Sustainable, affordable and transferable approaches to experienced doctoral supervisor development

Doctoral study is complex and continues to evolve, bringing a need for expanded, ongoing equipping of supervisors. Supervision takes place against a background of contextual, political, economic and cultural affordances/constraints, with multiple purposes, and in a global higher education system. The result can be significant tensions for supervisors, and often, poor student satisfaction and progression. Globally, systematic development of doctoral supervision capacity is unusual and/or prohibitively expensive at scale.

In response, this paper reports a design research initiative to develop a series of collaborative online workshops for experienced doctoral supervisors, supporting deliberate 'reflective, personal, scholarly and systematic reflection' across ten areas of doctoral supervision. Participants are then well-equipped to craft a successful application for the prestigious UKCGE supervisor recognition. Our evidence suggests short-term benefit is in two phases: directly via collaborative workshop engagement with the supervision literature in relation to participants' shared experiences of supervision, and then via application of that to practice, captured in semi-structured scholarly reflective accounts on development of practice in submission for accreditation. Embedded medium-term benefits are now emerging.

Further iterations suggest the approach is sustainable, transferable, affordable, and richly beneficial to participants, doctoral students and wider doctoral communities. The contribution is both theoretical and practical.

Keywords: doctoral supervision; supervisor development; collaborative workshops; UKCGE recognition

Introduction

Postgraduate research supervisor (elsewhere, advisor, mentor) roles are under-valued, under-provisioned and under-developed in many HEIs globally (Swai, 2019; Taylor et al., 2020), The traditional purpose of nurturing embryonic researchers fit to curate and

develop an academic field (Golde & Walker, 2006) is in tension with recent managerial imperatives towards a scientific-technical postgraduate education that serves wider purposes of market economies (Halse & Mowbray, 2011). Additionally, doctoral supervision takes place against a background of contextual and cultural affordances and constraints but in a global, and mobile, higher education system. Recent years have also seen widespread diversification of the student body and of doctorates, massification, and formalisation of doctoral study (Hasgall et al., 2019). The result is multiple and significant challenges for supervisors, and often, poor student satisfaction, and low rates of doctoral progression and completion, especially in non-laboratory settings (Churchill et al., 2022; Sverdlik et al., 2018).

Swai (2019) shows that supervisors learn from the supervision process, their own doctoral education, institutional guidelines, institutional training courses and individualized learning, and within those, reflection on practice plays a critical role (Churchill et al., 2022; Halse, 2011). As academics, we value, and can benefit from, scholarly approaches to our work (Henderson, 2018), even though many supervisors do not currently engage with the related literature (Taylor et al., 2020). Insight is needed into how supervisor capacity might be enhanced in a sustainable and affordable way. Such enhancement should be aligned with the goals of doctoral study, which, within a range of purposes as above, focuses on the production of a significant contribution to knowledge and the equipping of the student as an independent researcher. We therefore conceptualise doctoral education as having a focus on learning for the particular research project with a meta-focus on learnng to become a researcher, and within a paradigm of education for heutagogy. The supervisory role is then to support both the research project and learning for the craft of research, to be a role model, and to provide a person-, discipline- and stage- appropriate supportive intellectual, technical/strategic

and emotional relationship (De Gruchy and Holness 2007). As such, supervisor development can be considered at one end of a spectrum of teacher professional development (PD). Within a doctoral 'learning alliance' (Halse & Bansel, 2012), Shulman and Shulman (2004) identify clusters of cognitive, dispositional, motivational, performance, reflective, and communal characteristics of 'accomplished teaching': high quality doctoral supervision is enormously complex, and requires deliberate and careful development and sustenance. However, systematic development of doctoral supervision capacity in universities globally is unusual and/or prohibitively expensive at scale (Manderson et al., 2017), although initial induction of some sort is comparatively common (Taylor et al., 2020).

This situation pertains even at the author's well-respected research-internsive university, where systematic analysis and enhancement of supervision is unusual. The author is local 'graduate tutor', with overall responsibility for all ~180 department doctoral students and their supervision by ~80 colleagues, who have very varied lengths of experience. In response, we report on an educational design research initiative developing a series of collaborative online workshops for experienced doctoral supervisors, where 'experienced' is interpreted as meaning that the supervisor has seen at least one doctoral student through each stage of doctoral sueprvision from selection to successful completion. The initiative sets out to support deliberate 'reflective, personal, scholarly and systematic reflection' (UKCGE, 2019) and transference to practice across ten areas of doctoral supervision, and related issues, via a genuine community of practice (CoP), and in particular in the online context, a community of inquiry (CoI) model (Garrison et al., 2010). Participants are then well-equipped to craft a successful application for the prestigious UKCGE (2019) supervisor recognition.

The aim of our research is to explore how experienced supervisors can be supported to enhance their understanding and practice of doctoral supervision. We asked: ***How can collaborative workshops structured around UKCGE-identified key areas of supervision be designed so as to support supervisor development in affordable and sustainable ways that also enhance mutual collaboration and learning across the contexts concerned?*** Ethical consent was secured from the author's institution (REC 1590), and for research related to iteration 2, from the university of Johannesburg also. Below, we offer early evidence that the model adopted appears to be sustainable, transferable, affordable, and richly beneficial to participants, doctoral students and wider doctoral communities. In so doing, we contribute to practice by offering a replicable and apparently transferable approach to the development of doctoral supervision; we also contribute theoretically by showing how the three iterations to date have boht been informed by existing research, and can be framed in terms of grounded design research elements that inform and predict outcomes from future related initiatives.

The UKCGE recognition process:

UKCGE (2019) offers well-respected supervisor recognition via submission of a 'personal, recent, analytical, example-based, scholarly and systematic' account of supervision across ten key areas, supported by references from colleagues and former supervisees, as follows:

- Recruitment and selection

- Supervisory relationships with candidates

- Supervisory relationships with co-supervisors

- Supporting candidates' research projects

- Encouraging candidates to write and giving apporpriate feedback

- Keeping the research ont rack and monitoring progress

- Supporting candidates' personal, professional and career development

- Supporting candidates through completion and final examination

- Supporting candidates to dissemiante their research

- Reflecting upon and enhancing practice

To variable extents, those areas support thoretical comparison with Halse & Malfroy's (2010) dimensions of supervision (the learning alliance, habits of mind, scholarly expertise, technê and contextual expertise), as well as Bruce & Stoodley's (2013) categories of supervision-as- (promoting the supervisor's development, imparting academic expertise, upholding academic standards, promoting learning to research, drawing upon student expertise, enabling student development, venturing into unexplored territory, forming productive communities, and contributing to society). Inevitably, the selection of ten areas is not comprehensive, for example omitting specific reference to research ethics, to the signposting and promotion of wider resources than supervisors, to equality, diversity and inclusion in doctoral education, and to emerging creative and/or deeply collaborative understandings of doctoral education (Harrison and Grant 2015; Shulman and Shulman 2004).. However, there is ample opportunity to reflect on those aspects of supervision within the account, and formative/summative feedback typically probes such reflection.

Educational Design Research

(EDR) is a methodological framework (Bakker, 2018) that sets out to develop theoretical insights and practical solutions simultaneously, in real-world contexts, together with stakeholders (McKenney & Reeves, 2018). There is a dual focus on instructional theory and improved design, in a cyclic, reflective process that asks how to

design the teaching-learning arrangement so that the teaching-learning processes reach an intended aim. The process is therefore 'theoretically oriented, interventionist, collaborative, responsively grounded, and iterative… scientific understanding is used to frame not only the research, but also (alongside craft wisdom and creative inspiration) to shape the design of a solution to a real problem' (McKenney & Reeves, 2018, p. 12). This study is, in particular, didactical, focused as it is on supervisory teaching, so we conceptualise it as didactical design research: the how-questions are complemented (and refined) by the what-questions (which should be guided by theory elements (Prediger, 2019). Theory generated from design research is typically 'humble' (local), but susceptible to theoretical generalisation (Yin, 2009). EDR also makes demands on leadership and participation: its leadership needs empathy, orchestration, flexibility and social competence in a new CoP (McKenney 2016), and productive participation in a new CoP DR context requires innovativeness, responsiveness to evidence, connectivity to basic science, and dedication to continual improvement (Bereiter, 2002) – a subset of Shulman and Shulman's (2004) characteristics of the 'accomplished teacher' learning in the focus context.

Methods

The Workshops Design Process:

Design Research (DR) is theoretically oriented. In terms of the 'how', we adopted a synchronous online modality, for reasons of accessibility, convenience, and cost. Recent years have seen rapid expansion in access to, and use of, synchronous distance learning tools (Sand, 2022), and although the related pedagogies remain underdeveloped (Mallon et al., 2023), we are beginning to understand better how to establsih the social, teaching, student and central cognitive 'presences' apparently necessary for effective learning

(Shea & Bidjerano, 2010). These are well supported for example via a relatively small participant group, establishment of a secure and supportive ethos, clear goals, active learning approaches, shared supplementary resources and use of breakout discussion.

Darling-Hammond et al. (2017) identified three features of organisation for effective teacher professional development (PD), that we adopted for initial design: active learning, collaboration, and sustained duration interleaved with practice….and they emphasized the need for assessment of participant learning in relation to clear goals, for reasons of both motivation and quality of learning; Fan et al. (2023) show that excessive demands on teacher commitment are counter-productive, and that the range of PD experienced should be coherent with teachers' goals.

In terms of the 'what', the UKCGE framework supports supervisor learning enhanced by scholarly engagement with the literature and reflection on practice (on both what has been and what might be). As shown above, this appears a theoretically-consistent tool with which to structure content. UKCGE (2019) provides a range of appropriate support materials, and the UKCGE recognition application process was thought to provide extrinsic motivation for participation, as well as embedding personal independent scholarly reflection on practice.

We therefore initially adopted a model of six spaced (three-weekly) one hour collaborative workshops, and limited the group size to at most fifteen; participants had to justify their application, and commit to missing at most one session. After the introductory 'prototype' workshop, each participant was responsible for leading a literature-informed, active half-session focused on one of UKCGE's ten identified areas of supervision, and structuring that so as to supporting scholarly reflection on links with supervision experience. To date there have been three design iterations, each facilitated by the author:

1. In the author's home department in a research-intensive university in England, Oct 2021-March 2022: ten Education academics plus two 'critical friend' experienced supervisors, from Egypt and South Africa respectively.

2. Five supervisors from each of the universities of Johannesburg, Namibia, and Zambia, from a variety of science and social science disciplines, March 22-June 2022. Co-facilitation by one of the initial 'critical friends'; related comparative research by the author and one academic from each of the three southern African universities involved.

3. Ten social science academics from the author's home faculty, Oct 2022-March 2023

Nearly all participants (23 of 25) went on to submit applications for UKCGE recognition, and all have succeeded, 13 of the 23 at the second attempt. Research was led by the author, with support from each of the three southern African leads involved in iteration 2.

Data collection and analysis were designed to support iterative theorising and refinement of workshops, as follows:

Insert Table 1 here

Surveys collected core supervisory information (academic background and supervision experience). They probed participant intervention experiences and perceived learning, focused initially around structure, people organisation, reported practices and content, in order to discern potential improvement for intervention purposes. Surveys drew on Halse and Malfroy's (2010) and Bruce and Stoodley's (2013) supervision categories. For iteration 2 the survey also included questions around

the associated cultural and contextual affordances and constraints, to inform comparative analysis, but that is not the main focus here. In-depth interviews probed such issues more deeply.

Reflexive thematic analysis leading to 'unified interpretative stories' (Braun & Clarke, 2022) was applied to data available after each iteration, with further analysis and interpretation informed by the literature. Each of the four researchers was to some extent an 'insider', as is typical in DR. Additionally, the author is a senior academic within a well-respected university, so that, while some of the participants were more senior, validity of response might have been impacted by unequal power relations, especially if a respondent came from a culture where age and/or academic hierarchies are especially pervasive. Considerable care was therefore taken to seek, and be seen to value, 'no holds barred' responses in surveys and interviews as part of the collaborative inquiry culture established, even though, with the small number of participants involved, most responses could be identified from the participant characteristics requested (that were necessary for data interpretation). In reporting findings, we have taken care to look for 'typicality' in positive response or claim of positive impact, while also noting individual challenges ore reservations in order to consider developments in design that might address those. Trustworthiness was enhanced by cross-researcher and participant validation of interpretation, though findings remain fundamentally subjective and co-constructed, since they are based on participant reports. Findings in DR are initially local, depending on theorisation to support transferability; in our report below, we therefore move from the local to the theorisation of that.

Findings

At a high level, participants reported a near-immediate benefit to their own thinking and, crucially, practice, in each of two phases: via **collaborative workshop** engagement

with the **supervision literature in relation to** participants' **shared experiences of supervision,** and then via **application of that to practice**, captured in semi-structured **scholarly reflective** accounts of (development of) practice in submission for **accreditation**. Submitted reflective accounts confirm that. Each of the aspects in bold was widely identified as being instrumental in participant development. Later unsolicited emails and live comments (with consent for quotation) show embedded medium-term benefits to supervisors and, importantly, to doctoral students, are now emerging, and the process catalysing related conversations more widely within participants' institutions. Further, expansion of workshops to low-resource supervision contexts and also across academic disciplines, in iterations 2 and 3, suggests that in summary, the approach is sustainable, transferable, affordable, and richly beneficial to participants, doctoral students and wider doctoral communities: we justify those claims below and in discussion.

After iteration 1, for example, surveys included the following four comments:

> The best professional development I've had in 17 years at (home institution): challenging, refreshing, reconstructive of both thinking and practice (Iteration 1 participant 1);
> Transformative to approach supervision with a parallel academic and professional lens (Iteration 1 participant 2);
> A wonderfully supportive, stimulating and humbling experience that is already impacting my supervision practice (Iteration 1 participant 3);
> I feel privileged to have had access to so much wisdom and experience: my thinking about doctoral supervision has deepened and grown, and my practice is both renewed and developing further (Iteration 1 participant 4).

But also

> Time for small group discussion of a stimulus question or case study is the jewel and shouldn't be rushed (Iteration 1 participant 4);

Despite what you kept saying, I should have been more disciplined about making notes on my learning as I went (Iteration 1 participant 1).

Further, not all initial applications for recognition were successful: for example, some participants appeared to assume the application was a formality, and needed to re-submit with a more carefully-crafted account. Feedback suggested some colleagues found the need for resubmission quite challenging, although following final recognition, they acknowledged the benefits to their knowledge and practice of engaging with the process in more depth:

Initially, I felt angry, as if my professionalism was being questioned, but in restrospect I've shifted to seeing the process of deeper engagement as productive in itself: I'm now more secure in my reflections and the imperative to make the changes I've started putting in place, so that resubmission has been very productive, and I've said that to colleagues; I've also come to see active engagement with the literature, and questioning supervision practice with others, as an ongoing need, for both my own benefit and that of our students (Iteration 1 participant 5).

In consequence of such data, iteration 2 retained core features as above, but was expanded to include:

- A stronger leadership steer on the centrality of small group discussion and limited number of slides in workshop planning;

- A stronger encouragement for participants to make notes of reflections and experiences during and after sessions, to support both depth of writing and manageability of producing the submitted reflective account;

- Inclusion of optional additional sessions engaging with submission criteria as part of an opt-in peer assessment of draft reflective accounts, so as to support mutual support, understanding of what was being valued, and enhanced rates of formal recognition.

In addition, iteration 2, responding to the changed context and additional comparative research, featured an introductory session that shared core characteristics of the four national/university doctoral supervision contexts, as a foundation for mutual understanding. Further, it included facilitator active listening to, and probing for, what might be contextual or cultural affordances and constraints on supervision practice. Resulting areas of supervisory concern included most doctoral students working in a second/third/… language; institutional incentives for timely completion; early academic foundations often insecure; insufficient supply of experienced supervisors; and a range of doctoral assessment systems….. While these occur variably across universities globally, the intrinsically international and interdependent nature of doctoral systems suggests they are, at least potentially, relevant universally. These concerns impacted, and informed, participant reflections and practice, but they did not appear to bring any pressing need for further major adaptation of underlying design.

However, the inclusion of participants from disciplines beyond the social sciences brought not only a richness of wider perspective (for example, different norms of publication, funding and career trajectories in lab-based disciplines), but challenges in coming to understand the supervision literature, much of which is presented within social science qualitative paradigms. While feedback was again overwhemingly positive, and despite the additional review activities inserted, the path to successful recognition was again found to be challenging, with colleagues indicating that the nature of the required critical scholarly and practice-related narrative was unfamiliar:

> It was a steep learning curve for me as an engineer to learn to read and critique the supervision literature. But I enjoyed that, and the workshops and reflection on my supervision have opened my eyes to other possibilities I think I should put into practice (Iteration 2 participant 1);

> The workshops have been inspiring, and they've already affected my supervision. My colleagues want to have the chance to take part also, they're jealous! But writing the submission was hard: after the peer review workshop I thought I knew what was wanted, but they said it's not reflective or critical enough. It was really hard to turn round and re-write, but I think it's stronger now, and I've learnt from that (Iteration 2 participant 2).

Challenges in complying with requirements for recognition, even afetr peer feedbcak based on UKCGE criteria, might reflect southern African cultures, but might just vary by local institutional culture: iterations 1 and 3 both took place in a single research-intensive university in England.

Iteration 3 therefore built on the two earlier series, retaining core design features as well as structures to support opt-in peer review of draft reflective accounts, but also inserting an early shared reflection on approaches to engagement with the social science literature. Workshops were largely less ambitious than in the previous two iterations, and conributions sometiems less confident, possibly because of the mix of personalities involved; we plan to move to a renewed focus on the commitment/collaboration required, and 'rationale statement' required pre-participation. Nevertheless, participant feedback was very positive, with no substantive changes suggested:

> This is definitely a format that worked well for me: thank you so much. I learned a great deal both from the experiecnes of colleagues across (the institution) and from enaggament with the supervision literature, and shall be much mro sensitised to that moving forward. The submission was also very productive, catalysing several small change that my students have welcomed (Iteration 3 participant 1).

Such are the core findings in terms of intervention design; DR demands also consideration of the theoretical elements involved. We present those using an adaptation of Prediger's (2019) elements of didactical DR:

Insert Table 2 here

Discussion

Our data suggest short-term benefits in two phases: directly via collaborative workshop engagement with the supervision literature in relation to participants' shared experiences of supervision, and then via application of that to practice, captured in semi-structured scholarly reflective accounts on development of practice in submission for accreditation. Our initial findings above relate to several aspects of the innovation: its online modality, requirements for the peopling and process of successful EDR, and our theorisation of the target content. We address each of those areas in turn.

Given the online modality adopted, Shea and Bidjerano's (2010) **social, teaching, student and central cognitive 'presences'** appeared well supported via a relatively small participant group size, establishment of a secure and supportive ethos (as confirmed by participants), clear goals, active learning approaches inlcuding the use of breakout discussion, and shared supplementary resources. Whether this is a minimal necessary set to achieve those presences is not yet determined, but in any case we conjecture that any such minimal set depands, inter alia, on the participants.

We noted above that McKenny (2016) shows that **leadership of EDR** requires empathy, flexibility and social competence in a new CoP. Our participants suggested in responses that was achieved, but there remains a particular threat in this area from insider research, as discussed. Importantly, we do not consider that the extent of such qualities needed for such leadership are exceptional, so viable leadership should normally be available locally, though it does require some relevant knowledge and preparation. Bereiter (2002) argues that **productive participation** in a new CoP DR context requires innovativeness, responsiveness to evidence, connectivity to basic science, and dedication to continual improvement. Our data did not support a need for

especial innovativeness from all participants, though the research leadership needed some such. Videos show that participants did, though, demonstrate Bereiter's other qualities; we do not have the data to establish whether those are strictly necessary.

Our model drew, directly or indirectly, from every source identified by Swai (2019) as contributing to supervisor development: participants suggest participating supervisors show considerable variation in approaches to supervision and supervisory roles adopted, even within one university frequently made connections with the doctoral education they themselves had received, as well as to specific exemplars within their own supervisory practice; they reflected on the affordances and constraints of their own institutional guidelines and structures, and either to their (in all cases, fairly limited) experiences of institutional training, or to the absence of such opportunity. They engaged both collectively and individually with making links of practice with the supervisory literature, and developed their own individual reflective account for recognition submission. Throughout, individual or collaborative reflection on practice and possibilities in relation to the literature appeared particularly valued by supervisors, and productive for their learning.

We note briefly that across contexts, there were variations in the affordances and constraints of supervisory guidelines and structures – and that the impact of those was experienced variably by individual, as well as by discipline. However, within each area of supervision considered, there was also much that was in common across contexts, disciplines and individuals - including major challenges associated with doctoral student induction, progression and support. The quality of student preparation, availability of high quality (co)supervisors, doctoral assessment structures, financial and career doctoral completion (dis)incentives, all serve to shape the choices perceived to be available, and point to particular issues sometimes specific to context.

In summary, we claim the approach adopted is:

- **Sustainable:** we contend that the necessary leadership is usually available to universities locally, and that while requiring some time and knowledge, it makes only reasonable professional demands of an experienced education developer or other appropiate academic. We make similar claims of the participants, and the time, commitment and other qualities required of them. Eighteen months after first accreditation, benefits to individual supervisors, to doctoral students, and to wider local research cultures are still being reported in unsolicted (email ro personal) reports; longer-term impacts are of oucrse not yet known.

- **Transferable:** we have begun to show that the approach transfers across disciplines and contexts, including some low reource contexts, provided attention is paid to emerging needs for local adaptation; further research would be needed for a more robust claim.

- **Affordable:** we have addressed time and commitment, but financially, the costs are not great (UKCGE makes an administrative charge in relation to accreditation, but peer assessment is undertaken on a voluntary basis). Similar but cheaper models of assessment could conceivably be developed, but status of the resulting accreditation si also important for extrinsic motivation.

As above, some supervisors reported a 'transformative' impact on their thinking and practice; the scale of such occurrence, and its sustainability, would need further research.

However, in summary, we suggest we contribute to practice by offering a replicable and apparently transferable approach to the development of doctoral supervision; we also contribute theoretically by showing how the three iterations to date have both been informed by existing research, and can be framed in terms of grounded

design research elements that inform and predict outcomes from future related initiatives.

Other researchers and participants

The author was responsible for design of iteration 1 and 3 workshops, participation, and research. Three southern African colleagues contributed to the second iteration of each of those, including to the development of research around a second, comparative research question. That is not the focus of this paper.

Declaration of interest

The author declares no known conflict of interest.

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Table 1: Data collected

	Workshop video	Post-UKCGE submission participant	Submitted reflective	Recordings of participant interviews (i/v) and unsolicited email or live comments
Iteration 1	6	12	12	2 i/v recordings, from 'critical friends'; 9 email and 8 live comments
Iteration 2	9	15	13	4 i/v recordings, from both facilitators and the two other national lead participants; 13 email comments
Iteration 3	7	10	10	3 i/v recordings, from purposively chosen participants; 7 email comments

	How-questions for theory elements on the design of teaching-learning arrangement	**What-questions for theory elements on structuring the content**
Categorial theory elements	Medium, duration, structure, assessment/recognition, characteristics of leadership and participants.	Wide range of aspects of supervision, plus academic skills to support accessing supervision literature and scholarly reflective accounts of practice.
Normative theory elements	Supervision conceptualised as a particular form of teacher PD, at one extreme of engagement with knowledge and of independent learning.	Collaborative reflection on a range of supervisory responsibilities and experience, informed by the literature. These might be organised via UKCGE ten areas although with sensitivity also to what is not included there. This has a goal of scholarly, specific reflection on a wide range of supervisory practice, leading to enhanced practice, and external recognition of that.
Humble predictive heuristics	Functional access to medium and to appropriate literature and assessment resources. Online, secure and supportive ethos, collaborative, sustained, active participation including via distributed responsibility, structures to support assessment/recognition or other incentives to commit. Provision should be made to pre-empt and/or support initial 'failure' of recognition.	Participants might need to be supported to learn from the literature and to reflect on practice in writing; Content needs to be broad across supervision, though particular issues of concern and interest depend on individual, discipline, culture and context.
Descriptive theory elements	Participants need sufficient breadth and depth of experience to sufficiently benefit from others' accounts and from the literature – and to then transfer to practice. Distributed leadership needs deliberate semi-structure and sufficient (considerable) space for interchange.	With the given approach, supervisors can reflect on their own practice in relation to the literature and to their own and others' experience; codifying that within a UKCGE submission appears to support both embedding of that learning and transference to practice.
Explanatory theory elements	This design capitalises on all Swai's (2019) identified pathways to supervisor learning, and especially via practice-informed and scholarly reflection. It conforms to Darling-Hammond et al.'s (2017) key characteristics of effective PD.	The approach appears to both draw on and contribute to development of the range of Shulman and Shulman's (2004) characteristics of 'accomplished teaching', as well as to Halse and Malfroy's (2010) and Bruce and Stoodley's (2013) specifically identified aspects of supervision, but does so in ways which are particular to the individual and their context.
Refined predictive theory elements	The humble predictive heuristics appear to extend across a range of disciplines and a range of cultural and resource contexts, but might need to be complemented by additional support for engaging with the process where the expectations draw on assumed knowledge, skills and academic habits not possessed by all participants. Experienced and locally 'successful' supervisors need culturally-acceptable support to develop a deeply informed and reflective account that is open to problematisation of aspects of their practice. We have yet to test the impact of other facilitators and further groups of participants: it might be that McKenny's (2016) and Bereiter's (2002) respectively necessary characteristics have threshold levels for intervention 'success'.	The literature does not identify significant aspects of supervision that lie outwith those experienced across the disciplines within which our participants worked, nor beyond the two geographical areas with which we engaged, although there might be distinctions by degree. These include work in relation to issues of equality, diversity, and inclusion, and of even more reduced resources. Further distinctions might be found with more research.