaluation and reflection. But researcher expertise also serves design, e.g. by providing research-based insights. This role is largely dependent on the skills of orchestration, flexibility and social competence.

### **Cross-cutting competencies**

In the descriptions above, key factors were mentioned contribute to design research interactions with practitioners from the perspective of each role. Reflecting on these factors across the set of roles, it can be noted that several foundational competencies recurred. Specifically, the following competencies are crucial to fulfilling two or more roles; orchestration, empathy, flexibility and social competence. *Orchestration* is needed for simultaneously attending to key aspects of each phase (e.g. research framing, data collection, solution design) as well as implementation and spread (which also include infrastructure woes and stakeholder ownership). *Empathy* is needed for exploring and attending to the needs, wishes and concerns of stakeholders; creating designs that re usable, practical and congruent with stakeholder concerns; help researchers understand and interpret (especially qualitative) data; others take into account (un)shared goals or become exposed to the incentives, motives and reward structures in different settings. *Flexibility* is needed for balancing well-framed investigation with open-mindedness; staying focused on design goals and utilizing unplanned opportunities; drawing conclusions and deriving new questions. Such flexibility also serves orchestration – e.g. optimizing the human and material resources available in ways that remain aligned with overall project goals. Early in design research trajectories, *social competence* is needed to develop trust, build relationships, invite people to feel safe and speak frankly; during design, these skills are needed to negotiate design team tensions and to stimulate new thinking; during evaluation, these skills help engender cooperation, ease frustrations and encourage participants to see things through and remain objective until results are in; for implementation and spread these skills are needed to provide leadership and model positive attitudes. We assert that developing these foundational and cross-cutting competencies can help design researcher performance within and across each role. In the remainder of this section, we examine each competency in light of existing literature and in relation to specific phases of design research.

### **Framework for design researcher learning**

In the preceding sections, we have discussed the nature of design research and the importance of educating design researchers with varied sets of skills to interact with practitioners. Key phases of design research were articulated (analysis and exploration, design and construction, evaluation and reflection – each of which interact with

implementation and spread), as well as the main activities undertaken and the roles of practitioners in each. Thereafter, three different and crucial roles played by that design researchers were discussed. Descriptions of each role (consultant/facilitator, designer, and researcher) highlighted competencies needed for each. Finally, four cross-cutting and foundational competencies were identified and each was discussed: orchestration, empathy, flexibility and social competence. Based on these discussions, Table 1 presents an overview of crucial areas in which design researchers learn through and for collaboration with practitioners. The columns emphasize key areas of learning for each phase of design research alongside implementation and spread, considered by role and competence. The table shows how multiple roles and competencies come into play across entire projects and within specific phases. While individual development and needs would vary highly, the table could be helpful for shaping expectations and targeting learning supports to design researcher at various points in time.

Table 1. Design Researcher Learning through and for Collaboration with Practitioners<sup>1</sup>

Researcher learning about		Analysis & Exploration	Design & Construction	Evaluation & Reflection	Implementation & Spread
Roles (key work in each phase)	Consultant /facilitator	<b>Gets people to expose their (knowledge of) the problem(s)</b>	Supports design with expertise; manages people processes	Trouble-shoots when plans derail	Supports with advice/expertise; champion, moral purpose
	Designer	Gathers descriptions and explanations	<b>Crafts design process as well as designed products</b>	Recommendations for revision/use	New ideas for what could (not) work
	Researcher	<b>Frames and studies problem</b>	Supports design with research	<b>Rigorously investigates solutions</b>	Observes to broaden understanding of context
Cross-cutting competencies (key uses in each phase)	Orchestration	Literature review Field study Site visits & networking	Exploring solutions Mapping solutions Constructing solutions	Screening Expert appraisal Pilots Tryouts Structured & organic reflection	Adoption Enactment Sustained maintenance Dissemination and diffusion
	Empathy	Attending to needs, wishes, concerns of stakeholders	Creating designs that are usable, practical and congruent with target group needs/wishes	Understanding and interpreting data	Understanding how designs fit (or not) in specific contexts
	Flexibility	Critically investigate problem; uncover opportunities	Remain focused on achieving goals; Seek creative alternatives	Deduce and induce; Question why and what if	Goal-oriented improvisation
	Social competence	Developing trust, building relationships, inviting frankness	Negotiation, stimulation	Engendering cooperation, mitigating frustration, encouraging objectivity	Providing leadership, modeling positive attitudes

<sup>1</sup>Bold denotes especially heavy emphasis on this role in this phase

### Concluding remarks

We have argued for the development of design researchers with multiple skill sets. We have highlighted the importance of three roles and four kinds of competencies. We have tackled this work from the perspective of conducting educational design research together with practitioners. Yet it seems important to point out that, while the skills mentioned here develop through and later also serve interaction with practitioners, they are increasingly crucial skills for all modern researchers. Writing in the *Journal of Investigative Surgery*, Toledo-Pereyra (2012) suggests the following 10 qualities of a good researcher: interest, motivation, inquisitiveness, commitment, sacrifice, excelling,

knowledge, recognition, scholarly approach, and integration. Through extensive international research, Deloitte and Apec (2010) identified three sets of competencies required by researchers now and in the future: scientific competencies (scientific knowledge, ability to learn and adapt, ability to formulate a research issue, capacity for analysis and grasp of sophisticated technology tools, ability to work in an interdisciplinary environment, and ability to incorporate existing knowledge), project and team management skills (ability to work in a team, ability to develop a network, communication skills, ability to assess, language skills, business culture and management skills, project management skills, ability to manage and steer teams, awareness of the pertinence of the research and its impact on the environment), and personal aptitudes/interpersonal skills (creativity, open-minded approach, motivation/involvement, adaptability, ability to self-assess). Clearly, the foundational and cross-cutting competencies described here (empathy, orchestration, flexibility, and social competence) align well with existing literature on researcher competencies.

Thus, well-prepared researchers have much more than robust methodological skill sets. As Hostetler (2012, p. 16) indicates,

“The question of what counts as good education research... [is too often] conceived principally as a methodological question rather than an ethical one. Good education research is a matter not only of sound procedures but also of beneficial aims and results; our ultimate aim as researchers and educators is to serve people’s well-being.”

Design research has great potential to contribute to educational research in general (Anderson & Shattuck, 2012), and to the field of learning and instruction, specifically (Gravemeijer & Cobb, 2006). Because design research activities themselves simultaneously contribute to improving theoretical understanding and design practices of professionals, the researcher-practitioner learning through design research might best be characterized using Levin’s (2013) notion of knowledge mobilization – stressing the interactive, social and gradual nature of the bilateral connections between research and practice. Yet this potential contribution can only be realized when investigator skills include those of the consultant/facilitator, designer and researcher. Currently, few (graduate) programs support researcher learning in the domains described above, and little explicit attention is given to the cross-cutting and foundational competencies described. It may be that traditional research institutions have undervalued the contributions these roles have to make to both research and development in education (Burkhardt & Schoenfeld, 2003), but more modern ones have begun to emphasize, stimulate and reward researcher attention to the co-creation, uptake, and use of knowledge. This paper offers considerations for targeting such efforts in the field of learning and instruction.

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