How professional education can foster praxis and critical praxis: An example of changing practice in healthcare

Abstract

Learning is crucial to how professionals enact practices, and to how practices change. Professionals frequently encounter uncertainty regarding what to do, requiring praxis informed by practical wisdom, which takes into account the virtues of practice. Critical praxis takes this further, questioning current norms to reduce untoward effects. A simulation-based education program for healthcare professionals was selected for study due to strong evidence of sustained improvements in handling a rare and challenging birth emergency (shoulder dystocia). Videos of simulations and debrief discussions were analysed in terms of complexes of sayings, doings and relatings. Practitioners learned to respond in agile, collective ways to specific situations, through praxis. An extension to the theory of practice architectures is offered, based on two new concepts. "Connective enactments" involved narration, questioning, and directing actions; these contributed to "collective accomplishments" of fluid role-switching, responsive sequencing and pacing, and producing calm. These new concepts help to theorise how professional education can contribute to practice change by fostering praxis and critical praxis, addressing the architectures that shape practices.

Keywords

Practice theory; professional learning; simulation; praxis; healthcare; collaboration

Introduction

What happens in a practice is contextual and only ever fully determined in the moment of action (Schatzki, 2010), meaning the work professionals do and the knowledge they need to do that work in every day practice are not fully specifiable in advance (Hager, 2011). This unfolding nature of practices can be conceptualised in terms of emergence, and it raises important questions about relationships between professional practice, learning, and the moral purpose of practice (Kinsella & Pitman, 2012). This is especially the case in healthcare, the context for this paper. Moments where emergence is most problematic for those involved include emergencies where prescribed procedures are not sufficient to determine how to act, and yet those actions have significant consequences. These are frequently sites where practice change is also needed, in order to reduce untoward outcomes. This paper explores an educational program that addresses one such moment in healthcare practice, and which has been linked to sustained practice change.

Shoulder dystocia (when a baby's shoulder gets stuck during birth) is a high-stakes emergency. "Few obstetric emergencies cause as much anxiety as shoulder dystocia" (Fahey & Mighty, 2008 p. 121). It can be 'one of the most frightening emergencies in the delivery room' (Baxley & Gobbo, 2004, p. 1707), often occurring with no warning, and with no simple solution. The delivery team must act in ways that cause the least harm to both the baby and mother – a moral concern – yet historically, physical injuries to one or both have been common, and if

not resolved within minutes, foetal brain injury or death are likely (Baxley & Gobbo, 2004). Understandably, shoulder dystocia has been a focus for practice improvement through professional education, and guidelines in the form of mnemonic (HELPERR) used to help practitioners recall a sequence of manoeuvres that aim to release the shoulder and deliver the infant. HELPERR sets out a sequence of actions: calling for help (H); evaluating for episiotomy (a cut) (E); raising the mother's legs (L); applying external pressure (P); entering to perform rotational manoeuvres (E); removing the posterior arm (R); and rolling the patient to her hands and knees (R) (Gobbo et al., 2017). This orders the actions associated with least harm first, rather than what is physically easiest (going straight for the posterior arm). If needed, P-E-R actions are repeated with the mother on all fours. HELPERR has been implemented in practice and incorporated into ongoing professional education in many countries (Gobbo et al., 2017), including the site studied. It is significant both because it specifies a safe set of actions that can resolve the problem of shoulder dystocia, and as an example of a protocol, given widespread use of similar devices to enhance safety and standardise practices in healthcare.

Clinical practice guidelines or protocols are common, with recent attempts seeking to implement these at increasingly granular levels (e.g., "precision medicine") (Rushforth & Greenhalgh, 2020). Effectivement management is increasingly recognised as a collaborative achievement, requiring team-work, not just individual actions, making shoulder dystocia a highly charged exemplar of a shift in focus from volume or quantity in healthcare improvement to values and quality, new approaches increasingly foreground critical interprofessionalism and patient-centred care (Comunale et al., 2021). A common approach to practice change focuses on diffusion of innovation, the spreading and scaling up of improvements from one site to another (Greenhalgh & Papoutsi, 2019). Others focus on more locally-focused development of pracititioners' motivation and ability to strengthen patient safety, including through team training (Brandstorp et al., 2016). This paper follows the latter approach, examining a site where professional education has been associated with sustained and significant improvements in clinical outcomes relating to shoulder dystocia, linked to granular changes in practice (Author2 et al., 2018). This site is particularly interesting because enhancing patient outcomes in shoulder dystocia has proved challenging internationally (e.g., Satin, 2018).

This paper extends a growing body of work using practice theory to cast new light on relationships between learning and practice. While these relationships have often been explored in terms of learning in everyday work (Billett, 2017; Fenwick & Nerland, 2014; Reich et al., 2017), our focus is on ongoing education for professionals, where there is a need to address the challenges of emergence, responsibility and the moral purpose of practice (Bontemps-Hommen et al., 2019; Fenwick, 2012, 2016; Iedema et al., 2013). In a systematic review of healthcare professional team work education, Eddy et al., (2016) found found participants particularly valued practical, authentic learning opportunities that fostered reflection and debriefing, including high-fidelity simulations. These are all characteristic of the educational program that forms the focus on this paper, which has as one of its key components, a session designed to promote interprofessional collaborative practice in responding to shoulder dystocia. Simulation is widely used, especially in healthcare (Abrandt Dahlgren et al., 2019), and while it has often been researched in terms of its reproductive character (through concepts of authenticity and fidelity) (Dieckmann et al., 2007), we explore its transformative potential – how simulation-

based education can be a means to *change* practices (Hopwood 2017; Hopwood et al., 2016; Rooney & Boud, 2019; Rooney et al., 2015).

We wanted to understand how this particular educational approach has helped professionals deal with the challenges that shoulder dystocia presents, and how in doing so it has also – simultaneously – contributed to sustained practice change. We explored this through linked concepts of praxis and critical praxis, embedded within the theory of practice architectures.

Theorising practice, emergence and learning

Practice theories have been widely applied to questions of professional practice, learning and education (Billett, 2017; Gherardi & Strati, 2012; Green, 2009; Green & Hopwood, 2015; Hager et al., 2012; Hopwood, 2014; Kemmis, 2009, 2019; Price et al., 2009). Practice has been defined in different ways, with many referring to a "temporally evolving, open-ended set of doings and sayings" (Schatzki, 2002, p. 87). Kemmis (2019) adds "relatings" (p. 13), referring to practice as a form of human action in history where actions (doings) are comprehensible in terms of ideas and talk (sayings), and the people involved are in particular kinds of relationships (relatings). These components hang together given the ends and purposes that motivate the practice (the project). The motif of doings, sayings and relatings is taken further in the theory of practice architectures to include moral aspects. Indeed, all of these are central to considering *professional* practices, as Mahon et al. (2017) explain:

> We regard professional practice as socially – and ethically – informed practice in various professional and occupational fields; it is professional not only by virtue of being linked to specific occupations, but also because it is conducted in the manner that, in ordinary language, we describe as professional. (p. 4)

Emergence is one of several threads common to diverse practice theories. According to Reich and Hager, (2014), "Practices are emergent, in the sense that the ways that they change and evolve are not fully specifiable in advance… [this] brings new understandings to how practices stay the same and how they evolve" (pp. 426-427). Stability and change can be conceptualised as co-present features of emergent practices. Practices are prefigured, such that they become patterned and recognisable, but they are also indeterminate, meaning there is always the possibility of acting differently (Schatzki, 2010, 2013; Hopwood, 2016). The ways practices emerge in particular instances are shaped by norms (Schatzki, 2010) and moral purposes (Bontemps-Hommen et al., 2020; Fenwick, 2016; Iedema et al., 2013; Kemmis & Smith, 2008; Kinsella & Pitman, 2012). They are also shaped, prefigured, enabled and constrained by practice architectures and the arrangements that comprise them (Kemmis, 2019).

The theory of practice architectures was developed by Kemmis and colleagues (Kemmis, 2019; Kemmis & Grootenboer, 2008; Kemmis et al., 2012, 2014; Mahon et al., 2019). The practice architectures of a practice are the cultural-discursive, material-economic, and social-political arrangements that give form and substance to a practice, hold it in place, enable and constrain it. To change a practice requires changing these practice

architectures. They prefigure but do not predetermine, practices, leaving practices to unfold differently each time (Kemmis et al., 2014). In shoulder dystocia, the cultural-discursive arrangements include technical language (such as that used to refer to manoeuvres in HELPERR) and ways of communicating among the delivery team; the material-economic arrangements include delivery equipment (monitoring maternal and foetal vital signs etc.), and characteristic embodied doings (including the HELPERR manoeuvres); the social-political arrangements include the relationships between different practitioners, which may reflect expectations of roles depending on profession, seniority, and experience.

In the theory of practice architectures, learning is learning to enact a practice differently and transforming the practice architectures that make the practice possible (Kemmis, 2019). Conceived in this way, simulation does not necessarily simply foster learning how things are already done by recreating the sayings, doings and relatings of stable, "real" practices. it can be a means to reshape how things are done by making new architectures possible (Hopwood, 2017). Such a transformative role for simulation can be understood by tracing how simulation changes the arrangements that make up the architectures of the practices they simulate.

The theory of practice architectures tackles the emergent nature of practices, and the morally charged dilemmas that can result, through notions of praxis and critical praxis. Praxis involves 'acting wisely and prudently for the good of humankind' (Kemmis, 2019, p. 95; see also Kemmis & Smith, 2008). This can be understood in terms of morally-committed action, informed by practice traditions including those of healthcare professions (a neo-Aristotelian view, see Bontemps-Hommen et al., 2020), or as history-making action, with moral and political consequences (a Hegelian-Marxian view) (Kemmis & Smith, 2008; Kemmis 2019). Kemmis (2011) suggests the former is frequently the view of praxis from a participant perspective, and the latter that from an observer's perspective. In exploring how professionals learn to respond to shoulder dystocia in ways that minimise harm to both the mother and baby, both of these views are in play: actions that are morally charged for those involved, and which have wider consequences.

The theory of practice architectures links praxis to the intentions, values, knowledge, understandings, and skills that drive practitioners' practices. The disposition to act wisely, virtuously, and for the greater good is referred to (drawing on Aristotle) as phronēsis (Kemmis & Smith, 2008). Practical wisdom can be understood as an "intended moral compass" (Bontempts-Hommens et al. 2019, p. 98), a disposition to perform the action one judges to be right, for a greater good. The associated action is praxis (Kemmis, 2019). Many authors use the term "practical wisdom" interchangeably with phronēsis (Bontemps-Hommen et al., 2019, 2020; Kemmis, 2019; Kinsella & Pitman, 2012).

How does praxis relate to emergence? In this paper, we follow Kemmis et al. (2014), taking up praxis is particularly valuable in understanding what people do when protocols, guidelines, or familiar routines are not sufficient.

> It turns out that we confront uncertain practical questions more or less constantly, in the form "what should I do now/next?" The kind of action we take in these circumstances is not a kind of rule-following, or producing an outcome of a kind that is known in advance… but rather action whose consequences are more or less

> indeterminate, but that can only be evaluated only in the light of their consequences—in terms of how things actually turn out. This kind of action is 'praxis'. (Kemmis et al., 2014, p. 26)

In health care, Bontemps-Hommen et al.'s (2019) definition of practical wisdom also points to emergence, linked to purpose or intention:

> Knowing how to remain focused on achieving the good for each individual patient, within the context of the practice and its telos, in ever changing situations, and of how to accomplish this by the most appropriate means, while dealing with complexity and situational and systemic pressure. (p. 103)

When a shoulder dystocia arises, the delivery team cannot simply follow rules that guarantee quick delivery without injury. Protocols – especially HELPERR – are important, but the effectiveness of a particular manoeuvre, and the consequences for the mother and child, are not known before they are performed, under incredible pressure given the possibility of serious and potentially fatal outcomes.

Kemmis (2019) and Kemmis and Smith (2008) further distinguish *critical praxis*. This involves 'interrogating and transforming existing ways of doing things that currently have untoward consequences' (Kemmis, 2019, p. 95). This is linked to a critical disposition to free people from previously accepted practices and norms. Given the well-documented adverse outcomes of shoulder dystocia (foetal and maternal injury, even death), practitioners and healthcare educators have long recognised the need to change practices (Baxley & Gobbo, 2004). So, when a shoulder dystocia occurs, those involved must act immediately for the good of the mother and child, but may also need to depart from established ways of doing things. In this paper we understand praxis as a form of action in-the-moment that achieves a particular delivery without injury. We take up the concept of critical praxis to pinpoint ways in which acting for the good involves breaking away from past practices, doing things differently.

Research context and methods

Shoulder dystocia: An unpredictable birth emergency

Shoulder dystocia is a high-stakes emergency that has been the focus of widespread attempts to change obstetric practices. Shoulder dystocia refers to when a baby's shoulder jams against a mother's pubic bone during delivery. The head has birthed but the torso is stuck. Maternal pushing and actions to pull the baby out must cease due to the high risk of serious injury, paralysis, or death. Practitioners must act in a window of between five and seven minutes, beyond which either brain injury or death is likely. Shoulder dystocia is common enough that practitioners are likely to encounter it, but not so common that practitioners become confident and effective in handling it (Fahey & Mighty, 2008). Ongoing professional education for shoulder dystocia has been recommended for over 20 years (Cornthwaite et al., 2015), with simulation adopted as the pedagogic approach in many settings. However, clinical outcomes have been inconsistent (Fransen et al., 2017; Satin ,2018; van der Ven et al., 2016; Walsh et al., 2011). A a focus on individual skills rather than teamwork has been suggested as a key reason for this (Cornthwaite et al., 2015).

Protocols have been a significant feature of attempts to improve outcomes in shoulder dystocia. They are often assumed to guide staff to undertake the correct actions, "making the right way, the easy way" (Cornthwaite et al., 2015, p. 4). A commonly used example is the aforementioned HELPERR protocol. While HELPERR is a mnemonic facilitating recall of specified actions and their sequence, evidence suggests that it is needs to function as far more than a private memory aid, being taken up as a shared reference in collaborative practice (Hopwood, Dahlberg et al., 2020).

Research setting and methods

This study focused on an education program operating at the University Hospital in Linköping (Sweden) since 2008, called PROBE (based on the Swedish for Practical Obstetric Team Training). All professionals involved in birth (obstetricians, midwives and nurse assistants) are required to complete a three-hour session comprising two simulation scenarios and practical skills training, once every 18 months. Professionals participate in groups of three or four (typically two midwives and an obstetrician, often a nursing assistant as well). The colleagues in each group work regularly together, but the groups are not stable practice formations.

Simulation scenarios 20-minutes in length are followed by 30 minutes of debriefing using an adapted version of Steinwachs' (1992) three-round approach, progressing from description to analysis then application, but with a particular focus on interprofessional aspects in each of these (Hopwood, Dahlberg et al., 2020). One scenario in every PROBE cycle involves a shoulder dystocia. This uses a pelvic mannequin, a doll to simulate the baby, and delivery suite equipment (vacuum extractor, monitors etc) and is facilitated by the midwives and obstetricians (usually in a pair), all of whom have been involved in PROBE since its inception. Participants are not told in advance what the focus of each simulation scenario will be.

A prior study measured the long-term impact of PROBE on clinical practices and outcomes in shoulder dystocia. From pre-implementation (2004–2007) to 2015, brachial plexus injuries reduced from 73% to 17% of cases (Dahlberg et al., 2018). Use of HELPERR became embedded, with a four-fold increase in internal rotation of the anterior shoulder (a manoeuvre less likely to cause injury). Survey data indicated an increase in practitioners' confidence in handling shoulder dystocia. These changes are noteworthy because attempts to reduce injury and change practices in shoulder dystocia elsewhere have often not been so succcessul (Satin, 2018).

Prior analyses of observational data explored how PROBE fosters use of HELPERR relationally rather than as a private memory tool (Hopwood, Dahlberg et al., 2020) and found that debriefing practices emphasise collective ways of reorganising, reframing, and recontextualising practice (Hopwood, Blomberg et al., 2020). However, these do not provide a complete picture of how PROBE has contributed to practice change. The quantitative evidence mentioned above (Dahlberg et al., 2018) indicates more than temporary or individual change: the architectures of shoulder dystocia practices appear to have changed. The accomplishment of the "wider good" (reduced injuries) and the breaking away from former ways of doing things suggest both praxis and critical praxis have been enacted. Hence, in this paper, we explore how PROBE, as a site linked to significant practice change, fosters praxis and critical praxis.

Three shoulder dystocia simulation and debrief cycles were video recorded. This produced nearly three hours of video data. Spoken interactions were transcribed verbatim and translated into English, with notes added documenting physical actions and positionings of participants. Ethics approval was granted and the 11 practitioners and two facilitators all gave written informed consent to participate.

Blomberg was one of the two facilitators in each scenario. With many years experience in obstetric practice, and a contributor to PROBE since its inception, Blomberg assisted in the analysis, explaining the clinical significance of actions or issues under discussion and identifying features in the data that were representative of established and enduring practices in PROBE versus those that were specific to the sessions.

We adopted Srivastava and Hopwood's (2009) approach to analysis. This holds the questions "What are the data telling us?" (a more grounded approach) and "What do we want to know?" (a more theoretically driven approach) in iterative interplay. The first step involved creating a practical and thematic summary of each simulation–debrief session. The result was an overview of what happened in the simulation, including when shoulder dystocia arose and the main steps enacted once this happened. The thematic summary identified the main issues that came up in each debrief. The second step sensitised the analytical gaze to the sayings, doings and relatings in the simulated action sequences and debriefs; in the latter the analysis looked for doings and relatings that were referred to (sayings in the debrief provided further analytical access to doings and relatings in the simulation). The third step explored how sayings, doings and relatings hanged together; it looked for ways that sayings, doings and relatings were connected and the projects (ends or purposes) in which these connections arose. At this point the first key analytical outcome emerged in the form of three "connective enactments", which focus on individual actions, albeit actions connected with and oriented to others.

The fourth step therefore went back through the simulations and debriefs for features that inherently involved more than one person. The result of this was three "collective accomplishments", which account for how praxis and critical praxis were accomplished by the professionals as a group. Next, these analytical outcomes were worked through a final time with a specific focus on arrangements that comprise the practice architectures.

Findings

Introducing connective enactments and collective accomplishments

In this section we outline key findings and then consider three vignettes in detail. Extended vignettes are important because issues were not discussed in short interactions, but unfolded recursively over different rounds of discussion.

Sayings, doings and relatings were found to hang together through three distinctive connective enactments:

1. Narrating, listening, and attuning. Giving verbal commentary on one's actions and their consequences, which become connected with the actions with others through listening and attuning.

2. Questioning, seeking, and giving confirmation. Expressing uncertainty about what to do, echoing assertions or commitments.
3. Directing actions. Instructing, guiding or suggesting to others, decision making, and directing continuation or change in actions or roles.

These connective enactments were momentary, concrete actions. Three collective accomplishments were also identified:

1. Fluid role-switching. Taking roles that vary from those assigned to professionals in 'normal' practice, and taking turns in performing specific actions.
2. Coordinated, responsive sequencing and pacing. Collectively determining what to do next, when to continue and when to change actions, based on specificities of the unfolding situation.
3. Producing calm and security. Enabling practitioners and the mother to feel calm and secure in what is happening, despite the urgency and risk of the situation.

The collective accomplishments were key to how praxis was enacted, and the connective enactments were the means to realise the collective accomplishments.

Vignette 1: Group 1

This vignette begins with an excerpt from the simulation when the shoulder dystocia occurred, followed by extracts from the debrief. Evident here are connective enactments of narrating/listening/attuning, linked to collective accomplishments of sequencing and pacing, fluid role-switching, and producing calm.

From the simulation

Midwife 2:	Did it pull back?
Obstetrician:	Yes it's pulling back, it's sucked back.
Midwife 2:	We turn off the drip.
Obstetrician:	Up with the legs. The drip is off, right? Now I will press the symphysis.
Midwife 1:	I'm putting my finger in, I'm trying to press. And here's the front shoulder…

From the debrief:

Facilitator:	Round two. What did you do really well?
Midwife 2:	We communicated well with each other.. It's good to communicate so that we know what we're doing. You [obstetrician] spoke out loud 'Now I am doing the cut', and then you [midwife 1] said 'I am trying the front shoulder and the back shoulder'. It's not easy to see.
Facilitator:	You confirmed. That's the way to do it, so other people know they are on track.
Obstetrician:	I felt it was calm and methodological. We all knew in what order we would do things, so it felt not stressed.
Facilitator:	Something you contributed to yourself?
Obstetrician:	I can do the mnemonic, and I need to repeat that out loud.

Facilitator: It will give a kind of security.

[…]

Facilitator 2: [to Assistant] When you hear 'shoulder dystocia' you can say 'now it's been one minute, two minutes'. It's very valuable, because you think it's been ten minutes and it's only one minute. It's calming to know.

[…]

Facilitator: You spoke loudly. You [midwife 1] mentioned front shoulder, you [midwife 2] gave feedback loudly what step you were at, so you [obstetrician] could go in directly and take the rear shoulder, since you knew what previous steps were done. It's not always the case that you can see. Then, the last round [signalling a shift to the third round within the debrief, focused on future practice], what to take with me to the delivery ward next time?

Midwife 1: The cooperation, to talk loudly. It is positive that we all know where we are and what we are doing. And not forgetting to include the mother in the team.

Facilitator: Next time, say 'shoulder dystocia' instead of 'it is sucked back' so everyone understands.

Midwife 2: I take something on how to talk with the patient. She is frightened, there's a lot of people coming in. It's very important for the patient. It includes the patient in the 'we'. I'll take that with me.

Facilitator: You say loudly what you are doing. Those of us who have been working a long time are not used to this. In the past, we hid it. But the experiences of patients are that it feels very safe, we seem to know what we are doing.

Facilitator 2: When you identify a shoulder dystocia, you do not see the patient. I know from experience, it's just getting the baby out.

Midwife 2: So then, you can tell the patient 'now we will work to deliver the baby'.

Obstetrician: To make sure we do it methodologically, so you do not run around and stress each other out.

Assistant: You should watch the clock. I have not realised the importance of that before.

The simulation excerpt illustrates a bundle of sayings, doings and relatings as practitioners verbalised, listened and attuned to one another. This connective enactment was a recurring focus in the debrief, discussed as helping to anticipate and determine what to do next, including the HELPERR actions. Debriefs foregrounded the importance of working with the mnemonic not privately ('in their heads'), but through sayings bundled with doings (narrated actions) that made coordination and sequencing (relatings) possible. HELPERR manoeuvres do not always work first time, and practitioners may need to switch roles and cycle through the manoeuvres multiple times. The facilitator linked clear narration to enabling one person to step in easily where another had left off, noting this would happen differently each time.

Narrations were also discussed in terms of creating calmness and security among the team. The facilitator encouraged the obstetrician to associate her verbalisation of HELPERR with this accomplishment, and the second facilitator linked the assistant's announcing of elapsed time to a calming effect, as well as helping the team switch roles at an appropriate pace. This was affirmed by the assistant as a key point to take forward in her practice. The emphaisis on feelings of calmness and security extended to considering the mother's experience.

Both midwives commented that this was something they intended to enact in future practice, although it would require deliberate effort, given the tendency to focus on the baby.

Vignette 2: Group 2

This extract comes from the debrief with the second group, in which directing actions and narrating/listening attuning were foregrounded as connective enactments contributing to accomplishments of role-switching, pacing, and producing calm.

Facilitator: What did you do well?

Midwife 2: I tried to get everyone to have something to do… Would it have been smoother if I had pushed from the other direction on the upper shoulder?

Facilitator: It's nothing wrong, if it's lying like this, I would also push that way. You did work with the front shoulder, and you did it for quite some time. Why is it important to do that?

Midwife 2: Because that's the problem.

Facilitator: Precisely, if you solve the problem that way, you'll never get a brachial injury. So, it's worth putting in some effort. It's easy to move on and pull out the back arm, but that's connected with many more injuries to the baby. So you did that really well, working with that a long time, that's where you make a difference to the baby.

Facilitator 2: And you can change roles, because it's hard work. You can go on for half a minute, a minute, but you get really tired. You [obstetrician] tried to say that you should switch but you said it very quietly. Give a clear sign when we need to change. You [plural] were very clear towards the patient: 'Now we are doing to do this, now this, now this'. As the patient, I knew what was happening. It made me feel safe.

Facilitator: It's very good that you expressed 'now let's do HELPERR'. You should either say HELPERR or shoulder dystocia. No-one doubted what aim you were working towards. It's very good, even while you are working, she [midwife 2] was saying she was on the front shoulder, so everyone knows. It's not easy to see, it's crowded… You said where you were in the sequence, and what happened. Patients appreciate it. When you talk loudly you give the impression of being a group of staff that knows what it is doing.

[…]

Facilitator: So, what do you take with you for next time you have this situation?

Midwife 1: It's teamwork and about communicating clearly with each other. I feel safe about what's happening in the room, everyone has their role and you help each other out, it's safe.

Midwife 2: Sometimes you talked a lot with the patient, it's good to make the patient feel safe. What did you think [midwife 1] because I ended up in the delivery position and you were with the mother?

Midwife 1: Sometimes it happens like that. I don't have any negative reflection on that. Now we need to get the baby out and do what should be the best for the patient.

Midwife 2: Sometimes you have spoken a lot with the patient earlier, and it is good to keep that communication, to make that patient safe.

Midwife 1:	I thought so, I worked with the patient during the contractions so she felt safe with me, we knew each other, that's comforting.
Facilitator:	It's a life-threatening situation, so give yourselves permission to focus on the situation, and don't think so much about taking over another's role… You kept up the communication all the time with the mother. It wasn't unclear who wore the leader's hat. That's important. I felt very safe listening to you. What do you take away?
Obstetrician:	To speak loudly and clearly. When she [midwife 2] was doing the manoeuvres, did she notice I'm beside her [available to help]?
Midwife 2:	I heard you say that.
Obstetrician:	I appreciated that you heard it, so we were listening to each other.
Midwife 1:	It is a good feeling, now that I'm reflecting on it. You're facing a problem, and everyone knows what it is, and everyone works with the same purpose, there's no-one saying 'no, that's not my usual way of doing it', which could happen if you're in a non-emergency situation. Here it is we just do it, no discussion, we're on it, and it's a very good feeling, secure.

In this simulation, midwife 2 directed practice, allocating positions and actions to colleagues in ways that broke away from normal roles and hierarchies. The doubt she expressed about this in the debrief was countered in ways that linked clearly to praxis, specifically getting *this* baby out safely and quickly, and being good for *this* mother by providing security through a familiar relationship that was available given the particular history of *this* birth. The repeated use of the word 'sometimes' highlights how these were not discussed as universal courses of action, but situation-specific ways of navigating variable circumstances.

The need for someone to direct action was framed in terms of clarity among the group as to who was leading, rather than adhering to stable leadership roles. While directions are given by an individual, what matters are bundles of sayings, doings and relatings, as others have to listen and act accordingly: it is a connective enactment. In the debrief this was related to the importance of being ready to vary from norms, as required by the emerging situation. Role-switching was valued within an orientation that let go of established roles, instead attuning to the particular demands of the situation. Here, praxis was a matter of fluid role-switching, a collective accomplishment that depended on clear direction of the action.

Praxis was also framed in terms of pacing as something which "makes a difference to the baby". The midwife's external pushing was discussed in terms of how sustained efforts reduce injuries: not moving on too quickly to new actions was accomplished by handing over responsibility when one gets tired. Effective turn-taking was unpacked as depending on a bundle of sayings, doings and relatings – individual actions connected with each other. This was evident as the obstetrician and second midwife reflected that the availability of help has to be announced, heard, and then acted upon. As in the first group, the connective enactment of narrating actions and listening and attuning to actions accordingly was linked to feelings of safety and calm, including for the mother. Unlike in Vignette 1, this group actually named HELPERR, which was noted and praised by the facilitator as an appropriate saying (rather than the less precise 'pulling back' or 'sucking back').

Vignette 3: Group 3

This vignette comes from the third group, where the debrief addressed questioning and confirming in detail, linked to narrating and directing. This extract reveals new associations with the three collective accomplishments.

In the simulation

Midwife 1:	We should apply the cup [responding to a deterioration in foetal vital signs]
Obstetrician:	You think so?
Midwife 1:	Yes I do.
Obstetrician:	Have we emptied the bladder? [To mother] Listen to me now, we are helping each other, so when we say it is time to push, it is important that you push. I will apply a cup, so when the contractions come we are helping each other.
[…]	
Midwife 1:	Now it is stuck, it's stuck.
Obstetrician:	It's stuck, yes, then we have a shoulder dystocia.
Midwife 1:	[To midwife 2] Turn off the drip .
Midwife 2:	Is it still a contraction?
Midwife 1:	No, it's stuck. It feels like it is retracting.
Midwife 2:	Then we turn off the drip.
Midwife 1:	Turn off the drip, move the legs backwards.
Midwife 2:	Are we running HELPERR?
Midwife 1:	Yes.
Midwife 2:	Is it H now?
Midwife 1:	No, we are at L. [lifts the mannequin's 'legs']
Obstetrician:	And now it is pressure [P]. I will press here.

In the debrief

Facilitator:	Round two, what did you do well?
Obstetrician:	I was considering turning the patient. We talked about it, and decided no, I will try once more. I think we had good communication. We talked to each other. We were thinking aloud and clearly expressed what we were doing. We said shoulder dystocia, we run it like this, you do this, you do that and I will do this… I talked to the patient, informed her about the cup. I made decisions, it's important not to hesitate.
Midwife 1:	I felt like it was me telling you to use the cup, it was very strange telling you what to do!
Obstetrician:	You're welcome to tell me!
Midwife 1:	I was thinking the baby must come out, we have tried pressure and everything, now we need the cup.
Midwife 2:	When we talked about doing HELPERR, we are at H, I just wanted to say we have Help, and you (midwife 1) said no, no.
Midwife 1:	I am not on H.

Facilitator 2: You were really clear there.

Midwife 2: I wanted clarity in this.

Facilitator: You did well [midwife 2], this stop and count through, it's good to speak out loud. Patients appreciate this, that you see what the problem is, that you have a strategy, That's nothing to be afraid of, it creates security in the room. What else did you do well?

Midwife 1: I was asking if I should press, or what others thought would be good.

Facilitator: You [plural] did ask questions the whole time. Sometimes it was 'yes' and sometimes it was 'no' which is normal. You have at least aired and reminded each other. So what will you take with you?

Midwife 1: That I will absolutely take longer in the manoeuvre. And to say all the steps out loud. Just because my own brain is on L maybe not everyone is.

Facilitator: Just give each manoeuvre a little longer, not going for the back shoulder, that is where the plexus injuries are coming, so stay on the first ones a bit more.

Midwife 2: I asked questions, I think I took good control when to use the cup, what I and the team should do.

Facilitator: We have this platform, it helps us feel safe.

Obstetrician: I did make decisions, too.

Midwife 2: Yes you made correct decisions. It is so insecure in a room when everybody is kind of waiting for everyone else. It is terrible. We've all had this experience. It's horrible.

Facilitator: Watching you work, there was no doubt you moved the hat around, sometimes [midwife 2], sometimes [obstetrician], and there was no doubt who had it and when this person says something, we work accordingly.

Instances of questioning and confirming arose around applying the cup, checking the bladder, the dystocia, turning the mother, and the protocol. These were not discussed as problematic authority-questioning or ignorance. They were valued for their function in creating calm and security. Questioning as an individual action became part of a connective enactment when the saying of the question was bundled with the doings of others and the relatings that emerged through these questions and answers. PROBE teaches that safe and effective practice is not devoid of such questioning but characterised by airing doubt and mutual reminding. In doing so, it values articulated uncertainty and doubt as important in praxis.

This group debrief emphasised leadership based on situational demands rather than adhering to hierarchical norms: a midwife *should* direct an obstetrician when this is what safe delivery requires. Such directing of action was deemed crucial for a safe outcome and linked to the collective accomplishments of agile role-switching and producing calm and security – including for the mother – and contrasted with the insecurity that arises with uncertainty as to whom is responsible for what, or with the risks of staying with rigid roles.

As in the previous two vignettes, the connective enactment of narrating/listening/attuning was repeatedly discussed. Again, the collective accomplishment of producing of calm and security linked actions to the

HELPERR protocol. Saying the steps of HELPERR out loud helped each participant know what others were doing, when to switch roles, and how to manage pacing.

Discussion

We now discuss how PROBE helps professionals deal with the high-stakes, highly charged challenge of shoulder dystocia through praxis, actions directed towards the good of injury-free delivery. We then consider critical praxis, and how PROBE explicitly interrogates past ways of working and actions that have untoward consequences. This leads to a discussion of how the connective enactments and collective accomplishments contribute to longer-term change (Dahlberg et al., 2018 by changing the cultural-discursive, material-economic and social-political arrangements that make up the architectures of shoulder dystocia practices.

Praxis

PROBE teaches that praxis depends crucially on what individuals do, but it is also something that no-one can achieve by themselves. Individual contribution and responsibility do not come at the expense of crucial teamwork aspects (Satin, 2018). 'What is right' in shoulder dystocia is that which reduces injury to mother and child, delivering the baby safely while minimising maternal anxiety or distress. However practitioners frequently remain uncertain as to what they should do when shoulder dystocia arises (Fahey & Mighty, 2008). The HELPERR protocol provides a concrete sequence of actions, but has proved insufficient. PROBE fills the gap between these concrete actions and how act for the good of mothers and babies.

PROBE frames doing what is right is framed in terms of the three collective accomplishments: being ready to switch roles; sequencing and pacing practice in responsive ways; and producing calm and security. Individual practitioners have responsibility for contributing to these through their own actions, the connective enactments: narration, questioning, and directing. These hang together as sayings, doings and relatings within the joint project of delivery avoiding injury. It is as part of this project that these complexes of actions have meaning and coherence (Kemmis et al., 2021). It is 'right' to narrate, question and direct others, because these actions make it possible to switch roles, sequence and pace collective actions, and because they produce calm and security in what is an extremely pressured moment. In this way, PROBE provides a stable but not rigid means to know how to achieve the good for each individual patient, despite the complex and situation nature of shoulder dystocia (Bontemps-Hommen et al., 2020).

Critical praxis

Critical praxis involves interrogating and transforming existing ways of doing things that have untoward consequences (Kemmis, 2019; Kemmis & Smith, 2008). Had the connective enactments and collective accomplishments represented a continuation of historical practice traditions that simply required more systematic enactment in practice, then they could not be understood in terms of critical praxis. However, throughout the debriefs they were linked not only to the good of injury-free delivery (praxis), but to a change from ways of doing things that were associated with injuries and poor experience for mothers. They thus also contribute to critical praxis. We saw many examples of such interrogation and explicit contrasting of the

practices being promoted by probe (and which have been shown to have become more common over a decade; Dahlberg et al., 2018), with those of the past.

For example, in Vignette 3, Midwife 1 said it was "very strange" to be telling an obstetrician what to do. As in the other two sessions, the group critiqued stable hierarchies of leadership and role, and the facilitators reinforced the importance of doing instead what is needed to deliver the baby, regardless of who does what and who tells whom what to do. In Vignette 3, Midwife 2 contrasted the security in knowing who was doing what she had just experienced with common "terrible" experiences from the past. Here we see interrogation of past practices (fixed roles) and a collective reflection that alternatives (fluid roles) would help to reduce untoward consequences. The collective accopmlishments of producing calm and security, and fluid role-switching are highlighted clearly in this contrast.

Further interrogations of past practices were evident, as when the Facilitor commented in relation to running commentaries on one's actions: "In the past, we hid it. But the experiences of patients are that it feels very safe, we seem to know what we are doing" (Vignette 1). Here, the connective enactment of narration is not only recognised as a feature of a transformed practice – different from those of the past – but one which reduces the untoward consequence of maternal anxiety. PROBE also fosters critical praxis in relation to the role of the HELPERR protocol in shoulder dystocia practices. It interrogates a use of HELPERR based on individual rule-following that simply guides correct actions, making what is 'right' 'easy' (Cornthwaite et al., 2015, p. 4). It transforms the way this protocol works, shifting it from a private memory tool that prescribes a fixed form of action to a shared reference point in fluid, emergent connective enactments.

Practice architectures

We now discuss PROBE in terms of practice architectures, specifically the three arrangements that enable and constrain action (Kemmis, 2019). These are not rigid, deterministic structures, they leave room for practices to unfold differently each time. PROBE has reshaped the architectures of shoulder dystocia practices by changing the cultural-discursive arrangements (particularly narration), the material-economic arrangements (particularly through embedding embodied actions of HELPERR, and prefiguring greater use of those actions less associated with injury), and the social-political arrangements (where leadership is fluid and practitioners exchange roles).

Cultural-discursive arrangements comparise language, communication and ideas, secured in the sematic space of practice through characteristic sayings (Kemmis et al., 2014). PROBE reinforces some existing arrangements, including the technical vocabularies around shoulder dystocia and the anatomy and manoeuvres referred to in HELPERR. However, PROBE has added to these, promoting enduring arrangements, especially through the loud narration of action. This is a new, stable pattern in the semantic space of shoulder dystocia practices. The normalisation and embedding of this in practice represents a rupture with the past. We suggest the longer-term changes in shoulder dystocia practices identified in the prior study (Dahlberg et al., 2018) have been enabled by this both *continuity* and *change* in the cultural-discursive arrangements of practice, which is echoed in and enabled by the architectures of the debriefs, which promote a relational approach to critical reflection (see Hopwood, Blomberg et al., 2020; Hopwood, Dahlberg et al., 2020).

Material-economic arrangements refer to work, activities, embodied doings, objects, infrastructures and materials (Kemmis, 2019). PROBE has not led to significant changes in the material equipment used. However, through the economic arrangement enabling and requiring practitioners to complete this simulation every 18 months, the embodied actions taken in shoulder dystocia have changed. The prior quantitative study found that embodied actions prescribed by HELPERR are now more routinely used (Dahlberg et al., 2018). While the *desired* actions have remained stable, PROBE has helped to secure these actions in embodied practice. This includes promoting dynamic arrangements where the bodily positionings of practitioners changes as they switch roles, and which prefigure actions so that those less associated with injury are attempted for longer. The debrief discussions highlighted how these arrangements prefigure subtleties in the "doings" of practices; it is not simply a matter of one action then another, but also of when to move from one to the next.

The social-political arrangements concern relationships between people, including roles, solidarity, and inclusion/exclusion (Kemmis, 2019). PROBE establishes a stable-yet-fluid social space, fostering relatings that are fluid, unconstrained by established norms of leadership or role assignment, making mutual directing of action and role-switching possible. Importantly, and as highlighted by Midwife 1 in the first vignette, PROBE explicitly includes the mother in these social-political setups: "It includes the patient in the 'we'. I'll take that with me." In an emergency that has typically been framed in terms of relationships between the individual or team and the "stuck" body of the baby, this inclusion is significant, and highlighted repeatedly by both facilitators and participants as something that breaks from the past, but which is fostered by PROBE and becoming embedded in practice.

Conclusion

PROBE constitutes ongoing professional education that is, and has been, transformative (Dahlberg et al., 2018). In a practice where uncertainty abounds and the stakes are high, PROBE fosters praxis (acting for the greater good) and critical praxis (critical interrogation of past practices in order to transform them and reduce untoward consequences). It does so by teaching specific connective enactments and collective accomlishments and reshaping the practice architecture that prefigures them.

Rather than seeking to spread or scale up an innovation (Greenhalgh & Papoutsi, 2019), PROBE has effected sustained and significant change in a particular setting. PROBE exemplifies a widespread and widely valued approach to practice change in healthcare based on regular, formalised simulation-based training (Brandstorp et al., 2016; Eddy et al., 2016). It also has features that connect – distinctively – with recent currents in efforts to change practice. PROBE operates at a high level of granularity, addressing the details and nuances of particular actions (connective enactments). This is different from the guideline-based approach to "precision medicine" described by Rushforth and Greenhalgh (2020, p. 581), because PROBE foregounds fluidity and emergence in the granular features. PROBE also exemplifies change efforts that foreground values and quality, in particular interprofessionalism and patient experience (Comunale et al., 2021; Eddy et al., 2016). However it does so in a distinctive way, by promoting collective accomplishments, including those that destabilise conventional professional hierarchies.

Through detailed analysis of an educational site that has, unusually, been empirically linked to significant and sustained transformation, we have contributed new understandings of the role of ongoing professional education in practice change, and how this is accomplished. Research on shoulder dystocia education tends to frame simulation as a process of reproducing authentic practice scenarios so practitioners can reproduce simulated practices in 'real' scenarios (Goffman et al., 2008). This reflects a wider tendency in the literature on simulation education to value authenticity and fidelity (Hopwood et al., 2019). However, this has been increasingly problematised, through alternative understandings of simulation as transformative in potential (Abrandt Dahlgren et al., 2019; Hopwood, 2017; Hopwood et al., 2016; Rooney & Boud, 2019; Rooney et al., 2015). The theory of practice architectures elucidates how this can be accomplished by reshaping practice archictectures to prefigure praxis *and* critical praxis. Protocol use is promoted as part of actions that attune to situational specificity rather than as a matter of straightforward compliance with a standard set of actions. PROBE facilitates learning that transforms practices and the practice architectures that make those practices possible (Kemmis, 2019). This connection of PROBE to wider change advances a growing body of work investigating simulation as a transformative educational form.

We argue the importance of ongoing professional education that addresses instances of practice where questions of "What should I/we do next?" arise, demanding practical wisdom or phronēsis. In navigating indeterminacy and uncertainty, professional responsibility becomes inflected with issues of practical wisdom and also with critical questions relating to the transformations needed to reduce untoward outcomes (Kemmis, 2019). Therefore, ongoing professional education has a crucial role in nurturing phronētic dispositions and making actions of (critical) praxis possible. We have shown how this can be accomplished through simulation and debriefing that create conditions of possibility in practice through specific connective enactments (actions that individuals can perform) and linked collective accomplishments (which rely on collaborative, interprofessional team work).

The concepts of connective enactments and collective accomplishments have potential as new analytical tools that may enrich further research. They gain their analytical value from their coherence with the theory of practice architectures as a framework that is dynamic, flexible and alive (Wilkinson & Bristol, 2018). Others have linked practical wisdom to practice transformation by looking at structural changes, for example, new forms of consultation and patient records (Bontemps-Hommens et al,. 2020), or through insights generated through researcher-prompted practitioner reflection (Iedema et al., 2013). These two new concepts provide a means to understand how professional education can change practices and the conditions that make practices possible. In terms of practical implications, the findings suggest the value of identifying and promoting relevant complexes of actions (hangings together; bundles of sayings, doings, and relatings) and their contribution to the collective accomplishments that constitute the means to realising the ultimate ends of practices. We anticipate that the three specific forms of each identified in this paper may be relevant in other contexts, and that there are likely additional forms that are of pertinence to different practice and educational sites. These would be matters for further empirical investigation.

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References

Abrandt Dahlgren, M., Rystedt, H., Felländer-Tsai, L., & Nyström, S. (Eds.). (2019). *Interprofessional simulation in health care: Materiality, embodiment, interaction*. Springer.

Baxley, E. G., & Gobbo, R. W. (2004). Shoulder dystocia. *American Family Physician*, *69*(7), 1707-1714.

Billett, S. (2017). Theorising the co-occurrence of remaking occupational practices and their learning. In P. Grootenboer, C. Edwards-Groves, & S. Choy (Eds.), *Practice theory perspectives on pedagogy and education: praxis, diversity and contestation* (pp. 67-86). Springer.

Bontemps-Hommen, C., Baart, A., & Vosman, F. T. H. (2019). Practical wisdom in complex medical practices: A critical proposal. *Medicine, Health Care and Philosophy*, *22*(1), 95-105. https://doi.org/10.1007/s11019-018-9846-x

Bontemps-Hommen, M. C. M. M. L., Baart, A. J., & Vosman, F. J. H. (2020). Professional workplace-learning. Can practical wisdom be learned? *Vocations and Learning*. https://doi.org/10.1007/s12186-020-09249-x

Brandstorp, H., Halvorsen, P. A., Sterud, B., Haugland, B., & Kirkengen, A. L. (2016). Primary care emergency team training in situ means learning in real context. *Scandinavian Journal of Primary Health Care*, *34*(3), 295-303. https://doi.org/10.1080/02813432.2016.1207150

Comunale, M. J., Lerch, W., & Reynolds, B. (2021). Integrating Advanced Practice Providers into value based care strategies: One organization's journey to achieve success through interprofessional collaboration. *Journal of Interprofessional Education & Practice*, *22*. https://doi.org/10.1016/j.xjep.2020.100384

Cornthwaite, K., Crofts, J. F., Draycott, T., Siassakos, D., & Winter, C. (2015). *Training for obstetric emergencies: PROMPT and shoulder dystocia*. The Health Foundation.

Dahlberg, J., Nelson, M., Dahlgren, M. A., & Blomberg, M. (2018). Ten years of simulation-based shoulder dystocia training - impact on obstetric outcome, clinical management, staff confidence, and the pedagogical practice - a time series study. *BMC Pregnancy and Childbirth*, *18*(1), 361. https://doi.org/10.1186/s12884-018-2001-0

Dieckmann, P., Gaba, D. M., & Rall, M. (2007). Deepening the theoretical foundations of patient simulation as social practice. *Simulation in Healthcare*, *2*(3), 183-193. https://doi.org/10.1097/SIH.0b013e3180f637f5

Eddy, K., Jordan, Z., & Stephenson, M. (2016). Health professionals' experience of teamwork education in acute hospital settings: A systematic review of qualitative literature. *JBI Database of Systematic Reviews and Implementation Repoprts*, *14*(4), 96-137. https://doi.org/10.11124/JBISRIR-2016-1843

Fahey, J. O., & Mighty, H. E. (2008). Shoulder dystocia: using simulation to train providers and teams. *Journal of Perinatal & Neonatal Nursing*, *22*(2), 114-122. https://doi.org/10.1097/01.JPN.0000319097.05415.1d

Fransen, A., van de Ven, J., Schuit, E., van Tetering, A., Mol, B., & Oei, S. (2017). Simulation-based team training for multi-professional obstetric care teams to improve patient outcome: a multicentre, cluster randomised controlled trial. *BJOG*, *124*(4), 641-650. https://doi.org/10.1111/1471-0528.14369

Fenwick, T. (2016). *Professional responsibility and professionalism: a sociomaterial examination*. Routledge.

Fenwick, T., & Nerland, M. (Eds.). (2014). *Reconceptualising professional learning: sociomaterial knowledges, practices, and responsibilities*. Routledge.

Gherardi, S., & Strati, A. (Eds.). (2012). *Learning and knowing in practice-based studies*. Edward Elgar.

Gobbo, R. W., Warren, J., & Hinshaw, K. (2017). Shoulder dystocia. In L. Leeman, J. D. Quinlan, L. T. Dresang, & D. S. Gregory (Eds.), *ALSO: Advanced Life Support in Obstetrics provider manual* (8th ed., pp. 1-20). American Academy of Family Physicians.

Green, B. (Ed.). (2009). *Understanding and researching professional practice*. Sense Publishers.

Green, B., & Hopwood, N. (2015). The body in professional practice, learning and education: a question of corporeality? In B. Green & N. Hopwood (Eds.), *The body in professional practice, learning and education: body/practice* (pp. 15-33). Springer.

Greenhalgh, T., & Papoutsi, C. (2019). Spreading and scaling up innovation and improvement. *BMJ*, *365*, l2068. https://doi.org/10.1136/bmj.l2068

Hager, P. (2011). Theories of workplace learning. In M. Malloch, L. Cairns, K. Evans, & B. N. O'Connor (Eds.), *The SAGE handbook of workplace learning* (pp. 17-31). Sage.

Hopwood, N. (2014). Four essential dimensions of workplace learning. *Journal of Workplace Learning*, *26*(6/7), 349-363. https://doi.org/10.1108/JWL-09-2013-0069

Hopwood, N. (2016). *Professional practice and learning: times, spaces, bodies, things*. Springer.

Hopwood, N. (2017). Practice architectures of simulation pedagogy: from fidelity to transformation. In K. Mahon, S. Francisco, & S. Kemmis (Eds.), *Exploring education and professional practice: through the lens of practice architectures* (pp. 63-81). Springer. https://doi.org/10.1007/978-981-10-2219-7_4

Hopwood, N., Blomberg, M., Dahlberg, J., & Abrandt Dahlgren, M. (2020). Three principles informing simulation-based continuing education to promote effective interprofessional practice: reorganizing, reframing and recontextualizing. *The Journal of Continuing Education in the Health Professions*, *40*(2), 81-88. https://doi.org/10.1097/CEH.0000000000000292

Hopwood, N., Dahlberg, J., Blomberg, M., & Abrandt Dahlgren, M. (2020). Double stimulation in healthcare emergencies: fostering expansive, collective tool use through simulation-based continuing professional education. *Pedagogy, Culture & Society*. https://doi.org/10.1080/14681366.2020.1805496

Hopwood, N., Rooney, D., Boud, D., & Kelly, M. (2016). Simulation in higher education: a sociomaterial view. *Educational Philosophy and Theory*, *48*(2), 165-178. https://doi.org/10.1080/00131857.2014.971403

Iedema, R., Mesman, J., & Carroll, K. (2013). *Visualising healthcare practice improvement: Innovation from within*. Radcliffe Publishing Ltd.

Kemmis, S. (2009). Understanding professional practice: a synoptic framework. In B. Green (Ed.), *Understanding and researching professional practice* (pp. 19-39). Sense Publishers.

Kemmis, S. (2011). Reshaping educational praxis: Spectator and participant perspectives. *British Educational Research Journal*, *38*(6), 885-905. https://doi.org/10.1080/01411926.2011.588316

Kemmis, S. (2019). *A practice sensibility: An invitation to the theory of practice architectures*. Springer.

Kemmis, S. (2021). A practice theory perspective on learning: Beyond a 'standard' view. *Studies in Continuing Education*. https://doi.org/10.1080/0158037X.2021.1920384

Kemmis, S., Edwards-Groves, C., Wilkinson, J., & Hardy, I. (2012). Ecologies of practices. In P. Hager, A. Lee, & A. Reich (Eds.), *Practice, learning and change: practice-theory perspectives on professional learning* (pp. 33-49). Springer.

Kemmis, S., & Grootenboer, P. (2008). Situating praxis in practice: practice architectures and the cultural, social and material conditions for practice. In S. Kemmis & T. J. Smith (Eds.), *Enabling praxis: challenges for education* (pp. 37-63). Sense.

Kemmis, S., & Smith, T. J. (Eds.). (2008). *Enabling praxis: challenges for education*. Sense.

Kemmis, S., Wilkinson, J., Edwards-Groves, C., Hardy, I., Bristol, L., & Grootenboer, P. (2014). *Changing practices, changing education*. Springer.

Kinsella, A., & Pitman, A. (Eds.). (2012). *Phronesis as professional knowledge: practical wisdom in the professions*. Sense.

Mahon, K., Francisco, S., & Kemmis, S. (Eds.). (2019). *Exploring education and professional practice: Through the lens of practice architectures*. Springer.

Mahon, K., Kemmis, K., Francisco, S., & Lloyd, A. (2017). Introduction: Practice theory and the theory of practice architectures. In K. Mahon, K. Kemmis, S. Francisco, & A. Lloyd (Eds.), *Exploring education and professional practice: Through the lens of practice architectures* (pp. 1-30). Springer.

Price, O. M., Scheeres, H., & Boud, D. (2009). Re-making jobs: enacting and learning work practices. *Vocations and Learning*, *2*(3), 217-234. https://doi.org/10.1007/s12186-009-9025-6

Reich, A., & Hager, P. (2014). Problematising practice, learning and change: practice-theory perspectives on professional learning. *Journal of Workplace Learning*, *26*(6/7), 418-431. https://doi.org/10.1108/JWL-02-2014-0016

Rooney, D., & Boud, D. (2019). Toward a pedagogy for professional noticing: Learning through observation. *Vocations and Learning*, *12*(3), 441-457. https://doi.org/10.1007/s12186-019-09222-3

Rooney, D., Hopwood, N., Boud, D., & Kelly, M. (2015). The role of simulation in pedagogies of higher education for the health professions: through a practice-based lens. *Vocations and Learning*, *8*(3), 269-285. https://doi.org/10.1007/s12186-015-9138-z

Rushforth, A., & Greenhalgh, T. (2020). Personalized medicine, disruptive innovation, and "trailblazer" guidelines: Case study and theorization of an unsuccessful change effort. *The Millbank Quarterly*, *98*(2), 581-617. https://doi.org/10.1111/1468-0009.12455

Satin, A. (2018). Simulation in obstetrics. *Obstetrics & Gynecology*, *132*(1), 199-209. https://doi.org/10.1097/AOG.0000000000002682

Schatzki, T. R. (2002). *The site of the social: a philosophical account of the constitution of social life and change*. Pennsylvania State University Press.

Schatzki, T. R. (2010). *The timespace of human activity: on performance, society, and history as indeterminate teleological events*. Lexington.

Schatzki, T. R. (2013). The edge of change: on the emergence, persistence, and dissolution of practices. In E. Shove & N. Spurling (Eds.), *Sustainable practice: social theory and climate change* (pp. 31-46). Routledge.

Srivastava, P., & Hopwood, N. (2009). A practical iterative framework for qualitative data analysis. *International Journal of Qualitative Methods*, *8*(1), 76-84. https://doi.org/10.1177/160940690900800107

Steinwachs, B. (1992). How to facilitate a debriefing. *Simulation & Gaming*, *23*(2), 186-195. https://doi.org/10.1177/1046878192232006

van de Ven, J., van Deursen, F., van Runnard Heimel, P., Mol, B., & Oei, S. (2016). Effectiveness of team training in managing shoulder dystocia: a retrospective study. *The Journal of Maternal-Fetal & Neonatal Medicine*, *29*(19), 3167-3171. https://doi.org/10.3109/14767058.2015.1118037

Walsh, J., Kandamany, N., Ni Shuibhne, N., Power, H., Murphy, J., & O'Herlihy, C. (2011). Neonatal brachial plexus injury: comparison of incidence and antecedents between 2 decades. *American Journal of Obstetrics and Gynecology*, *204*(4), 324.e321-324.e326. https://doi.org/10.1016/j.ajog.2011.01.020

Wilkinson, J., & Bristol, L. (2018). Practice architectures and ecologies of practices: knowing practice within sites. In C. Edwards-Groves, P. Grootenboer, & J. Wilkinson (Eds.), *Education in an eara of schooling: Critical perspectives of educational practice and action research. A Festschrift for Stephen Kemmis* (pp. 183-195). Springer.