Collective intelligence on the job: Intersections between workplace learning and collective intelligence

Margaret Bearman, Centre for Research in Assessment and Digital Learning, Deakin University

Introduction

Collective intelligence can be loosely understood as the "wisdom of the crowds" (Liemeister 2010) or "collaborative problem solving and decision-making" (Suran et al. 2023). Collective intelligence has long been associated with technology enhancement to human capability (Leimeister 2010). Typical examples are citizen science, crowd sourced computer coding or deliberative democracy (Olszowski 2024). Discussion of educating for collective intelligence appears to overlap with the educational technology literature (e.g. Hogan et al. 2023; Meza et al. 2018). However, this may overlook the possible understandings garnered from the extensive empirical and theoretical work around workplace education.

Workplaces can be conceptualised as sites where collective intelligence occurs on a daily basis. After all, in most workplaces, collaborative practices are necessary to 'get the job' done, with a collective understanding as to what the 'job' entails (Schatzki 2002). The workplace learning literature is itself eclectic. Broadly speaking, it encompasses both organisational psychological framings of teamwork, which considers the conditions that optimise team performance (eg Salas et al. 2015) and the strongly practice-based framings, which see learning as being 'stirred' into practice (Kemmis et al. 2017).

Comparing the two fields

When comparing the two literatures – collective intelligence and workplace learning, some differences become striking. A systemic review of collective intelligence models reveals some foundational assumptions across models; historical roots appear to be cognitive science – where knowledge is framed as something that can exist outside the knower – and its extension into systems thinking (Suran et al. 2023). Thus, reading collective intelligence literature provides the sense that collective intelligence is concerned with conscious and deliberate direction of joint cognition. There are some caveats: recent work turns to evolutionary origins such as 'swarm behaviour' (Hogan et al. 2023). However the impression is that collective intelligence can – and should - be harnessed through creating the right type of structural and technological conditions.

Much of the workplace learning literature, in contrast, emphasises that knowledge is a social property, bound to knowers and contexts. The best known example of this is the (often misunderstood) 'communities of practice' (Lave & Wenger 1991; Wenger 1998). From this perspective, learners become part of a community in similar ways: they watch more experienced practitioners and are given basic, delineated tasks to do, progressing to more complex roles as they gain expertise. Thus, learning in a workplace is conceptualised as embodied and contextualised with respect to the work and workplace (Lave and Wenger 1991). Wenger proposes a sense of identity develops as a learner moves more deeply into the community, interacting with each other and sharing language, tools and activities (Wenger 1998). Learners can also be seen as agentic: Billet (2006) theorises the mutuality of development between the workplace context and the learners. He suggests that workplaces offer opportunities to learn to work, while learners remake the act of working. All this workplace learning literature emphasise embodied, contextualised and relational ways of understanding collective activity.

This very brief comparison suggests strong differences between the fundamental propositions underlying both literatures. Collective intelligence mostly draws from cognitive, rational understandings of knowledge and knowing. It eschews what Donald Schon (1987) called the "swampy lowlands" of practice and nor does it take account of the social and material arrangements associated with workplaces and working.

Three provocations

So what are the implications of this comparison for collective intelligence? Drawing from Schatzki's 2002 theorisation of *practices* as a core organising unit of social activity, I propose three topics to be troubled.

- *Troubling collective intelligence as purposeful and cognitive*

Workplace learning is often built around activities, rather than deliberately organised. This can be thought of as an emphasis on *practices* rather than systems. One particularly interesting feature of a practice view is that it frames working activity as purposeful or working towards some kind of collective ends - therefore these can be *tacit* as much as explicit. By contrast, collective intelligence focusses on the deliberative inculcating of joint thinking – thus it has tends to have an explicit shared goal. To illustrate this difference, consider the notion of 'desire lines' – the paths that are formed as people walk through a space (Cresswell 2012) – versus a footpath, which clearly demarcates where people walk. And, as is generally experienced, desire lines can run counter to, or away from the intended route. How can or should ways of thinking about collective intelligence take into account the organising nature of a practice, with all its embodied and affective naunces? Or, to frame differently, how should collective intelligence lean into its strength – of collectively and agentically working towards an explicit shared goal – in the messy world of practice?

- *Troubling the role of technology (and other material arrangements)*

Technology is often foregrounded in the collective intelligence literature, as a coordinating tool that enables purposeful collective intelligence. Oher material arrangements are often backgrounded; the objects, spaces and bodies associated with collective intelligence are referenced far less frequently. From a practice perspective of workplace learning, technology and activity mutually constitute each other, and such mutual constitution is also embedded within particular material settings. How can or should collective intelligence expand to consider how intelligence resides within the material conditions as much as within *people*? Or, to frame differently, which material and technological arrangements are associated with successful experiences of collective intelligence?

- *Troubling the role of social arrangements*

Kemmis et al.'s (2017) theorisation of workplace learning suggests that material conditions are inextricably bound with social structures. Thus, material conditions are about power and social dynamics as they are about wealth. However, collective intelligence rarely grapples with these conversations. Yet, in many ways, part of its *raison d'etre* is to democratise, as seen in citizen science. The literature seems to elide the possibility that it may also be reinforcing or creating power dynamics that are less desirable. When thinking about collective intelligence, how can we ask: whose agenda is being served and why?

An educational response: simulation-based education

The challenges described above – the way human practices is organised within social and material contexts – also present challenges for the workplace learning literature. How can we ensure that our students can learn collaboratively, ethically and safely? The work-integrated learning literature highlights the value of simulation-based education. Thus, as a partial response to these provocations, I suggest that simulation may offer a highly promising means of promoting collective intelligence. For example, simulation has been used to teach management of healthcare emergencies (Martin 2020), the role of stakeholders in tense geopolitical negotiations (Vincent & Shepherd 1998) and management of river systems (Maier et al. 2007). Simulation-based education is routinely used to teach coordination, communication and shared mental models, tasks that are clearly a good fit for collective intelligence. To extend on this, collective intelligence scenarios can be designed with conflicting agendas or low-resource technologies or with clear moral challenges. Because simulation-based education is always set as tasks within a particular time and place, it takes account of collective activities and associated sociomaterial conditions.

Conclusions

There are many similarities and differences between the collective intelligence literature and the workplace learning literature. The collective intelligence community might wish to consider the provocations posed by the workplace learning literature. They may also wish to investigate the opportunities offered by simulation pedagogy as a means of educating for an embodied, contextualised form of collective intelligence.

References

Billett, S. (2006). Relational Interdependence Between Social and Individual Agency in Work and Working Life. Mind, Culture, and Activity, 13(1), 53–69. https://doi.org/10.1207/s15327884mca1301_5

Cresswell, T. (2012). *Foreword: Desire lines*.In Paul, H., Ganser, A., & Gerund, K. (Eds) *Pirates, drifters, fugitives: Figures of mobility in the US and beyond*, 7-10. Universitatsverlag, Heidelberg.

Hogan, Michael J., Adam Barton, Alison Twiner, Cynthia James, Farah Ahmed, Imogen Casebourne, Ian Steed et al. "Education for collective intelligence." *Irish Educational Studies* (2023): 1-30.

Kemmis, S., Edwards-Groves, C., Lloyd, A., Grootenboer, P., Hardy, I. & Wilkinson, J. (2017) Learning as being 'stirred in' to practices. In P. Grootenboer, C. Edwards-Groves & S. Choy (Eds.) *Practice Theory Perspectives on Pedagogy and Education: Praxis, diversity and contestation*. Singapore: Springer

Lave, J. & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press.

Leimeister, J. M. (2010). Collective intelligence. *Business & Information Systems Engineering*, *2*, 245-248.

Maier, H. R., Baron, J., & McLaughlan, R. G. (2007). Using online roleplay simulations for teaching sustainability principles to engineering students. *International Journal of Engineering Education*.

Martin, A., Cross, S., & Attoe, C. (2020). The use of in situ simulation in healthcare education: current perspectives. *Advances in medical education and practice*, 893-903.

Meza, J., Jimenez, A., Mendoza, K., & Vaca-Cárdenas, L. (2018, April). Collective intelligence education, enhancing the collaborative learning. In *2018 International Conference on eDemocracy & eGovernment (ICEDEG)* (pp. 24-30). IEEE.

Olszowski, R. (2024). Beyond the Individual: Understanding the Evolution of Collective Intelligence. In *Collective Intelligence in Open Policymaking* (pp. 63-126). Cham: Springer Nature Switzerland.

Salas, E., Shuffler, M. L., Thayer, A. L., Bedwell, W. L., & Lazzara, E. H. (2015). Understanding and improving teamwork in organizations: A scientifically based practical guide. *Human resource management*, *54*(4), 599-622.

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

Scherer, M. U. (2015). Regulating artificial intelligence systems: Risks, challenges, competencies, and strategies. *Harvard Journal of Law & Technology, 29*(2), 353–398.

Schön DA (1987) Preparing professionals for the demands of practice. *Educating the reflective practitioner* (Jossey-Bass Publishers, San Francisco)

Suran, S., Pattanaik, V., & Draheim, D. (2020). Frameworks for collective intelligence: A systematic literature review. *ACM Computing Surveys (CSUR)*, *53*(1), 1-36.

Vincent, A., & Shepherd, J. (1998). Experiences in teaching Middle East politics via internet-based role-play simulation. *Journal of Interactive Media in Education*, *1998*(3), 11-11.

Wenger, E. (1998). *Communities of Practice : Learning, Meaning, and Identity*. Cambridge, UK ; Cambridge University Press.

Acknowledgement