

Learning from clinical work: the roles of learning cues and credibility judgements

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CONTEXT: How learners interpret their clinical experiences to create meaningful learning has not been well studied. We explored experiences considered by doctors to be influential in their learning in order to better understand this process.

METHODS: Using a grounded theory approach, we interviewed 22 academic doctors who had been in practice for ≤ 5 years. Participants were asked to reflect on experiences they considered to have been influential during their training. Constant comparative analysis for emerging themes was conducted iteratively with data collection.

RESULTS: A model of clinical learning emerged in which the clinical work itself is central. As they observe and participate in clinical work, learners can attend to a variety of sources of information that facilitate the inter-

pretation of the experience and the construction of knowledge from it. These 'learning cues' include feedback, role models, clinical outcomes, patient or family responses, and comparisons with peers. The integration of a cue depends on the learner's judgement of its credibility. Certain cues, such as clinical outcomes or feedback from patients, are seen as innately credible, whereas other cues, particularly feedback from supervisors, are subjected to critical judgement.

CONCLUSIONS: Learners make complex judgements regarding the credibility of information about clinical performance. Credibility judgements influence the learning that arises from the clinical experience. Further understanding of how such judgements are made could guide educators in providing credible information to learners.

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 INTRODUCTION

In order for medical educators to provide an environment that facilitates learning, an understanding of the factors that are most influential in learning is required. Although survey data suggest that learners consider effective teaching and constructive feedback to be of high priority,¹ how medical knowledge is shaped is, in reality, complex. Teunissen *et al.*^{2,3} studied how residents and their clinical teachers perceived that learning occurred. Both groups recognised the central place of participation in clinical activities to learning, but teachers were more inclined than residents to identify external influences on learning, such as the input of attending doctors.

Much of the attention around how clinical teachers can influence learning has focused on the provision of feedback.⁴⁻⁷ Many factors affect how feedback is perceived, interpreted and used by learners. One study exploring internal medicine residents' perceptions of feedback found that residents valued well-timed, private feedback that fostered the development of an action plan, but might reject feedback if they did not perceive the sender as credible.⁸ An exploration of residents' perceptions of in-training evaluations revealed that the value learners placed on the feedback they received in this process was influenced by their perceptions of the evaluator's credibility and engagement, their own receptivity to constructive criticism, and the extent to which they trusted other sources of information about their performance, such as self-assessment.⁹ Explorations of self-assessment mechanisms have suggested a similarly complex process by which individuals access, interpret and respond to a variety of sources of information about their own performance, both external (such as feedback) and internal (such as their emotional state). These sources of information are not always aligned in terms of the messages they convey and this misalignment creates tensions.¹⁰

Learning is enhanced when learners are self-regulating, actively engage in setting learning goals, select strategies for achieving these goals and monitor their progress toward these goals.¹¹ Self-regulation hinges on learners being able to access and interpret information that indicates how their present state relates to their learning goals.^{11,12} Although feedback is widely accepted by educators as a valuable facilitator of self-regulation,¹¹ its acceptance and uptake among learners are neither

straightforward nor assured. In circumstances in which feedback is either not valued or outright rejected, learning is presumably shaped by other influences.

Learners are, in fact, presented with many sources of information about what should be learned and must make decisions about which of this information requires their attention. Hence, there is a need to better understand the process by which medical learners sort, interpret and integrate information as they learn. Gaining this understanding will require not only an appreciation of the sources of information, both external and internal, to which learners might attend, but also of the process by which these sources of information are weighed, valued and judged relative to one another. In this study, we focus on experiences perceived by doctors as having been influential in their learning, and explore the constituents and characteristics of these experiences in order to develop a better understanding of the conditions required for meaningful learning to occur. We ask not only what experiences are considered influential, but also what allows these experiences to resonate with learners.

 METHODS

To elaborate an explanatory theory of how medical trainees are influenced in their learning, we used a constructivist grounded theory approach, in which the vantage points of participants and researchers alike are accounted for as the data are interpreted.¹³ The constructivist approach further implies that existing relevant literature, including that exploring perceptions of medical learning, self-assessment and feedback,^{2,3,10,14} influenced the development of our research questions and interview probes, and provided sensitising concepts that informed the data analysis.

Data collection and analysis proceeded in an iterative fashion. A purposive sample of early-career academic faculty staff was recruited from a single, large Canadian medical school. All faculty staff within the first 5 years of their initial academic appointment were sent an e-mail introducing the study and inviting their participation. This group was targeted as it was anticipated that these individuals would have the benefit of reflective distance from their training, but remained close enough to training to recall important details. The study was approved by the university's ethics committee.

Twenty-two (10 male, 12 female) faculty members representing a range of medical and surgical specialties (internal medicine, $n = 3$; psychiatry, $n = 4$; oncology, $n = 3$; surgery, $n = 4$; neurology, $n = 4$; paediatrics, $n = 3$; medical genetics, $n = 1$) participated in individual, semi-structured interviews lasting up to 1 hour. Interviews were recorded and transcribed verbatim without identifying data. Interview data were analysed using the constant comparative approach customary in grounded theory.¹⁵ Analysis occurred alongside and informed data collection: initial transcripts were read in detail and emerging themes were identified, some of which were specifically explored in subsequent interviews using new interview probes. Transcripts were repeatedly re-examined as additional interviews were completed to provide ongoing comparisons across the dataset, allowing for the development of a robust coding scheme for organising and classifying data thematically. Consistent with a theoretical sampling approach, data collection continued until saturation of themes was achieved. Once the coding scheme was refined, the complete dataset was analysed with the goal of raising the analytic level from the categorical to the conceptual. This final level of analysis involved elaborating the relationships among the concepts, and identifying an interpretive model that would account for the data and render them meaningful.¹³ Finally, we examined our emerging model in the light of existing theories and considered how our findings elaborated or challenged these theoretical constructs.

RESULTS

Emerging from our data was a model of clinical learning, the core of which is the clinical work itself: learning occurs through the accumulation and processing of clinical experiences. As they participate in clinical work, learners can attend to a variety of sources of information, or 'learning cues', that facilitate the interpretation of the experience and the construction of knowledge from it. These cues include feedback, role models, clinical outcomes, patient or family responses, and comparisons with peers. The integration of a cue depends on the learner's judgement of the credibility of the information and his or her reflection on how it should be used to shape future performance. Various learning conditions, including the learner's own attitude and values, shape how these credibility judgements are made and how reflection proceeds. Each element of this model, illustrated in Fig. 1, will now be

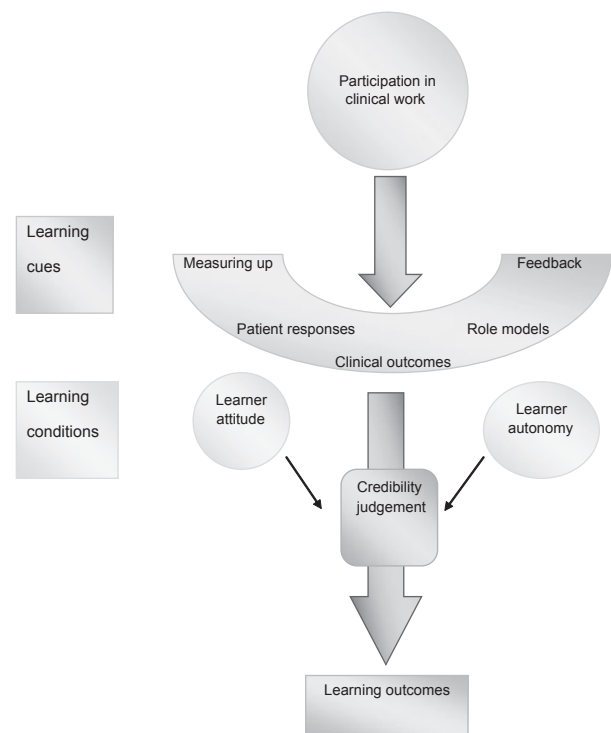


Figure 1 Conceptual diagram representing a model of clinical learning. As learners participate in clinical work, they are exposed to learning cues that can shape their learning according to the judgements they make about the credibility of the cues and the learning conditions they experience

examined in detail and illuminated by comments from participants (P).

Learning from clinical work

The accumulation of relevant, hands-on clinical experience was highly valued by all participants:

'I feel the majority [of the learning] was from the exposure and from just spending the hours of working things up on my own and learning from mistakes and learning from successes.' (P10)

Many participants were able to recall influential clinical cases with striking clarity, often years after their occurrence. Cases with negative outcomes or cases that engendered a strong emotional response seemed especially memorable, as one participant noted in reference to a surgical mishap during training:

'It's something that sticks in your mind very vividly and you remember almost every detail.' (P21)

In addition to learning by doing, participants valued opportunities to observe skilled individuals at work.

One participant, who recalled learning how to run a resuscitation in an emergency room setting, commented:

'...you learn more from watching. You watch the people that do things well, see what they do, see how they communicate with the people in the room, see what they're attentive to, and try to emulate on your own.' (P14)

Learning cues

Participants' descriptions of those factors they perceived as influential in their clinical learning revealed a number of cues to which they might attend as they interpreted their clinical experiences. These cues are described below.

Feedback

Although participants embraced the notion that constructive feedback from supervisors should be a key element of medical training, their stories suggested that truly influential feedback was uncommon. Less extreme versions of the sentiment conveyed by the following comment were widely expressed:

'I can't even think of any time that I got feedback that was useful.' (P18)

Many participants perceived that the learning path was often clear from the clinical experience itself, and that feedback that simply confirmed the content learned from the clinical experience provided little additional value. Examples of influential feedback that did emerge shared certain characteristics, including: immediacy, firm grounding in the clinical work at hand, and alignment with learner self-assessment and values.

One circumstance in which participants did recognise the value of feedback was in the debriefing of difficult experiences, when the clinical information received by the learner was difficult to interpret or potentially misleading. A typical example involved a negative clinical outcome that occurred although the learner had performed well:

'...if you have a difficult case which is not going as well as you want and you've done your best, I think that's where the positive feedback is really important because if you don't have anybody giving you feedback then you'll take it as a failure and you say I wasn't good enough... or it's my fault.' (P9)

Debriefing provides emotional support for the learner, maintains learner confidence, assists in placing negative clinical outcomes or learner errors into a proper perspective, and provides a model of reflective practice.

Role models

Role models, identified by every participant as critical to their learning, cue learners by providing observable standards to which they can aspire. Reflecting on how she had learned from her role model, one participant noted:

'I learned from him by emulating, not at all by what he said.' (P15)

Many participants suspected that their role models were unaware that they served in this capacity:

'These people didn't know. I think they were just doing what they do. I don't think they were aware that people were paying attention to them because those are just small moments to them.' (P12)

Clinical outcomes

Clinical outcomes were viewed as providing tangible, objective cues to the success of learner performance. Highlighting the perceived direct link between clinical outcome and doctor performance, one participant noted:

'In the patient world if your patient gets worse, that's a mistake.' (P20)

However, some participants sounded notes of caution about over-reliance on clinical outcomes as indicators of performance and progress. The inherent variability of clinical work led some to recognise that learning outcomes may be subject to luck and chance and may vary according to how a clinical scenario plays out:

'I think I got the sense that yeah you could be smart... but things might not break your way.' (P1)

In effect, a poor outcome may not always be a reliable signal of incompetence, and a good outcome may not always indicate competence.

Patient and family responses

The reactions and responses of patients and families serve as learning cues in two ways. Firstly, learners attend to these responses as they observe their

supervisors at work and use them to guide their selection of role models and their determination of which behaviour to emulate:

‘I saw someone delivering the news to someone of a malignancy that couldn’t be removed, and it was done in a very kind of harsh and very clinical way. Then the staff person left the room and that person, their family, was just completely devastated. I thought, there’s probably a better way to do this... I remember at that time thinking that’s not how I would do it.’ (P19)

Secondly, learners’ observations of patient and family responses serve as a direct guide to the quality of their own performance. One participant, describing the largely self-directed, trial-and-error process of learning to conduct critical conversations, remarked on the cues that he used to gauge his effectiveness:

‘... the body language and response of the family or patient. It would be like “Okay, that went okay” or “Oh, I’ve upset them.”’ (P17)

Measuring up

Another cue used by learners concerns their perceptions of how effectively they measured up, either to expectations set by respected supervisors or to peer performance. Public learning, such as being asked to respond to questions in a rounds setting, makes explicit this process of measuring up. One participant acknowledged that ‘fear of failure or of embarrassment in a group setting is very powerful’ (P21) and another commented: ‘Nothing will motivate me like humiliation by a credible teacher in front of my peers.’ (P3) Knowing that one is ‘measuring up’ can also be very reassuring, and can persuade a learner of her or his readiness for independent practice:

‘...to have somebody who’s seen a lot of residents say to you: “You’re on track, we have no worries,” was very reassuring.’ (P20)

Learning conditions

The process by which learners incorporate the cues that arise from their clinical work is influenced by both internal and external factors, which we have termed ‘learning conditions’. Among internal conditions for learning, many participants saw value in an attitude of openness to learning, as demonstrated by:

‘...someone who knows that they’re there to learn and who can... humble themselves a bit and understand that you can learn from people.’ (P12)

This openness is influenced by the personal values the learner brings to the clinical setting so that experiences and people that resonate with these values are more likely to be meaningful. The following example indicates how the learner’s values influence the sort of doctor he or she would choose as a role model:

‘I think deep down I knew how I wanted to practise. I knew I wanted to be compassionate and take my time and really be there for the whole patient, but I don’t think until you see someone do that, model that behaviour that you kind of know how to get there. How to get to where you want to be.’ (P7)

An external condition that emerged as powerfully influential across the dataset referred to the provision of autonomy to the learner. Opportunities for learners to take ownership of their clinical work were strongly motivating:

‘Because we were given more freedom in our rotations... to act more independently, we started to go, “Wow, we really need to know this stuff for our own sake, for the future, for our patients, to be able to be good physicians.”’ (P6)

Later in training, learner autonomy is a necessary facilitator of transition to practice, and the ability to perform independently is a highly credible indicator of competence:

‘I think I felt I was competent but I didn’t really know until... I was forced in situations to operate independently.’ (P19)

Credibility judgement

At the heart of this model of clinical learning is the process of credibility judgement, in which learners sort, weigh and assign value to the learning cues presented to them, deciding which information must be integrated into their developing professional identity and which information can be dismissed. As they participate in clinical work, learners use these cues to make decisions about which of the behaviours they observe in teachers or colleagues merit emulation and which should be ignored, and which of their own actions and approaches should be retained in future events and which require modification or adjustment. Although any clinical experience is

associated with a multitude of cues to which a learner might attend, our model suggests that only those cues judged as credible become influential in shaping learning.

However, not all learning cues are subjected to the same degree of critical review of their credibility. Feedback from teachers, for example, appears to be rarely accepted without being subject to questions about its credibility. Negative feedback is scrutinised especially critically, but can be strongly influential if its credibility is accepted. Acceptance may require the message of the feedback to be aligned with the learner's self-assessment:

'If someone had given me a negative evaluation and I thought they were wrong in that negative evaluation... I don't think that would bother me too much, but the fact that he was right... that on-the-mark negative evaluation is motivating or at the very least makes me think. It hits home a lot more.' (P3)

Alignment with the learner's personal and professional values is also important in the determination of the credibility of feedback. Consider this participant's response to feedback from a supervisor whose values failed to align with his own:

'You said, "Oh well, this fellow is just... not the way I want to practise medicine. I wouldn't take his advice seriously.'" (P2)

The feedback in this situation was rendered meaningless.

Credibility judgements about feedback are also influenced by the learner's respect for the source of the feedback. Respect seems to derive largely from that individual's performance as a clinician, rather than his or her style of relating to the learner, as in this example in which a supervisor's unorthodox style did not diminish the learner's respect for his opinion:

'There was one consultant who was known as a cowboy who did things often just to spite people, completely differently than the way everybody else did them, but who had the best clinical acumen of anybody... And so when he said to do something a certain way or when he didn't like the way you had done something, it mattered... it really mattered. And for reasons that aren't completely clear in my head – because you would think that someone who is that contradictory and that inflammatory sometimes

that you would want to brush off – his opinion mattered.' (P15)

Furthermore, respect is a dynamic construction that evolves through training:

'When you first start off in residency you don't really know – everyone is kind of the same. They're all consultants and they're all equally knowledgeable... but then over time you sort of watch them practise a bit and see how they behave and how they act and whether what they say is in agreement with what the rest of the [medical] community says. You sort of pick out who kind of stands out in terms of you know who really seems to know what they're talking about and who's respected in the community and who's just kind of blown off as a bit of a quack or an oddball... I think that's probably how you figure out who you can trust and who you can't trust in terms of feedback.' (P12)

The credibility that respect affords a supervisor may facilitate acceptance of critical feedback:

'Certainly the more respect I had for them the more negative feedback and the more straightforward feedback I could tolerate from them.' (P6)

Although feedback from supervisors is carefully weighed for its credibility, certain other sources of information seem not to require this critical review. Above all, the clinical work itself is presented by participants as inherently credible, and learning grounded in meaningful clinical experiences is perceived as memorable and practice-shaping:

'It always sticks in my mind, that... one case, that really profoundly... showed me what we do... and how much it matters, how much it means to people, how much responsibility you have... It showed me how to... really be a little bit more careful in terms of... those really complex patients and sick patients and to be there in the moment.' (P14)

This individual did not question whether this clinical experience had merit, but accepted it as an intrinsically valuable moment that demanded attention. Similarly, direct feedback from patients or families is viewed as innately credible. One participant recalled:

'...after I told the patient the bad news, then the family told me, "You seem cold or kind of not compassionate." I took that very seriously.' (P3)

This feedback demanded attention. Consider the following example of the reflective process triggered

when a patient was so critical of one participant's style of interacting that she requested a new doctor:

'I mean at first I was going to dismiss it and I thought, well, that isn't really fair to her, you know. Why don't I think about what happened in that encounter... I just thought I'd better not take this personally and try to figure out was there something that I said or did that I could do better.' (P7)

That the initial inclination to dismiss this feedback was overcome speaks of the innate credibility of feedback from patients; troubling feedback may be readily dismissed when it comes from a supervisor, but not so when the source is a patient.

Clinical outcomes also have innate credibility as indicators of learner competence, as in the following example, in which a participant describes learning to trust his or her own instincts:

'I was feeling fairly confident that a child had a specific diagnosis and there would be mentors or staff who didn't support that... In the end, once I pursued and persisted and found out that *was* the diagnosis... that also reinforced my confidence in saying that "Okay, I do have a good approach to this and I am able to make diagnoses even when I may not be supported by other staff that are obviously much more experienced."' (P10)

There were many similar examples in which positive clinical outcomes in challenging circumstances validated the learner's approach, powerfully building confidence and sometimes trumping criticism from supervisors.

DISCUSSION

The emergence of clinical work as the central resource for learning in our study echoes findings reported by Teunissen *et al.* on residents' perspectives of their own learning.² Teunissen *et al.* found that residents perceived that they learned by *doing* and then observing the reactions of others, including their supervisors and their patients, to what they did.² Personal knowledge was constructed through the interpretation of work-related activities.² Our study begins to unravel the complex process by which learners construct meaning from their clinical work and puts the role of feedback, long regarded as a critical element of medical learning, into perspective. Feedback is just one of a number of cues learners use to interpret their clinical experiences and it cannot

be influential unless it survives a critical assessment of its credibility.

This process of credibility judgement deserves particular attention, as it appears to be a key step in the construction of knowledge from clinical experiences. Learners, confronted with a barrage of information that might guide their learning, employ credibility judgements in order to choose which of this information merits their attention. How are such judgements made? Research on human cognition suggests that complex judgement tasks are often approached using a range of relatively simple cognitive strategies or heuristics, the choice of which may be determined by the specific problem or environment.¹⁶ Such heuristics, which often involve attending to some information while ignoring other information, may be not only adaptive but also effective in facilitating sound judgements.¹⁶ The use of heuristics to facilitate judgements about clinical learning has been the subject of very little research, although one study suggested that practising doctors engaging in self-directed learning may use heuristics to determine when they have learned enough so that they can stop seeking new information.¹⁷

Our work suggests that during clinical learning, learners may engage heuristics, perhaps at a largely unconscious level, that sort available information according to its credibility. Information that is embedded in the actual work of the doctor carries tremendous weight. For example, patient and family responses and clinical outcomes are perceived as so intrinsic to the work that they cannot be ignored in any judgement heuristic, whereas information such as feedback from supervisors is weighted less strongly and must be supported by additional evidence if it is to be judged credible. These findings align with earlier explorations of doctors' workplace learning, in which clinical outcomes, patient satisfaction and feedback from patients were regarded by doctors as credible indicators of their performance.^{18,19}

Ultimately, information that does not survive credibility judgement is unlikely to influence learning, whereas information that is deemed credible, even if challenging to the learner, may demand action. Challenging, negative or emotion-laden clinical experiences may be such powerful learning influences precisely because the learning cues they contain emerge from the judgement heuristic as highly credible, demanding learner attention in a way that neutral events do not. Previous work has suggested that negative feedback may be problematic because its intended effects are often thwarted by recipients'

emotional responses or their perceptions that it is inaccurate.^{20–22} Our results refine this understanding. We found many examples in which negative feedback from patients or families motivated a change in practice, probably because such information was judged to be credible.

Learning cues that are judged as credible therefore appear to exert considerable influence on how learners construct knowledge. However, when the decisions learners make about where to focus their attention are based largely on internally constructed notions of credibility, there is a danger that clinical learning may be derailed if the cues learners rely on lead them off course. Eva and Regehr²³ recognised the same danger in the realm of self-assessment. In their call for a reformulation of self-assessment, they identified the need to understand the cues that influence individuals' judgements about their learning, when those cues may be misleading, and how trustworthy external sources of information can be incorporated to provide balance and correction.²³ By illuminating how learners use credibility judgement heuristics, our study may help us to anticipate how learners will respond to various cues. Future research should explore whether the process of credibility judgement is serving learners well in the way it directs their attention and reflective efforts, and how corrective actions can be most effectively taken when the guidance offered by learning cues is faulty.

What, then, is the message for medical teachers? Teachers must recognise that their feedback competes for attention with other, sometimes more innately credible, learning cues. By understanding both the intrinsic value of clinical work itself and the processes by which learners make credibility judgements, teachers can identify productive opportunities for involvement in their learners' development. Teachers are perhaps never more influential than when they serve as role models, cueing learners through their actions and providing examples that learners can emulate. Teachers can also play important roles in assisting learners to reconcile conflicting cues from clinical work. Our participants recognised, for example, that teachers were sometimes critical at moments that called for debriefing, when clinical outcomes could not be relied upon to give accurate information to learners about their performance.

Our approach to data collection via individual interviews has illuminated the internal processes of judgement and reflection that influence learning.

However, this individual focus is also a limitation because it may fail to capture external influences such as professional culture. The hierarchy of information sources that lead certain cues to be valued above others is undoubtedly not entirely individually derived, and future research should explore the social and cultural influences on how information is weighed and utilised. There would also be value in observational studies that capture instances of learners interacting with feedback and other learning cues in order to refine our understanding of how such information is judged and interpreted. Finally, ours was a single-site study with volunteer participants, which may limit the transferability of our analytic insights to other contexts. It should be noted, however, that although our participants all currently practise in a single academic institution, they represent a broad range of geographic and cultural training backgrounds.

CONCLUSIONS

Medical learners, confronted with multiple cues that might guide their learning, make credibility judgements about those cues that determine which information merits their attention and reflection. Cues that resonate most with learners and most consistently drive their learning are those that are most clearly embedded within the clinical work they aspire to do. Educators should recognise the impact of intrinsically credible learning cues, anticipate the critical review of credibility to which their feedback will be subjected, and strive to provide feedback that survives this credibility judgement to optimise their influence on learning.

Contributors: CW conceived and designed the study, collected many of the data, and took responsibility for the data analysis and was the principal author. ED and CPMvdV helped refine the data analysis and interpretation, critically revised and made important contributions to manuscript revisions. Lorelei Lingard contributed to the study design, assisted with data collection and in refining the data analysis. She critically revised and made important contributions to manuscript revisions. All authors approved the final manuscript for submission.

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