Loopy Experts: Using Communities of Practice in Self-Directed Learning to Advance Heliski Guide Flight Safety

by

Tony B. Walker

A research paper submitted in partial fulfillment of the requirements for the degree of

Master of Adult Education at the University of Calgary

Author Note

I have no known conflict of interest to disclose.

Correspondence concerning this article should be addressed to Tony Walker, 4618 Westview Drive, Terrace, BC, Canada. V8G 2S8. Email: helicourse@gmail.com

Abstract

This research examines heliski guides developing safe work practices in close collaboration with pilots. Certain expert guides exhibit high levels of crew resource management (CRM), an aviation discipline comprised of communication, leadership, and decision-making. This paper investigates how such guides acquire CRM expertise individually, without explicit training. An appreciative inquiry of seven heliski pilots assisted in developing the criteria for guide CRM expertise. Three expert guides, suggested by these pilots, were then interviewed to discover their thought processes and learning models. The results of the interviews, supported by the literature, defined a paradigm of the expert who uses a looping method of deliberate practice by embracing a community of practice and learning through self-direction. The research illustrated that experts are motivated by professionalism to use psychological safety promoting feedback and situational awareness to create a continuous loop of self-directed learning.

Keywords: communities of practice, psychological safety, feedback, heliski guides, self-directed learning

Your chance of dying today in a commercial airline accident is ten times less than 1980, a safety margin produced from the advancement in the hardware of flight and the introduction of Crew Resource Management (CRM) (Airbus, 2020). CRM is an aviation discipline teaching communication, leadership, and decision-making within the flight crew environment in order to anticipate and proactively deal with problems.

Heliski operations involve the flying of skiers and their guides to the top of unmarked ski runs where they are dropped off to ski to the bottom. The guide closely controls the skiers around the helicopter, but unlike the skiers in the backseat who are out of contact, guides sit beside the pilot interacting in flight through the intercom. As the heliski flying environment is uncontrolled, pilots must make multiple decisions on every flight including safety critical aspects such as space to land, flight visibility, and power limitations. Piloting helicopters, unlike larger airliners, is subject to influence from the customer / passenger. This influence can be positive in achieving higher levels of operational safety and efficiency, or negative, leading to tension, unsafe acts, and inefficiencies. Heliski guides receive no CRM instruction, but some amongst the cohort (the "experts") behave as if trained, influencing the pilot and bringing excellence to the operation.

The literature of expertise illustrates that proactive behaviors, feedback, deliberate practice and pattern recognition are fundamental factors in mastering a skill, demonstrated by confidence and competence (Ericsson, et al., 1993). Experts learn through experience, guided by peers, mentors, and reflection. Their self-directed learning is undertaken with the knowledge that sometimes they do not know what they do not know. This awareness of the unknown is created through a combination of situational awareness and feedback.

In communities of practice (CoP), learning is an action defining one's identity and is more than an individual endeavor, it is a social act, generating and retaining knowledge through

communication with others (Wenger, 1996). This communication is enhanced through psychological safety, a condition where one feels included, safe to learn, to contribute and to challenge the power structures within a group. This interpersonal risk taking is rewarded with acceptance rather than embarrassment or marginalization (Zhang, et al., 2010). Psychological safety enables effective feedback, providing the circumstances where needed information is delivered in a timely way. The communication and learning of experts is motivated by a sense of professionalism derived from the CoP generated identity.

The research question of this study asserts that self-directed learning to attain expertise uses guidance from communities of practice. The phenomenological study, using an appreciative inquiry of seven pilots and three heliski guides, collected multiple stories and instances of guide behavior indicating advanced CRM skills. The results of the interviews showed a consensus amongst the pilots that strong CRM proficiency of expert guides was manifested by an understanding of the pilot's thinking, the use of psychological safety, feedback to communicate effectively, and a proactive sensibility towards emergent safety. Data from the guides reinforced the findings from the pilots, expanding on the paradigms of communities of practice, expertise, and professionalism.

This paper presents a definition of expertise and a description of how these experts learn helicopter CRM through self-regulated learning in communities of practice, using psychological safety, feedback, situational awareness, and professionalism.

Literature review

A synopsis of the literature is presented below based on the themes derived from the study results.

Expertise

Expertise is an amalgam of knowledge and skill, done with confidence, extending beyond competence. Mastery and wisdom are developed with increased knowledge derived from experience that is a cycle of positive change, as the complex tasks are broken down into component parts and improved individually (Ambrose, 2010; Jarvis, 2008).

Parker and Collins (2010) note that increased performance results from proactive behaviors such as initiative, expressing voice, proactive service, and problem solving. These are different from passive behaviors that do not have the anticipatory element that enables control of the environment. Deliberate practice is one such proactive behavior. Simply experiencing and practicing a situation does not lead to in-depth learning. Deliberate practice uses repeated, specific, and challenging activities to build on preexisting knowledge with immediate feedback that improves the level of expertise. Without the feedback, efficient learning is impossible and improvement minimal. (Ericsson, et al., 1993; Jarvis, 2015; Weiman, 2012).

Intuition is derived from pattern recognition skills, which create deep knowledge structures, an ability to pick up on subtle cues, and develop judgment (Kahneman & Klein, 2009). If cues are tightly coupled with outcomes then further intuition and expertise is produced. This reinforcing of intuitive pattern recognition skills through feedback enables the development of accurate judgment (Berry et al., 2008; Kahneman & Klein, 2009; Krueger, 2014). A kind learning environment, where information and action are tightly coupled with consequences, is more efficient at developing intuition than a wicked environment, one that is dynamic, involving mismatches, false or missing information, and poor feedback. A hot stove is an example of a kind learning environment, providing immediate feedback when touched, whereas predicting the stock market is an example of the wicked (Hogarth et al., 2015).

True experts understand that expertise is not a domain transferrable behavior but one that must be developed for each discipline. Knowledge of this fact controls overconfidence as compared to those with less experience, experts have a reduced amount of confidence in their decisions because of a deeper understanding of the nuances and complexity within their domain (Kahneman & Klein, 2009). A kind environment may have wicked aspects or paradoxical situations and experts intuitively know they might be missing pertinent information or be wrong in assessing the situation (Jarvis, 2008; Jarvis, 2015; Oskamp, 1965). Heuristics are intuitive mental shortcuts used to tolerate paradox, using known information and frameworks to develop plausible responses, and are utilized to deal with the expert's uncertainty (Jarvis, 2008; Kahneman & Klein, 2009; Raab & Gigerenzer, 2015). Learning from individual or unique critical incidents, and being aware that these can be a contradiction of beliefs, can evoke metaphorical power through interpretation. Experts capture near misses as feedback to understand how to avoid future incidents (March et al., 1991).

Learning

To be successful, self-directed learning requires the engagement of the learner with guidance and feedback from mentors and peers (Zimmerman, 1990). This active learning can be spontaneous or directed and is a constructivist approach where knowledge is constructed by a learner's cognitive effort based on previous knowledge. The learner is a co-creator of knowledge contributing valuable insight and experiences to the learning process (Bernstein, 2018).

Workplace learning is 80% informal, an ongoing practice that includes self-directed learning and mentoring (Cacciattolo, 2015). Much of this learning occurs in the social interaction between workers as they develop solutions for problems that arise, where increased autonomy and direct mentoring are effective. Workplace learning is usually unintentional and unseen at the

time of creation but upon reflection, workers are able to discern a change in their knowledge and behaviour (Cacciattolo, 2015). Career related continuous learning has been shown to be the most effective method in providing workers with continual improvement in their job-related activities through an individual focus (Rowold & Kaufield, 2008). This learning can be spontaneous or reactive when the objective of the activity or discussion is not learning but rather performing the activity and this spontaneity creates some of the most useful learning experiences (Cacciattolo, 2015). Continuous learning uses problem solving techniques and social competence to development knowledge, skills, and behaviours (Rowold & Kaufield, 2008).

A "guide on the side" can be key to developing and remembering, as the ability to watch and learn from a master prior to attempting a task can create a more effective learning situation (Cacciattolo, 2015; Clark & Mayer, 2008). This theory has some opposition as its effectiveness is based on how active the learner is during the learning (Bernstein, 2018). Kalaian and Kasim, (2014) concur pointing out that unguided discovery learning without discipline is ineffective.

Simple single or closed loop learning is the detection and response to errors that represent the theory in use, in essence, doing things right. Double loop learning incorporates feedback and iteration to improve what works, manage risks, and understands causality, to continually advance and determine whether the right things are being done (Argyris, 1991; Yeo, 2008). Self-regulated learners approach education with confidence and resourcefulness, aware of what they do and do not know; accepting responsibility to master their goals using systematic motivational and behavioral strategies, and self oriented feedback (Zimmerman, 1990).

Communities of Practice

Learning is not only an individual process but is social, as learners work together developing knowledge through a common identity (Wenger, 1998). Communities of practice

(CoP) bind people together through activity and learning in a joint enterprise as defined by the members partaking in mutual engagement and a shared collection of communal resources developed over time (Boud & Middleton, 2003; Wenger, 1998; Young & O'Connor, 2003). CoP participation creates a culture and social identity among its members that is larger than any individual (Fuller et al., 2005; Machles et al., 2010). A CoP is multidimensional and not just a network where information flows only top down but where the experienced worker can learn from the novice, who bring their own identity, beliefs, attitudes, and skills (Fuller et al., 2005; Wenger, 1996). The development and use of the CoP, to support a sense of community and safety, enables information exchange supported by trust and creates an environment of learning. Organizational politics can interfere with learning, especially as this learning and personal growth can be seen as a power dynamic, where newcomers can threaten the established hierarchy (Cacciattolo, 2015; Fuller et al., 2005).

CoPs have boundaries, perspectives, language, and shared experiences, which reinforce the sense of community and create barriers of understanding and inclusiveness for those outside the community. Boundary exploration between CoPs fosters learning as the differing cultures come to understand each other through negotiation and communication, creating new meaning (Wenger, 1996). CoP learning creates knowledge produced collectively across boundaries through social dynamics where the knowledge held by the CoP is greater than that of any of its individual members (Karasavvidis, 2002; Young & O'Connor, 2003). Knowing is unstable as it is a continuous social activity developed through the repetition of practice, generating a collective competence using shared identity, learning by doing, and supportive participation. Skillful performance is a dynamic accomplishment, not based on static properties, but on the

activity itself as it generates tacit knowledge (Amin & Roberts, 2008; Handley et al., 2006; Orlikowski, 2002).

Psychological Safety

Psychologically safe groups enable participants to take interpersonal risks such as expressing differing ideas, disagreeing with others in the group, and exhibiting personal diverse behaviors without fear of penalty (Edmondson 1999). An individual feels they will not be undermined, their skills and talents are recognized, and they are able to bring up tough issues without negative personal consequences. Leaders provide the most influence in shaping the psychological safety dynamic of groups that become secure in speaking up so information flows are enhanced, enabling acquisition of tacit knowledge and nuanced understandings (Roussin et al., 2014). Psychological safety enhances learning through a willingness to disclose errors and seek improvement from feedback, something that cannot occur if there is a potential of embarrassment (Edmondson 1999; Gherardi & Nicolini, 2000).

Exposure to dissenting views can contribute to a resistance to conformity and an increased level in independent thought. A minority view provides social cues regarding the consequences of countering convention and so can show courage and foster respect (Nemeth & Chiles, 1988). Speaking truth to power presents some personal risk to the speaker such as reduced opportunities, reputational harm, or negative feedback. The advantages of speaking upward can benefit the speaker, the audience, and the organization by pointing out problems as they occur, stemming ill-advised behavior, and creating awareness of opportunities. Self-censorship derives from the social belief based on past experiences that speaking up is risky and silence is the best method to maintain one's safe place in an organization. Psychological safety

creates an environment where self-censorship is replaced by input that is desired, forthright, and true. (Detert & Edmondson, 2011).

Feedback

Feedback as an act in itself is without value as it can be positive by reducing role uncertainty, or negative through creating loss of face. Negative feedback can provide impetus for improvement or conversely the avoidance of additional feedback to reduce perceived indignity. Positive feedback can create high performance expectations or an indolent attitude towards betterment (Sherf & Morrison, 2020). Feedback is only useful if it is wanted, as individuals tend to be open and respond positively if they have a tendency towards receiving it and in these cases, it is highly correlated with learning and high self-esteem (Anseel et al., 2013; Sherf & Morrison, 2020; Trope & Neter, 1994; Tuckey et al., 2002). Individuals are unlikely to seek feedback if it not seen as useful (Sherf & Morrison, 2020).

Situational Awareness

Situational Awareness (SA) is the observation and perception of events and surroundings that are interpreted through dynamic reflection thus creating a projection of potential futures (Parse, 2018; Stanton et al., 2001). A complex and dynamic environment requiring numerous quick decisions makes SA increasingly difficult. Pressures of the moment need to recognized and managed as interference with data gathering for SA limits its efficacy (Bennett, 2018). Team SA can be more effective if members possess a shared mental model enabling better information sharing with less communication as discussion is reduced and extraneous information and is ignored. Lacking SA is not necessarily a weakness as this realization can lead to a modification of behavior and enhanced performance (Endsely, 1995).

Professionalism

Professionals perform to a standard with the characteristics of ethical behavior, reliability, strong interpersonal skills, and self-improvement (Ali et al., 2020; Evetts, 2011). Professionalism is a value system and an attitude that portrays and protects the ideology of the profession, whose members have an intrinsic enjoyment in the rendering of service to the public through a duty of trust (Bruce & Ahmed 2014; O'Connor, 1998). Professionals have a high degree of individual autonomy and an ethical stance to provide superior levels of service to the public. Independent thought, practice, and knowledge are used when encountering new problems and novel dilemmas that depend on personal deliberation and reflection rather than prescriptive answers (Carr & Carr, 2000).

Method

Phenomenology looks to produce insight and meaning without artificial conditions into complex social worlds. Interpretive skills are used to develop an understanding of the subjects through observation, data description, analysis, and development of theory (Cohen et al., 2018; Creswell & Creswell, 2018). The research focused on the lived experience of the participants and sought to identify their individual and social construction of reality.

The selection of the pilots was generated by a non-probability sample representing a particular group rather than a random selection from the greater community. A weakness of this convenience sampling is the inability to generalize towards a broader population (Cohen et al., 2018). Seven of an estimated 450 Canadian heliski pilots were selected for the research based on personal connections with the interviewer and successful careers in the industry ranging from two to thirty years. Appreciative inquiry, a methodology focusing on the positive, searching for the best in people and their organizations (Cooperrider, et al., 2000), was used to develop a

definition of guide expertise and the parameters of actions used by guides with high CRM skill. Directional inquires were created based on my interest and prior knowledge of the subject matter.

The choice of three guides as suggested by the pilots is an example of snowball sampling. This method is considered valuable in qualitative research, as it requires social knowledge and an equalization of power relationships between the interviewer and participant, establishing higher levels of rapport and trust (Cohen et al., 2018). Due to the small number of participants, snowball sampling cannot be considered inclusive of the entire community. The guides, with experience of between 20 and 30 years, were interviewed in depth exploring their history, training, actions, attitudes, and thoughts to develop an understanding of how they learned and performed CRM. The recorded interviews of the pilots and guides were conducted by telephone or in person and the data coded by reflecting on the meanings of the statements. The codified data were then divided into units of meaning using a reflexive approach, forming common narratives by looking for linkages, contrasts, and comparisons.

A reflexive awareness of this researcher's bias is important because I am both a heliski pilot and a CRM instructor and, as a researcher, am not neutral. My ten years of heliski and CRM instructing experience shapes the interpretations of themes and development of meanings, influencing the research. In the discussions with the subjects my personal experiences were limited to providing contextual background without overriding the responses. I do not work at any of the heliski operations represented so the use of backyard research and the possibility of power imbalances or reticence of the subjects to provide sensitive information was not a concern (Creswell & Creswell, 2018).

The data supplied consistent themes that were researched through a literature review using the search terms of expertise, communities of practice, psychological safety, feedback, situational awareness, and professionalism.

Results

The seven pilots interviewed reflected on their interactions with expert guides and were consistent in their comments regarding the guide's knowledge of the pilot's job, understanding pilot concentration and limitations, and the power of both negative and positive influence. The teamwork aspect of the job was mentioned as the pilots appreciated a guide who trusts the pilot to perform. A recurring theme was the negativity expressed by the pilots regarding guides who "tried to fly the helicopter", removing command from the pilot. This was seen as dangerous behavior because of the tacit understanding amongst the pilots that guides have no idea of the difficulty involved in flying a helicopter in the production heliski environment and if errors are committed, the consequences fall on the pilot alone.

Guides who provided an interpersonal environment of calm and empathy were highly regarded by the pilots. Expert CRM guides had a secure identity with quiet confidence where egos were put aside for the betterment of the team, as evidenced by facilitating rather than manipulating crew. The guides developed traits such as a proactive mindset, exploring the counterfactual, awareness of the unknown, understanding nuance, realistic expectations, being trainable, and not succumbing to pressures. They had strong communication skills and asked questions, being keen to understand, engaging in dialogue, and were responsive to input. They were aware of the importance of communication through comments such as "I want the pilots to say no." and asking pilots about their assessment of the situation, taking care with language to ensure the proper message is sent and received.

The paradigm of safety was constant in the results. Pilots noticed that guides who have been part of an accident are proactive in their safety awareness and more open to improvement. Two of the guides who had been peripheral to a fatality mentioned that it affected their decision-making, strengthening their paradigm of "safety trumps everything", regardless of the financial or personal pressures.

The three guides all took pride in their work, exhibiting high levels of care and seeing themselves to be in control of their future. The three had consistent training and mentoring that provided high levels of demanded excellence by older guides, previous employers, and family. This pursuit of excellence is central to the guides' identity and that of their work community. The guides were aware of the intellectual comfort zone and the meaning of it as a place of stagnation. This lack of learning created motivation for the challenge of continual improvement. They saw that everyone can make a mistake but it was recognized that those who don't learn from experience suffer from insecure identities. In this vocation one has to be able to wear the mistake without argument, knowing that to repeat it is unacceptable, as evidenced by the statement "don't do anything stupid".

Curiosity, thinking ahead, and reflection were self-directed learning skills the three guides used to develop CRM. They were conscious of the pressures that can arise during the day to provide a better customer experience, which in turn can push the safety margins towards danger. This awareness included looking for changes, attentiveness to an increasing pace of operations, responsiveness to distraction, and trying to answer why something is happening rather than just accepting it.

The guides had a deep understanding of the pilots' situation. Pilots were seen as individuals with their own risk tolerance and communication styles making each pilot-guide

pairing unique. The guides wanted to set the pilot up for success, liking the ones who were engaged and removed any toxicity from crew communications ensuring it was easy for the team to raise safety concerns and shut down the operation, regardless of pressures to keep going.

Discussion

Ten years experience can mean two things - one year of the same experience ten times or ten years of constant improvement. Simply engaging in a task without deliberate practice and effortful activity results in stasis, an inability to improve to levels otherwise possible. This discussion follows the looping logic of experts who create a situation of deliberate practice for themselves through experiential learning in communities of practice, enabled by psychological safety that develops feedback to create situational awareness, which in turn loops back to continued experiential learning. This paradigm and the behavior it produces is motivated by the sense of professionalism these experts possess.

Experts are able to anticipate and control their areas of expertise, becoming so through experience, in a cycle of continuous learning developed through proactive behaviors such as initiative and deliberate practice (Ericsson, et al., 1993; Kahneman & Klein, 2009). Guides who master CRM have pattern recognition skills and intuitive judgment that is exhibited through their adaptability in the workplace and ability to work with the pilots. Examples of this behavior are the capability of "reading the pilot's mind" and the ability to adapt to a changing scenario, adopting a new approach by taking into account shifting variables.

The CRM CoP of the expert guide is developed through personal experience. Some guides have never had a close call, incident, or accident induced by their behaviour while others have been exposed to recurring examples. Pushing the pilot to fly in low visibility, landing at inappropriate spots, or changing the plan without enough time to do so safely are all examples of

guide behaviors that have caused accidents. The experts have either personally experienced an accident or have been associated with such behaviors, giving them motivation to be part of the CoP which has a safety culture, one that is a process rather than an object. This culture is perceived by each individual as an action in the moment, rather than a destination arrived at, and rather than one of inactive knowledge, the culture is one of discipline, embracing continuous and spontaneous learning.

CRM reflects an emergent safe work practice where safety develops in the moment. Guides are part of a socially constructed community of practice whose culture defines risk and appropriate action. The CRM CoP recognizes that the technical approach to safety by creating rules for specific dangers and risks cannot be complete as the spectrum of risk is much wider than that encapsulated by a simple object such as a rule book. It is not possible to create an answer to every safety question, as many of the questions themselves are unknown. This rule making behavior limits the span of knowledge and the ability of an individual to create such knowledge (Gherardi & Nicolini, 2000) and is counter to the behavior of a professional (Carr & Carr, 2000).

The achievement of this knowledge through the constructivist experiential learning in the CRM CoP uses feedback engendered by psychological safety. Feedback is continuous, whether in the scheduled morning and evening meetings or during the day through interactions with pilots and other guides. Secure in their own identity, the guides sought out with intellectual humility both positive and negative feedback provided by peers and mentors. This feedback was somewhat directed but depended on the individual's reflection and effortful learning to build the knowledge base and actions of an expert. The single loop learning of the initial and simple actions is foundational and precedes the double loop learning, determining whether the right

things are being done (Argyris, 1991). This learning was evidenced by the guides reflecting on the acceptance of risk, safety margins, and the search for disconfirming evidence.

Empathy, social skills, dialogue, and especially openness were traits deemed by the pilots to make a guide particularly good at CRM. These social interactions are all aspects of psychological safety and lead to open communication with the rest of the group (Edmondson, 1999), creating an environment so the information needed for self-directed learning becomes available in a timely fashion. This high level of psychological safety also enables dissenting or contrary viewpoints to be captured, especially as desired negative feedback provides impetus to improve for members of a CoP such as that of the expert guides (Tuckey et al.,2002).

There is no one method of effective learning, rather a collection that depends on the individual, the social environment, the point in the career, and the operation (Rowold & Kaufield, 2008). The CRM self-directed experiential learning of expert guides uses situational awareness to develop pathways of knowledge in an effort to embrace all the viewpoints and information in emerging situations. This action of being present is a fundamental component of situational awareness (Parse, 2018). Based on earlier feedback and frameworks, guides use situational awareness to look for what is uncertain and out of place, building on their heuristics through reflection and thus developing intuition (Kahneman & Klein, 2009). An awareness of distraction in the cockpit, the financial pressures of the operation, and personal perception of risk are examples of areas where situational awareness is a valuable learning tool.

The guide's job entails risk management through decision making under uncertainty. A positive attitude towards the job and a safety culture of practice and competency has been shown to deliver better crew performance ratings by a difference of a standard deviation. This positive attitude reduces the latent condition that is not the cause of an accident, but a contributing factor

to it (Sexton & Klinect, 2001). The guides' professional attitude is motivation for exemplary CRM as their CoP is a system driven from within rather than from above, and is not about market power and credentialing but creating and preserving an attitude (Evetts, 2011; Larson 1979).

Conclusion

A phenomenological study was undertaken to determine how certain heliski guides have achieved without training superior crew resource management skills enabling safer and more efficient heliski operations. The study used appreciative inquiry interviews with seven heliski pilots and three heliski guides and employed a reflexive approach to code the data, forming common themes and narratives.

Guides used the looping logic of continual improvement to achieve expertise. Deliberate practice through effortful directed learning led to the acquisition of the skills and knowledge required to perform excellent CRM. The CRM community of practice within which these guides operated used psychological safety, where interpersonal risk taking is valued, enabling feedback to be produced. This feedback created an outline for further spontaneous and active learning that was developed through situational awareness, providing a perception of events and the projection of possible futures that produced experiential learning. The significant level of professionalism in the CRM CoP provided motivation for attaining high standards and continuous learning.

The study indicated that experts can learn and achieve a degree of mastery outside their realm of expertise by using a CoP that produces psychological safety, generating effective communication and feedback. If the CoP culture features expertise and professionalism, the expert will find motivation to self-direct their learning through deliberate practice and feedback from the CoP and the situation itself.

Convenience sampling of the pilots was a limitation of the study, as the sample is possibly not representative of the entire heliski pilot population. The small snowball sample of guides limits the applicability of the findings. Further study of guides with diminished CRM proficiency, relative to those of equivalent experience, is needed to confirm that experts do not autonomously generate their own knowledge and behavior and that communities of practice are a prime component of self-directed learning.

References

Airbus (2020). *A statistical analysis of commercial aviation accidents 1958-2019.* X00D17008863 Issue 4. February 2020. https://www.airbus.com/content/dam/corporate-topics/publications/safety-first/Statistical-Analysis-of-Comercial-Aviation-Accidents-1958-2019.pdf

Ali, A., Anakin, M., Tweed, M., & Wilkinson, T. (2020). Towards a definition of distinction in professionalism. *Teaching and Learning* in *Medicine*, 32(2), 126-138.

Ambrose, S. (2000). *How learning works: Seven research bas*ed *principles* for *smart teaching*. John Wiley and Sons.

Amin, A., & Roberts, J. (2008). Knowing in action: Beyond communities of practice. *Research Policy*, 37(2), 353-369.

Anseel, F., Beatty, A. S., Shen, W., Lievens, F., & Sackett, P. R. (2015). How are we doing after 30 years? A meta-analytic review of the antecedents and outcomes of feedback-seeking behavior. *Journal* of *Managem*ent*,* 41(1), 318–348. https://doi.org/10.1177/0149206313484521

Argyris, C. (1991). Teaching smart people how to learn. *Harvard Business Review*, 69(3), 99.

Bennett, S. (2018): The training and practice of crew resource management: recommendations from an inductive invivo study of the flight deck. *Ergonomics*, 62(2). 219-232. DOI:10.1080/00140139.2018.1506159

Bernstein, D. (2018). Does active learning work? A good question, but not the right one. *Scholarship of Teaching and Learning in Psychology*, 4(4), 290-307.

Berry, J., Abernethy, B., & Cote, J. (2008). The contribution of structured activity and deliberate play to the development of expert perceptual and decision-making skill. *Journal* of *Sport & Exercise Psychology*, 30(6), 685-708.

Boud, D., & Middleton, H. (2003). Learning from others at work: Communities of practice and informal learning. *Journal* of *Workplace Learning*, 15(5), 194-202.

Bruce, K., & Abdullahi A (2014). *Conceptions* of *professionalism: Meaningful standards* in *financial planning*. Taylor & Francis Group.

Cacciattolo, K. (2015). Defining workplace learning. *European Scientific Journal* 1(Special Edition). 243-250.

Carr, David, & David Carr. (1999). *Professionalism and Ethics* in *Teaching*. Taylor & Francis Group.

Clark, R., & Mayer, R. (2008). Learning by viewing versus learning by doing: Evidence-based guidelines for principled learning environments. *Performance Improvem*ent, 47(9), 5-13.

Cohen, L., Manion, L., & Morrison, K. (2018) *Research methods* in *educat*ion. (8th Edition) Routledge.

Cooperrider, D., Sorensen, P., Whitney, D., & Yaeger, T. (Eds.). (2000). *Appreciative inquiry: Rethinking human organizat*ion toward *a positive theory* of *change*. Stipes.

Creswell, J.W., & Creswell, J.D. (2018). *Research design: qualitative, quantitative, and mix*ed *methods approaches* (5th Edition): Sage.

Detert, J., & Edmonson, A. (2011). Implicit voice theories: Taken-for-granted rules of self-censorship at work. (Report*). Academy* of *Manageme*nt *Journal*, 54(3), 461-488.

Edmondson, A. (1999). Psychological safety and learning behavior in work teams. *Administrative Sci*ence *Quarter*ly, 44(2), 350-383.

Endsley, M. R. (1995). Toward a theory of situation awareness in dynamic systems. *Human Factors,* 37(1), 32–64. https://doi.org/10.1518/001872095779049543

Ericsson, K., Krampe, R., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, 100(3), 363-406.

Evetts, J. (2011). Sociological analysis of professionalism: past, present and future. *Comparative Sociology*, 10(1), 1-37.

Fuller, A., Hodkinson, H., Hodkinson, P., & Unwin, L. (2005). Learning as peripheral participation in communities of practice: A reassessment of key concepts in workplace learning. *British Educational Research Journal*, 31(1), 49-68.

Gherardi, S., & Nicolini, D. (2000). The organizational learning of safety in communities of practice. *Journal* of *Manage*ment *Inquiry*, 9(1), 7-18.

Handley, K., Sturdy, A., Fincham, R., & Clark, T. (2006), Within and beyond communities of practice: Making sense of learning through participation, identity and practice. *Journal* of *Manage*ment *Studies*, 43: 641-653. doi:10.1111/j.1467-6486.2006.00605.x

Hogarth, R., Lejarraga, T., & Soyer, E. (2015). The two settings of kind and wicked learning environments. *Curr*ent *Directions* in *Psychological Sci*ence, 24(5), 379-385.

Jarvis, P. (2008) Learning to be an expert: The place of vocational education. In Kumar, R., Kumar, P., & Ramsey, P. (Eds.) *Learning and performance matter.* (pp. 171-184). World Scientific.

Jarvis , P. (2015) Learning expertise in practice: Implications for learning theory. *Studies* in *the Educat*ion of *Adults,* 47(1), 81-94, DOI: 10.1080/02660830.2015.11661676

Karasavvidis, I. (2002). Distributed cognition and educational practice. *Journal* of *Interactive Learning Research,* 13(1), 11-29.

Kahneman, D., & Klein, G. (2009). Conditions for intuitive expertise. *American Psychologist,* 64(6), 515-526.

Kalaian, S., & Kasim, R. (2014). A meta-analytic review of studies of the effectiveness of small-group learning methods on statistics achievement. *Journal* of *Statistics Educat*ion*,* 22(1), 1-20.

Krueger, N. (2014). Experts learn experientially?: The impact of experiential learning on developing the entrepreneurial mindset. ICSB World Conference Proceedings, 1-3.

Larson, M. (1979). *The rise* of *professionalism: A sociological analysis*. University of California Press

Machles, D., Bonkemeyer, E., & McMichael, J. (2010). Community of practice. *Professional Safety*, 55(1), 46-51.

March, J., Sproull, L., & Tamuz, M. (1991) Learning from samples of one or fewer. *Organizat*ion *Sci*ence*,* 2(1), 1-13.

Nemeth, C., & Chiles, C. (1988). Modeling courage: The role of dissent in fostering independence. *European Journal* of *Social Psychology*, 18(3), 275-280.

O'Connor, S. (1998). Professionalism. *Washington University Law Quarter*ly, 76(1), 13.

Orlikowski, W. (2002). Knowing in practice: Enacting a collective capability in distributed organizing. *Organizat*ion *Sci*ence*,* 13(3), 249-273.

Oskamp, S. (1982). Overconfidence in case-study judgments. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), *Judgm*ent *under uncertainty: Heuristics and biases* (pp. 287-293). Cambridge University Press. doi:10.1017/CBO9780511809477.021

Parker, S., & Collins, C. (2010). Taking stock: Integrating and differentiating multiple proactive behaviors. *Journal* of *Manageme*nt, 36(3), 633-662.

Parse, R. (2018). Situational awareness: A leadership phenomenon. *Nursing Sci*ence *Quarter*ly, 31(4), 317-318.

Raab, M., & Gigerenzer, G., (2015). The power of simplicity: A fast and frugal approach to performance science. *Frontiers* in *Psychology*. 6, 1-6 https://doi.org/10.3389/fpsyg.2015.01672

Roussin, C., Maclean, T., & Rudolph, J. (2016). The safety in unsafe teams: a multilevel approach to team psychological safety. *Journal* of *Manage*ment, 42(6), 1409-1433.

Rowold, J., & Kauffeld, S. (2008). Effects of career-related continuous learning on competencies. *Personnel Review*, 38(1), 90-101.

Sexton, J. B., & Klinect, J. R. (2001, May). *The link between safety attitudes and observ*ed *performance* in *flight operations* [Paper presentation]. In Proceedings of the Eleventh International Symposium on Aviation Psychology (pp. 7-13). Columbus, OH, United States.

Sherf, E., & Morrison, E. (2020). I do not need feedback! Or do I? Self-efficacy, perspective taking, and feedback seeking. *Journal* of *Appli*ed *Psychology*, 105(2), 146-165.

Stanton, N., Chambers, P., Piggott, J., & Stanton, NA. (2001). Situational awareness and safety. *Safety Sci*ence, 39(3), 189-204.

Trope, Y., & Neter, E. (1994). Reconciling competing motives in self-evaluation: The role of self-control in feedback seeking. *Journal* of *Personality and Social Psychology*, 66(4), 646-657.

Tuckey, M., Brewer, N., & Williamson, P. (2002). The influence of motives and goal orientation on feedback seeking. *Journal* of *Occupational and Organizational Psychology*, 75(2), 195-216.

Wenger, E. (1996). How to optimize organizational learning. *Healthcare Forum Journal*, 39(4), 22-23.

Wenger, E. (1998). Communities of practice: Learning as a social system. *Systems Thinker*, 9(5), 2-3.

Wieman, C. (2012). Applying new research to improve science education: Insights from several fields on how people learn to become experts can help us to dramatically enhance the effectiveness of science, technology, engineering, and mathematics education. *Issues* in *Sci*ence *and Technology*, 29(1), 25-32.

Yeo, R. (2008). How does learning (not) take place in problem-based learning activities in workplace contexts? *Human Resource Develop*ment *International*, 11(3), 317-330.

Young, J., & O'Connor, J. (2003). How experts learn outside the domain of their expertise: an exploration of a faculty community of practice. [Doctoral dissertation, George Mason University]. ProQuest Dissertations and Theses.

Zhang, Y., Fang, Y., Wei, K., & Chen, H. (2010). Exploring the role of psychological safety in promoting the intention to continue sharing knowledge in virtual communities. *International Journal* of *Informat*ion *Manageme*nt, 30(5), 425-436.

Zimmerman, B. (1990). Self-Regulated learning and academic achievement: An overview. *Educational Psychologist*, 25(1), 3-17. https://doi.org/10.1207/s15326985ep2501_2