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Knowledge Building
as New Perspective
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Indice

Editorial

Knowledge Building as new perspective for Education: From belief mode to design mode and the need for 'infrastructuring' 5
Frank De Jong, Stefano Cacciamani

ARTICLES

Designing Informal Knowledge Building learning spaces: Students' Knowledge Building Design Studio 13
Guangji Yuan, Chew Lee Teo, Alwyn Vwen Yen Lee, Aloysius Kian Keong Ong, Jen Hui Lim

Student reflections on the integration of Knowledge Forum as 'equipment' for knowledge building practice 37
Dina Soliman, Andrew Whitworth, Steven Priddis

Real-world experts co-facilitate design-mode Knowledge Building in a continuing medical education course in palliative care 66
Leila Lax, James Meuser, Daphna Grossman, Paolo Mazzotta, Merna Wassef, Anita Singh

Meeting students halfway: Materials in an ideas-centered classroom 99
Richard Reeve

Learning from the knowledge builders: Student perspectives on the challenges of classroom Knowledge Building communities 122
Katerine Bielaczyc

Infrastructuring for Knowledge Building: Advancing a framework for sustained innovation 139
Shiri Kashi, Yotam Hod, Alwyn Vwen Yen Lee, Guangji Yuan, Etan Cohen, Katerine Bielaczyc, Bodong Chen, Jianwei Zhang

Connecting between systems for classroom-based Knowledge Building sustainability and scalability 157
Thérèse Laferrière, Cesar A. A. Nunes, Niall MacKinnon, Linda Massey, Chew Lee Teo, Richard Reeve, Telma P. Vinha, Vincent Gagnon

Real-world experts co-facilitate design-mode Knowledge Building in a continuing medical education course in palliative care

Leila Lax, James Meuser*, Daphna Grossman*, Paolo Mazzotta*, Merna Wassef*, Anita Singh**

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Abstract

Engaging real-world experts as partners in co-facilitation of collaborative Knowledge Building with students has been overlooked in educational research, yet it is an enriching way to elevate knowledge work beyond knowledge acquisition, for authentic, improvable impact on practice. Reflective observational analysis, a novel method, indicates that successful integration of real-world experts as co-facilitators in sustained Knowledge Building depends on distributed responsibility, shared leadership, and collective engagement in sociocognitive load. Demands and time are substantive; benefits to facilitators are not always clear, initially. Cognitive collective responsibility elevated agency of belief-mode and design-mode Knowledge Building for improvement in palliative care practice.

Keywords: Knowledge Building, Design-mode, Co-facilitation, Shared Leadership, Palliative Care, Continuing Medical Education

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Introduction

Collaborative Knowledge Building (KB) online in the Palliative Care eLearning (PCeL) Program is designed to promote continuing education and knowledge translation to practice in palliative care for family physicians and nurse practitioners (Bereiter & Scardamalia, 1993; Lax et al., 2015). The goal of this program is to expand professional capacity and elevate palliative care for patients and their families. The KB discourse in Knowledge Forum (KF) spans 6 modules, over 7 months, and is framed by palliative care issues concerning pain management, other symptoms, and care during the last days of life (Scardamalia, 2017) (Figure 1).

Figure 1. Palliative Care eLearning Program, 6 Modules, in Knowledge Forum.

In the PCeL Program authentic patient cases are used, as a springboard for discussion of real-world issues. The family physician and nurse practitioner participants are encouraged at the onset of the course, to *go beyond* the case, to collectively focus on their related professional practice and real-world concerns. For example, partici-

pants examine barriers to palliative care in their own communities and practice, and work together to create real-world solutions, to improve care for patients and their families, within the health care system. In other words, participants are encouraged to *go beyond* belief-mode KB, to focus on KB in design-mode (Bereiter & Scardamalia, 2003, 2006; Scardamalia, 2002).

Background on belief-mode and design-mode Knowledge Building in the Palliative Care eLearning Program

Bereiter and Scardamalia (2003; 2006) have distinguished belief-mode and defined design-mode KB. More recently they tied belief-mode KB to critical thinking and design-mode KB to design thinking (Scardamalia & Bereiter, 2017; Bereiter & Scardamalia, 2016). However, the original terminology of *belief-mode* and *design-mode* KB provide greater clarity for our context. They indicate:

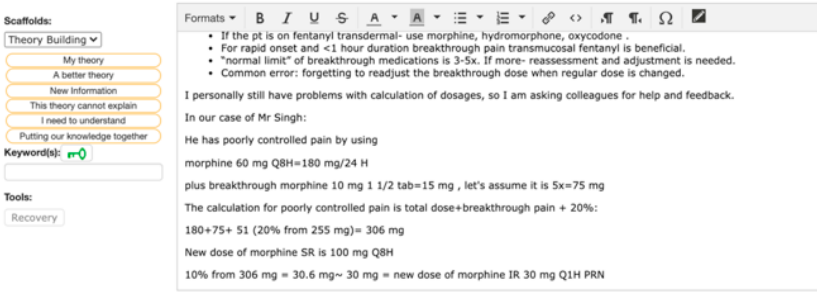
> A distinction between two modes of dealing with knowledge and ideas – originally labeled "belief mode" and "design mode" (Bereiter & Scardamalia, 2003) – has played an important part in knowledge building theory and pedagogy. …Belief mode was seen as comprising the wide variety of ways in which people evaluate knowledge claims – the ways in which they arrive at decisions about what to believe. Design mode was seen as the mode of invention and idea development – the kind of activity through which new knowledge is created. What makes design mode especially important in knowledge building is that it is the mode of idea improvement – a core principle of knowledge building. …Design mode and belief mode both deal with ideas in significant ways; in belief mode the focal question is "Is it true?" whereas in design mode the focal question is "How can we make it better?" Both modes are valuable and work well together, but since ancient times education has been conducted almost exclusively in belief mode (Scardamalia & Bereiter, 2017).

In the context of the PCeL Program the distinction between belief-mode and design-mode KB is evident and yet woven together since both are deemed necessary to elevate knowledge work (Bereiter,

2002a; Bereiter & Scardamalia, 2003; Scardamalia & Bereiter, 2014). The minimal structure of the PCeL curriculum in KF allows participants to define the scope of KB and enables opportunistic growth according to community epistemic interests and emergent issues. Design-mode work is supported by the openness of KF that literally reflects the boundlessness of KB.

The following examples, from the PCeL Program highlight the distinction between belief-mode and design-mode KB and the interplay between them. Work in belief-mode is necessary for understanding of current best practices in palliative care. For example, knowing the titration of pain medication from morphine to hydromorphone is essential, as shown in the KF note in Figure 2.

Figure 2. Example of work in belief-mode of calculations for titration of pain medication.



Belief-mode curricula, whether case-based discussion or didactic, lecture-style is the typical mode employed in most continuing medical education courses, whether online or in person (Frenk, 2010). The novel feature of the PCeL Program is the focus on design-mode KB to evoke knowledge translation to practice. The KB design-mode discourse in the PCeL Program context includes collective work on ideas, not typically found in traditional didactic curricula, such as barriers to care (Figure 3), spirituality (Figure 4), managing difficult communications (Figure 5), the purpose of hope (Figure 6), existential distress (Figure 7), dealing with the grief of losing a patient (Figure 8), and current controversial issues, like medical assistance in dying

(MAiD) (Figure 9). Below are examples from the PCeL Program of participants' design-mode KB, that clearly distinguishes it from belief-mode KB and traditional learning. (Please read the text within these KF notes that capture the breadth, depth, and novel nature of the discourse.) These single notes provide a "snapshot" of the ideas-at-the-centre of the discourse, connected to numerous build-on notes in various discourse clusters in KF and the overarching goal of idea improvement.

Figure 3. Emergent idea about "stigma" prompted design-mode KB on this psychosocial aspect as a barrier to care.

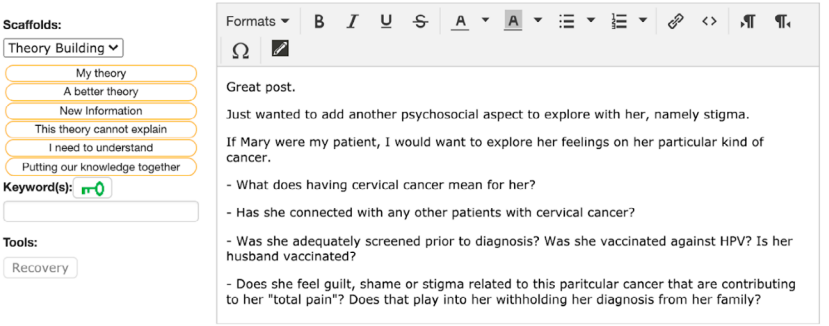


Figure 4. "Spirituality is important for patients and … for care givers."

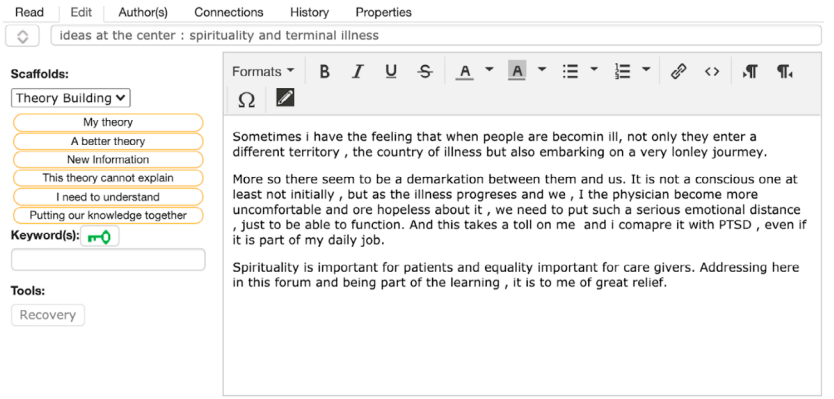


Figure 5. A participant shares her perspective that patient communication is care and explains the framework that she uses to guide "hard on the heart" conversations.

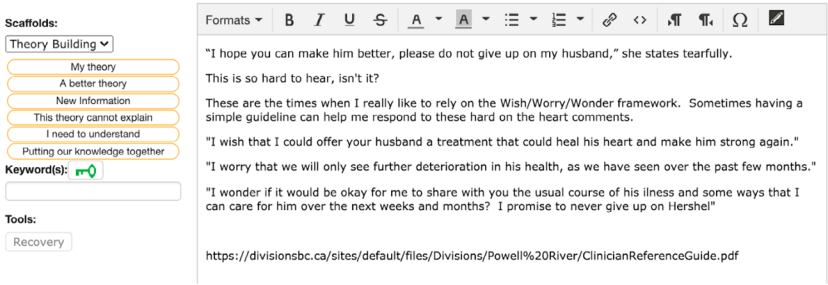


Figure 6. The purpose of "hope" for patients, families and practitioners is discussed, framed by a quote from Robert Frost: "Hope does not lie in a way out, but in a way through".

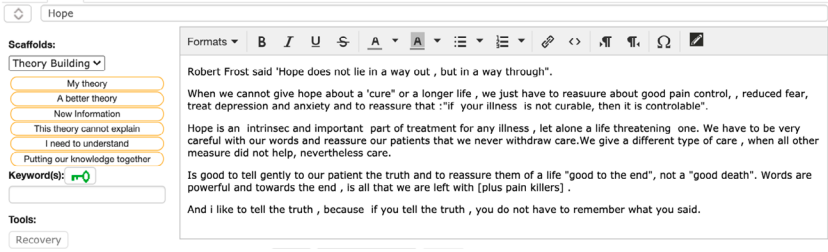


Figure 7. This note stimulated a robust discussion about existential care for patients, care givers, and physicians, not often considered in traditional curricula.

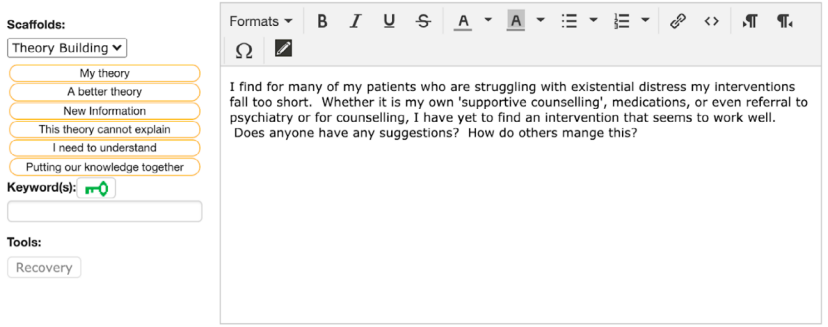


Figure 8. In a build-on note this participant expressed how she dealt with personal grief

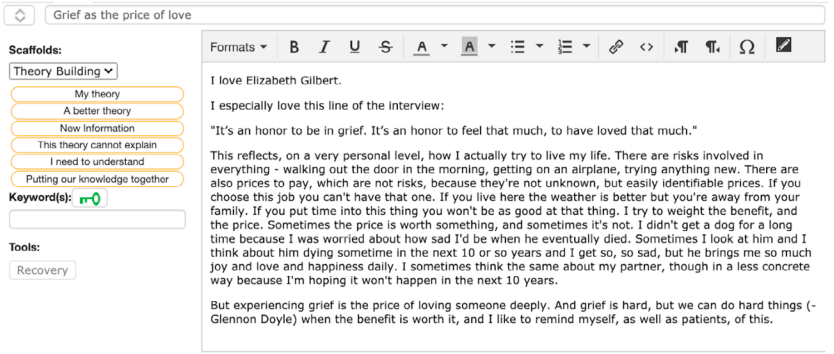
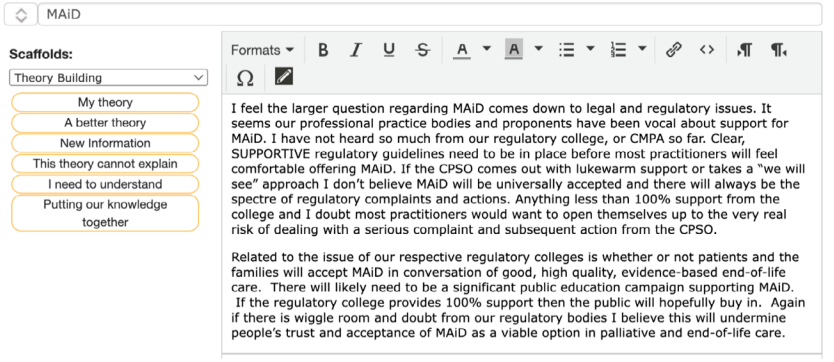


Figure 9. Opportunistic KB on medical assistance in dying (MAiD), a current issue in the Canadian medical system, evoked a high level of active engagement in the discourse.



KB in design-mode, as we see from these exemplars, offers unique opportunities for communal discourse that is well-suited to continuing professional development. The discourse *goes beyond* knowledge mobilization and competency-based curricula, typical in medical education (Hodges & Lingard, 2012) to address promising and improvable ideas (Chen, 2017). Design-mode knowledge work is not intuitive, nor is it well known and therefore KB theory, principles, and strate-

gies must be made explicit to all participants, students, and facilitators. (Scardamalia, 2002; Scardamalia & Bereiter, 2014).

Bereiter & Scardamalia's informative paper, titled *"Good Moves" in Knowledge Creating Dialogue* (2016) provides an excellent resource on dialogic actions for KB discourse. They describe seven dialogic moves and provide examples in Table 1. It is important to note that critical discourse or belief-mode knowledge work is just one of the seven aspects of KB discourse listed.

Table 1. KB discourse moves and examples (Bereiter & Scardamalia, 2016).

Dialogue move	Example
Problem definition	Clarifying the essence of the challenge, why it is important, and why has it not been addressed already
New ideas	Introducing new concepts, distinctions, or analogies and connecting them to current state of art
Promisingness evaluation	Considering which idea has greater potential for development into a theory, design, or product and how it relates to alternatives
Meta-dialogue	Reflecting on the discourse, evaluating its progress, recognizing individual contributions and collective accomplishments, troubleshooting when the discourse is perceived as not going right socially or conceptually
Comparison	Looking beyond the immediate sphere to analogous problems and solutions, connecting ideas across problem and community boundaries
Critical discourse	Considering the trustworthiness of information on which a particular design decision is based
Higher-level ideas	Working collaboratively to develop an idea that has application beyond the current problem domain

In the PCeL Program the design researcher introduces KB theory, principles, and specifies strategies for *going beyond* belief-mode to design-mode work. Theory, principles, and strategies are then linked to technical aspects of collaborative work in KF. Contextualized strategies for prompting design-mode KB are discussed with the KB/KF facilitators in a training session in advance of the opening of the PCeL Program and communicated to participants/students in the first session (via in-person presentation or videoconferencing). Student participants and facilitators are provided with following 12 strategies for working collaboratively in both belief-mode and *going beyond* to work in design-mode (Table 2).

Table 2. Strategies for collaborative KB with ideas-at-the-centre and for going beyond (belief-mode, in design-mode) in the PCeL Program.

1. Contribute a note with your understanding of an idea-at-the-centre.
2. Add a build-on note with a related practice issue.
3. Identify a barrier in practice and ideas for change or improvement.
4. Add a good reference paper, video, podcast, presentation, etc.
5. Dig deeper with good questions.
6. Address misconceptions immediately.
7. Identify knowledge gaps.
8. Take the opportunity to ask your personal practice questions.
9. Use the opportunity to mentor each other.
10. Ask for expert feedback and practice knowledge from your colleagues and the facilitators (who are specialists in palliative care).
11. *Go beyond* the case; collectively advance knowledge in belief-mode and design-mode.
12. *Go beyond* by advancing ideas-at-the-centre; identifying barriers to care and discussing current, relevant issues important to you and to improvement of practice.

In the PCeL Program, it is noteworthy that the facilitators are real-world palliative care experts, leaders in their field with academic appointments. The facilitators play a key role in shifting the discourse from belief-mode to design-mode KB in KF. In their training session, the design researcher also advises facilitators to model design-mode

KB by bringing their own patient cases, experience, and reflections into the KF discourse, and by posing practice questions. Their participation in collective KB establishes high-level expectations for authentic knowledge work at the edge of ideas related to practice.

In past years, one palliative care expert facilitated each of the six PCeL Program modules. In the PCeL Program 2021-2022, two real-world palliative care experts facilitated the discourse in each module. They built-on each other's ideas and student participants' ideas. Thereby, creating a new model of concurrent, collaborative facilitation, or what we have called "co-facilitation" of KB, that demands investigation. One facilitator had three-years' experience and had taken the PCeL Program before. The other facilitator was new to the Program and had not taken the course before.

Statement of the issue

Although much research has been conducted on students' collaborative KB, little focus has been given to the role of the facilitator, as mentor and partner (Lax 2016; Tabak & Baumgartner, 2004). We are not aware of any research conducted on multiple experts working simultaneously in KF as co-facilitators with students; nor are we aware of any studies that have been conducted on sustained engagement of multiple, real-world experts, as facilitators of KB. However, noteworthy are Cacciamani and colleagues related studies examining KB facilitation styles in an online university course (2012) and instructor's perspective on various designs of blended learning (2021).

In the PCeL Program in past years, the typical ratio of 1 facilitator/expert to many students was the KB/KF community norm. The facilitator supports collaborative KB by posing questions, drawing out misconceptions, prompting reasoning and searches for evidence, and most importantly, bridging real-world practice by modeling informative, reflective note contributions on personal practice challenges (Lax, 2015; Scardamalia & Bereiter, 2014). This pedagogic strategy *goes beyond* the artificial constraints imposed by case-based learning (Barrows & Tamblyn, 1980) and inert knowledge (Whitehead, 1929),

common to didactic teaching/learning, to emphasize knowledge translation and its impact on practice.

In past years, 1 facilitator was responsible for responding to numerous posts by the many participating students (n=8 to 22). To lighten the load, in more recent years, 2 experts alternated facilitation of the 6 modules, moderating the discourse in 3 modules each. Previous facilitators were past participants in the PCeL Program and therefore were familiar with KB.

In 2021-2022, a new facilitator was engaged and needed to be trained as a KB facilitator concurrently while taking the course. This led to the new facilitator collaborating with the more experienced facilitator and a mutually engaging collaboration between palliative care experts and participants.

The new facilitator, a respected palliative care expert and experienced physician mentor and teacher, described her initial experience of KB facilitation as "intense". This form of facilitation is demanding in terms of time and challenging in terms of required depth and breadth of sociocognitive contributions for physician facilitators who are also carrying busy patient practices and heavy hospital/community workloads.

The aim of this design research, case study is to examine the reflections of the two palliative care experts on co-facilitation (one new to KB in KF and the other an experienced facilitator) and to determine what sociocognitive interactions influenced belief-mode and design-mode KB with student participants, to inform the next iteration of the PCeL Program. This study is guided by the following research question: What are the interrelationships between co-facilitation sociocognitive interactions, collective KB (students and facilitators) in belief and design-mode, and idea improvement?

Method

The research protocol for this design research (Bereiter, 2002b) case study (Creswell, 2003) was approved by The University of Toronto Social Sciences Research Ethics Board.

Research methodology

This study uses reflective observational analysis, a novel two-part approach developed by the researchers/authors. The method was inspired by Schön's (1987) notion of the reflective practitioner and informed by Bereiter and Scardamalia's (1993) conception of improvable knowledge. The reflective component employs open-ended questions and written responses. The observational analysis component focuses on review of the KF database by the design researcher and selection of a series of build-on notes as exemplars to illuminate the reflective feedback comments, highlight KB in design-mode and belief-mode, and identify knowledge creation "good moves" (Bereiter & Scardamalia, 2016).

This observational analysis does not just focus on the note content, as is common in much KB research, but on the relationships between and across notes. The objective is to identify knowledge trajectories and evolution of ideas, alongside interactions that influence KB, such as rotating roles, shared leadership, and cognitive collective responsibility (Lax, 2016; Scardamalia, 2002). Details from the data collected in KF enables qualitative, description, and detailed, granular reporting. This is context-specific, case study, design research and it is distinguished by its authentic, albeit narrow representation, for formative feedback purposes to inform the next iteration, rather than any summative purposes or generalizable goals.

Research context

This study was conducted within the PCeL Program 2021-2022. It is a continuing medical education course offered through the Office of Continuing Professional Development, Temerty Faculty of Medicine, University of Toronto, Toronto, Canada (https://www.cpd.utoronto.ca/pcel/). The course is certified for through the College of Family Physicians Canada and is financially supported by the Ontario Ministry of Health and Long-Term Care. The PCeL Program is composed

of 6 online modules in KF that run over 7 months, as well as, 2 in-person or videoconferencing sessions (3 hours each), 1 at the opening of the program and the other midway through. KB work is conducted through facilitated, collective discourse online in KF. A complementary Website (https://pcelprogram.ca) provides details on program schedules, an eLibrary of resources, knowledge tests for individual formative feedback (Lax, 2015), and opportunities for the creation of reflective action plans for participants to make explicit their plans for change to improve practice.

Participants

In the PCeL Program 2021-22, the discourse was co-facilitated by two palliative care experts in each module. One facilitator was new to the PCeL Program and KB/KF facilitation and the other was an experienced KB/KF facilitator having taken the course and facilitated for the last three years. Both facilitators are currently practicing clinicians, family medicine specialist in palliative care, at large, urban, teaching hospitals in Toronto and experienced teachers with academic appointments in the Temerty Faculty of Medicine, at the University of Toronto. Additionally, the experienced facilitator was an educational consultant for the College of Family Physicians of Canada. Twenty-two student participants are allowed to register annually in the PCeL Program. In the 2021-2022 course, 20 family physicians and two nurse practitioners registered. The majority of student participants indicated that they have been in professional practice for more than 10 years.

Procedures and data collection

This study was conducted in two parts.

(1) The new facilitator was asked to reflect and respond in writing to two questions. Her response was reviewed and supplemented to

by the more experienced facilitator. The two questions for reflective response were:

- What were the challenges of co-facilitating KB, and what, if any, were the benefits of co-facilitating KB?
- What are your reflections on the experience of co-facilitating KB in KF, rotating roles and shared leadership?

The questions were emailed by the design researcher to the co-facilitators and their reflective responses were received back by email.

(2) After receiving the co-facilitators' responses and analyzing their reflections on their KB process, the design researcher selected a cluster of build-on notes in KF. These exemplars illuminate the co-facilitators' experience and highlight sociocognitive interactions between the facilitators and student participants, ultimately demonstrating design-mode KB and its intrinsic relationship to belief-mode.

Analysis

The facilitators' reflective responses made explicit their findings on co-facilitation and the sociocognitive interactions of working together and collectively with student participants to improve knowledge. In the first step of this reflective observational analysis, the design researcher reviewed and qualitatively analyzed the facilitators' responses, highlighting the emergent ideas and various KB sociocognitive dimensions, informed by descriptions of shared leadership, rotating roles, cognitive collective responsibility (Lax et al., 2016; Ma et al., 2016; Scardamalia, 2002).

Contributions to KF by participants provided a large dataset for qualitative analysis. In the second step of this reflective observational analysis, the design researcher selected a KB/KF cluster of build-on notes, for within, across and between note analysis of KB. The KB/KF dataset and specific clusters of build-on notes, enables observation of sociocognitive interactions and visualization of knowledge work, in belief-mode and design-mode, emphasized by "good moves" in dialogic discourse (Bereiter & Scardamalia, 2016). The selected cluster of build-

on notes was analyzed according to these dimensions, informed by the theoretical literature on KB in belief and design-mode (Scardamalia & Bereiter, 2017; Scardamalia & Bereiter, 2014), "good moves" (Bereiter & Scardamalia, 2016), the KB principle of cognitive collective responsibility and sociocognitive interactions of shared leadership and rotating roles (Lax et al., 2016; Ma et al., 2016; Scardamalia, 2002).

Commentary on design-mode research and analysis

Creative KB in design-mode is difficult to measure or make tangible. Unlike belief-mode measurement, it is not well developed. We need new ways to evaluate and derive meaning from collective, design-mode knowledge work. This study uses reflective observational analysis, a novel method and term we have created to support a step towards the methodological examination, within, between and across cognitive artifacts in a KF space.

We can measure the worth of KB by demonstrating typical individual knowledge improvement on pre/post-tests (Lax et al., 2015). But that doesn't capture the nuanced personal experience and meaningfulness of collaborative KB. We can agree on the benefits of collaboration versus individual learning and demonstrate active participation, through KF build-on and social network measures (Lax et al., 2010; 2016). But that doesn't capture the essence of the extraordinary layer of *going beyond* and working with emergent ideas for knowledge improvement. What needs to be illuminated is this "other" meaningful aspect of collaborative KB that participants value, that is typically devoid in traditional, educational environments that focus only on individual learning in belief-mode.

Quantitative outcomes of belief-mode work do not address, express, or illuminate the process of design-mode KB. Belief-mode focuses on final outcomes, whereas design-mode focuses the process, the flow of KB. Belief-mode examines qualitative dimensions *within* notes. Design-mode qualitative research examines the build-ons *between and flow across* notes. Belief-mode evaluates the end point; design-mode evaluates the evolution of ideas and iterative improvements.

Belief-mode focuses on individual accomplishment; design-mode focuses on collective knowledge advancement. Belief-mode assesses what is known; design-mode assesses what we need to know and where we will go next (Table 3). As the famous hockey star, Wayne Gretzky said, "(I skate) to where the puck is going to be, not to where it has been" (Wikipedia, 2023). It is not surprising that new research and evaluation methods are necessary to capture the complexities of design-mode KB and how belief-mode is intrinsically woven within. Our development of reflective observational analysis is a step in this regard.

Table 3. Analytic dimensions of belief-mode and design-mode KB.

Belief-mode KB Analysis	Design-mode KB Analysis
Focuses on outcomes	Focuses on process
Conducted within KB/KF notes, i.e., content analysis	Conducted within KB/KF notes, between & across build-on notes & across clusters
Evaluates the end point	Evaluates the evolution of ideas & trajectory of knowledge improvement
Aims to determine individual accomplishment	Aims to determine collective knowledge advancement
Assesses what is known	Assesses what needs to be known next and idea refinement
Uses traditional methods (e.g., pre/post-tests)	Needs new methods (e.g., "good moves"; reflective observational analysis)
Goal: knowledge acquisition of current justified true beliefs	Goal: idea improvement, creative knowledge work, design thinking

Results

The aim of this reflective observational analysis study is to examine the interrelationships between co-facilitation by real-world experts, sociocognitive interactions, and collective KB (students and facilitators) in belief and design-mode for idea improvement. Results of this study highlights features of co-facilitation by real-world experts and the creation of a new model of KB in KF. Rotating roles and shared

leadership between co-facilitators, as well as between student participants, is elucidated in the KF problem space. Cognitive collective agency, aimed beyond learning and knowledge acquisition, successfully supports design-mode KB, as evidenced by the dialogic "good moves" employed.

Challenges and benefits of co-facilitating Knowledge Building

The co-facilitators identified various KB challenges in this continuing professional development course, and some unexpected benefits. The new facilitator in her post-course written, reflective analysis, highlighted the challenges of addressing misconceptions in a KF note and how to provide feedback on professional practice. She explained the importance of cognitive collective responsibility in co-facilitation. She wrote:

"When facilitating discussion online with colleagues who have been in practice for years and have approaches to care that you think should be modified, you are faced with a dilemma. How do you correct the approach to care respectfully? How do you convey respectful discussion and discourse online, when the nuances of non-verbal cues are not seen in the written conversation? How do you respond in a timely manner, not leaving incorrect concepts lingering?"

This challenge occurred in one of the modules, where a very seasoned clinician (student participant) was suggesting a medication to treat neuropathic pain which was no longer available and was not the optimal approach to managing the specific symptom.

Working with an experienced facilitator allowed the new facilitator to ask for guidance and to review the response prior to posting to ensure that it was written thoughtfully and respectfully, while correcting the error in approach to care. Having 2 facilitators allowed for more timely responses and ensured the discourse regarding the choice of medications was addressed. Having the experienced facilitator engaged in the discourse, provided safety for the new facilitator to respond to the post and immediately correct the error with the confidence.

In another module there was discussion about how the clinician might explore the cause of symptoms such as anorexia or agitation at the end of life. Some of the participants suggested several tests to investigate the cause. It is true that tests are helpful in learning about possible contributing causes, but should we do the tests? Understanding the nuances of goals of palliative care discussions where a person's values, wishes and trade-offs are explored to ensure person-centred care is very challenging. Exploring these nuances in an online discussion adds an extra layer of complexity. The new facilitator presented the concepts of goals of care discussions to inform the group of the importance of these exploratory conversations before ordering tests. On the other hand, the skilled facilitator posed questions allowing the participants to work out the issue amongst themselves coming to the same understanding but through their own inquiry. Having both the experienced and new facilitators working in the same KB problem space allowed for cognitive mentorship opportunities that benefitted the new facilitator.

Co-facilitators' reflections on shared leadership and rotating roles

The co-facilitation model helped to improve the confidence and KB capabilities of the new facilitator. This strategy ensured that all modules promoted excellent KB while simultaneously increasing the skills of the new facilitator. She indicated that "This model is a wonderful way to introduce new facilitators to the program within a safe and supported environment enhancing the experience of both the new facilitator and the participants".

Different palliative care experts/facilitators have different strategies for challenging and supporting students and come with unique skill sets and clinical experience. The new facilitator indicated "We seldom have the opportunity to observe how others teach and facilitate courses. By allowing facilitators to occupy both lead and back-up roles, I was provided with a mentorship opportunity to enhance my own techniques by observing how another person facilitated".

What also became very clear early in the experience of the cohort of students exposed to the co-facilitation model is that the new facilitator brought significant added value to the KB experience in a number of ways. She came with experience in palliative care conducted in hospital and long-term care settings, which matched very well to the practice settings of many participants. She was also able to share a variety of new references and practice resources, all of which were added to KF and to the online library of materials available to future participants. Finally, as a respected author and co-author of a number of highly regarded contributions to the palliative care literature, she brought a reflectiveness to the online discussion that clearly came from thinking deeply about the core clinical, ethical, and system questions raised for participants by the program. When faced with patient problems posted by participants, as a real-world expert, she could grapple with the issues and respond effectively. Engaging real-world experts in collective KB provides deep and relevant content expertise, embedded context knowledge, and the ability to make explicit professional skills that may or may not be implicitly understood in practice.

Although facilitators are considered the experts in the field, the student participants were also experts in other facets of care unique to their practice setting and population. For example, colleagues who work with people experiencing homelessness provided the opportunity for the facilitators and other participants to consider issues unique to this population. Family physicians learning together with nurse practitioners provided a better understanding of each other's experiences and approaches to care. In the KB discourse it became evident that, the participants worked in different locations: urban, suburban, and rural and in different care settings: clinic, hospital and nursing home. Each of these areas provide unique challenges in palliative care and are illuminated in the shared contributions in KF. Rotating participants in the facilitator "hot seat" created agency, diversity, democracy, and opportunistic leadership in KB. A heterogenous group composed of participants from related but different professions, working with different patient populations, in different professional practice settings offers KB opportunities to improve ideas through shared leadership and rotating roles.

Exemplars of co-facilitation, shared leadership, and rotating roles in design-mode discourse

There are many examples throughout the six PCeL Program modules of co-facilitation, shared leadership, and rotating roles in the KB discourse. One cluster of ideas-at-the-centre regarding Medical Assistance in Dying (MAiD) from Module 5 is provided as an exemplar (Figure 10). Starting with the note titled "Personal Experience with MAiD", the right and left build-on note trajectories are quoted herein. Spelling errors have not been corrected to maintain authenticity of the quoted notes.

Exemplars of observed co-facilitation and visualization of shared leadership and rotating roles are specified within, between, and across notes. In addition, results of observed KB belief-mode and design-mode work is explicated according to Bereiter and Scardamalia's (2016) dialogic "good moves", i.e., problem definition, new ideas, promisingness, comparison, critical discourse, higher-level ideas, and meta-dialogue.

Figure 10. PCeL Program 2021-2022, Module 5, KB clusters on MAiD

Medical Assistance in Dying (MAiD) Cluster, Ideas-at-the Centre

Participant 1 shares a personal story about one of her close relative's palliative care experience and how he felt that he gained a sense of control with MAiD. The KB discourse move identified herein is problem identification.

Personal Experience with MAiD

My xxx was diagnosed with liver cancer at the end of 2017. Shortly after the diagnosis he had requested MAiD. He was a "young" 89-year-old – a very active (still golfing, woodworking, etc.), independent, and social man. Like JM wrote, he was aware what the trajectory of the disease would do to his quality of life. After being connected with his community palliative care team, he actually declined MAiD. He achieved good symptom control, but eventually became a shell of his former self. Roughly 8 months after diagnosis, he again requested MAiD and followed through with his decision. I'm not sure what changed his mind initially - the assurance for better symptom control? the hope that he would meet his first great-grandchild (which he did). I never did ask him. My yyy told me that going through with MAiD was also about a sense of control at a time where he felt pretty powerless.

MAiD Cluster, Right Branch Build-on Notes

Participant 2 is the new facilitator, who builds-on to Participant 1's personal story with her patient's story about loss of a sense of self and loss of dignity near the end of life. She writes "*…It was no longer about his symptoms but more about his existential sense of being…*". The KB discourse moves identified are new ideas, particularly around the concept of existential sense of being and promisingness of this idea for continued KB and deeper understanding to improve patient care.

Choosing MAiD

Thank you for sharing this personal story. Your xxx reminds me of one of my patients who wanted to pursue MAiD but when his symptoms became well controlled, he chose not to undergo MAiD. Several months later as he got weaker, he felt that he was losing his sense of self and his dignity. It was really no longer about his symptoms but more about his existential sense of being. He was able to describe it so well and did ultimately die by MAiD surrounded by his family. I often find that the feeling of loss of self, loss of dignity, being dependent is what most of my patients describe when they choose to die by MAiD.

Participant 3 contributes a build-on note with a poem by Tennyson on existential suffering in impending death. The KB discourse moves identified are metadialogue and comparison. Through this poetic expression there is implicit reference to not only understanding the patient's end of life experience but the physician's and nurse practitioner's own existential distress, as they care for their patients.

MAID

Sunset and evening star.
And one clear call for me!
And may there be no moaning of the bar
When I put out to sea.
Twilight and evening bell
And after that the dark!
And may there be no sadness of farewell
When I embark
Alfred Lord Tennyson understood the existential suffering of impending death in 1892.

Participant 4, the experienced facilitator, makes a brief personal comment.

Tennyson poem

Love it!

Participant 3 builds-on to say that there are two more stanza in this poem and a choral version, but more importantly opens the discourse to a wider discussion, generalizing about human nature and the desire to die peacefully with grace "*without the struggle provoked by our innate will to live*". The KB discourse moves identified herein are new ideas and problem definition.

ALT

Sorry that I only took the time to type two stanzas. There are two more if anyone cares to look them up. He wrote this at age 80 about three years prior to his death It would seem that it expressed his wish to go peacefully with grace without the struggle provoked by our innate will to live. A death we might all wish for when ready.

There is also a chorale version of this poem on You tube with Rani Arbo and the Southampton University Choir.

Participant 2, the new facilitator, finds the choral version online and adds the link in her next build-on note. She thanks Participant 3 for sharing, echoing the experienced facilitator's previous note. Through this we understand the importance of the poetic and choral expression of Tennyson's words on existential distress at the end of life. This appears to be deeply meaningful on a multiplicity of levels, personally and professionally, to the co-facilitators and the student participants.

Choral version of the poem

Here is the link: https://www.youtube.com/watch?v=JNZ754iEPuM

I just listened to it – beautiful!!!! Thank you for sharing.

Participant 3 now moves away from the existential discussion and circles back to reframe the initial discourse on dignity and control at the end of life. She works in belief-mode and design-mode to provide a critique of three diagnostic scales. Most importantly she puts the concepts of these tools together and *goes beyond* focussing on their diagnostic potential to advance ideas on how they can be used together to prompt earlier palliation – to improve patient care. A recent authoritative reference is cited. Participant 3 rotates once again into a leadership role. The KB discourse moves identified are critical discourse and higher-level ideas.

Frailty and MADD

Certainly, the desire to maintain dignity and control are so important. Reading the literature regarding the clinical frailty scale, its conversion to the PPS scale shows correlation with the 4th graphic on the GSF Prognostic indicator guide.

Mostly, these things are quite intuitive to you as a longstanding G.P. for these patients. They are the ones the ER M.D. admits as "failure to thrive". Or they are the ones your clinic staff will give you a heads up stating that patient so-and-so is noticeably slipping and will fill in for you the things they have noted.

Recognizing these three indicators and taking them into consideration could prompt earlier attempts at palliation. A call to their loved one to ascertain what they may have noted is always appreciated as they may have not felt comfortable bringing this up regarding their loved one.

MAiD Cluster, Left Branch Build-on Notes

Participant 4, the experienced facilitator, contributes a build-on note that highlights his reflective wisdom and experience in practice. He advances ideas on issues with MAiD legislation, cultural differences in attitudes towards MAiD, and the potential of therapeutic benefits of applying for MAiD. The experienced facilitator, now takes over the leadership position, working in belief-mode and design-mode to

advance new ideas and confirm previous mentioned ideas about regaining control with MAiD. The KB discourse moves identified are critical discourse and new ideas.

Control

I remember hearing, when the MAiD legislation was first proposed, that this was all about us Yuppies trying to control every aspect of our lives, down to this last one. Your Grandad's example shows how important control is, and not just for Yuppies. We have a fairly substantial cohort (maybe 10-20%) of patients who request, and are assessed for eligibility for, MAiD who don't choose to go through with the procedure. It's a much larger proportion in Holland (up to 80% of those who complete the first stages), and I'm not sure why there's such a difference. One way of understanding this phenomenon is that there is therapeutic benefit to just knowing that you could complete the MAiD process, even if you don't choose to.

All of you know, because you hear it every day, how grateful our patients and their families are for all the work we do in palliative care. I have to tell you that the gratitude we get from MAiD patients and families is way beyond even that high bar. And one of the things almost all of them talk about is regaining control through insertion of the possibility of MAiD into their care.

Participant 5 details federal reporting on MAiD and points out how it is less than ideal and how it could be improved. This is the nurse practitioner, who could easily be mistaken for the experienced facilitator based on her detailed knowledge and experience. She now takes the leadership role from the experienced facilitator to build-on complexities of MAiD reporting. She provides an informative explanation, detailed critique, and system level recommendations for improvement in MAiD applications and statistics. Her KB contribution exemplifies work in primarily in belief-mode. But her critical appraisal of how data is managed begins to address potential design-mode opportunities. The KB discourse moves identified are problem definition and critical discourse.

MAiD

The way the federal reporting occurs for MAiD is less than ideal in helping us to understand what happens when someone goes through the MAiD assessment process, but doesn't die from MAiD.

Currently, reporting is required by a MD or NP if, after you receive a WRITTEN request, you provide an effective transfer, a patient formally withdraws their request for MAiD, you found them ineligible after an assessment, or they die from something other than MAiD, but these reporting requirements only apply if you learn about these situations within 90 days of receiving the patient's WRITTEN request. These limitations create a lot of situations in which reporting isn't required and therefore isn't captured in the data that is reported by Health Canada (of which there have been two annual reports so far as this reporting only started in Nov 2018).

https://www.canada.ca/content/dam/hc-sc/documents/services/medical-assistance-dying/guidance-reporting-summary/document/MAID%20At%20a%20glance_EN_WEB.pdf

There is no requirement in Ontario for a specific sequence when it comes to MAiD; before a patient can receive MAiD, they must be assessed by two different assessors and sign a witnessed request but these three things can happen in any order. For example, there are times when I have completed an assessment for MAiD prior to receiving the patient's completed Clinician Aid A form and even had patients have both assessments completed with Aid A being completed. Lots of reasons for this – limited access to witnesses, timing of assessment visits, the benefits that Jamie speaks of didn't warrant waiting for paperwork to be finished first.

In the 2020 report 12.7% of all written requests for MAiD that were received (and reported) in 2020 resulted in death from a cause other than MAiD (described as dying before receiving MAiD which is misleading in itself). All of this to say, that there are lots of reasons why the formal data we have in Canada doesn't capture the true number of MAiD assessments that are completed as, what I think of as, a therapeutic intervention in itself, that doesn't become a MAiD death for many potential reasons.

Participant 2, the new facilitator, provides a brief build-on note, agreeing with the nurse practitioner on MAiD reporting, recognizes her leadership role.

MAiD Reporting

I just completed the form for a patient who requested MAiD but did not die with MAiD – She wanted to know everything was prepared in case. Regardless that form is ambiguous and a pain to complete.

Results of this KB analysis of within note content, between note build-ons, and the flow of ideas across notes clearly demonstrates the collective cognitive responsibility for co-facilitation and shared leadership, through the fluid rotation of roles, between the facilitators and amongst some student participants. Co-facilitation effectively enabled distributed responsibility and sharing of sociocognitive load of KB. Co-facilitators shared leadership with participants which supported the rotation of roles, resulting in rich discourse from a multiplicity of perspectives, supporting collective KB beyond belief-mode, emphasizing design-mode work. These findings highlight the value of collaborative KB and unanticipated rewards, even for experts in practice. This KB cluster on MAiD is a current, emergent issue that demonstrates the opportunistic interplay between belief-mode and design-mode KB in this course. All seven of Bereiter and Scardamalia's (2016) listed knowledge creating "good moves" are evident in this cluster.

Discussion

In the PCeL Program design-mode KB is valued by the community of practitioners in their continuing professional development. One participant posted a note in KF about the value and impact of the PCeL Program on her, stating that she will be grieving the end of this course. She wrote:

I embarked on this Palliative Care course with curiosity and desire to learn something different. I had no idea how powerful and difficult it would be. I remain grateful… for what I learned… from each and every one of you, the participants, who taught me so much. Your knowledge, wish to share and openness are remarkable. … I though this will be easy. Instead, I found myself… wondering how much, we, as physicians can absorb, endure, and resolve. Not easy, but hey … inspiring. And in a way I … grieve the end of this course.

Successful collaborative KB is often defined by cognitive collective responsibility, shared leadership, and rotating roles where students take the lead from each other and from the teacher/expert (Lax et al., 2016; Ma et al., 2016; Scardamalia, 2002). In the PCeL Program 2021-2022 a new model emerged with two palliative care physicians co-facilitating in all six modules, over the course of seven months. Significantly the facilitators became active partners in the KB process, building-on each other's ideas, in addition to mentoring participating family physicians and nurse practitioners, the students in this program. An opportunistic synergy was created for symmetric knowledge advancement for co-facilitators and the student participants.

Co-facilitation provided broader access to experiences and expertise, distributed the sociocognitive load and responsibility, and ultimately provided multidimensional perspectives, supporting participants' KB. This high-level collaborative participation of real-world practitioners as co-facilitators, elevated the exchange of ideas, promoted knowledge improvement, and increased the number and complexity of authentic practice problems discussed by participants.

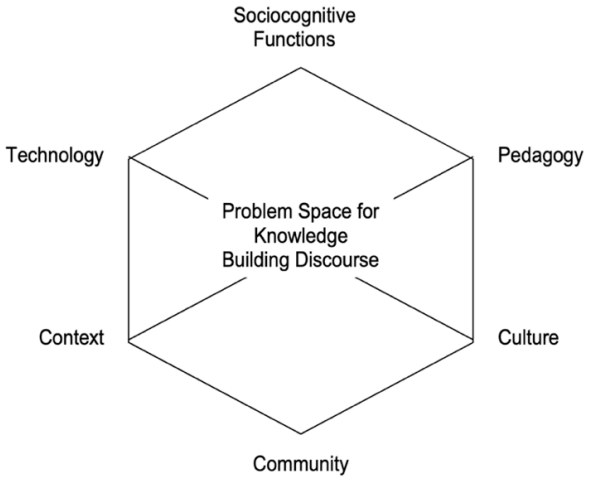
The co-facilitation, mutually supportive structure, was beneficial for the real-world experts, as well as the students, breaking barriers between linear fabricated case-based learning and authentic discourse issues, embedded in practice, to support contextualized KB and translation (Scardamalia & Bereiter, 2014). The flow of KB/KF discourse provided greater focus on a diversity of real-world issues and prompted numerous emergent ideas from participants who identified ideas important to their knowledge work, situated in different contexts, and relevant to their improvement in practice. *Going beyond* in design-mode KB is essential to the identity, integrity, personal and professional development of family physicians. Perhaps this is the

core of continuing professional development that really counts, beyond acquiring the basic competencies of practice.

Co-facilitation and collaborative KB with improvable ideas in the KF "problem space" (Figure 11) (Lax et al., 2010; Scardamalia, 2002) differs from typical elearning environments that are limited in their pedagogic focus to individual knowledge acquisition. Through the lens of co-facilitation and a focus on collective knowledge advancement, we can visualize the necessary design dimensions for KB systematic change (Figure 11). For example, as in this study, sharing the sociocognitive load impacts the pedagogy, culture, and community interactions for sustained KB by real-world experts.

Co-facilitation of KB discourse makes 5 important contributions, which are: (a) the support of KB discourse that involves multiple idea linkages, (b) the movement of discourse and organization ideas at higher levels, (c) the integration of various sociocognitive functions for combined impact and strength for advancement (d) the possibilities of knowledge work in design-mode, as well as belief-mode, and (e) the engagement of real-world experts in a sustained KB community to impact knowledge improvement and elevate expertise, practice, and systems change.

Figure 11. Knowledge Building design framework (Lax 2010, p. 22)



The success of the co-facilitation model led to the current engagement of a third facilitator, a physician who previously took the course and practices in palliative care; she joined the team of experts in the 2022-2023 PCeL Program. This is the 20th year of this course in KF and improvable ideas continue to emerge, such as sharing the sociocognitive load through co-facilitation with real-world experts and collective responsibility for working at the edge through sustained KB in design-mode.

We need new ways to evaluate and derive meaning from collective, design-mode knowledge work. This paper introduces and effectively employs a new 2-part method that we created and termed, reflective observational analysis, to support a way in which collective, design-mode KB can be evaluated, through methodological examination, within, between, and across cognitive artifacts in a KF space.

Conclusion

Real-world experts as partners in co-facilitation in collaborative KB with students has been overlooked in educational research yet is an essential and enriching aspect that can elevate knowledge work and extend it beyond knowledge acquisition for authentic, improvable change in practice. The success of integrating real-world experts in the KB process depends on distributing responsibility, shared leadership, and collectively engaging with the sociocognitive load. The time-consuming work of facilitating a very active KB community is evident. The benefit to facilitators is not always clear, initially; as a partner and participant in a cognitive, collaborative KB community, facilitators are often unexpectedly rewarded too.

In the PCeL Program, working in design-mode, as well as in belief-mode supports KB with relevant ideas and issues at the edge of knowledge to improve palliative care practice and effect change. This is the key feature that distinguishes KB from learning and makes promising change possible. The results of this reflective observational analysis on the PCeL Program 2021-22 demonstrates that real-world experts as co-facilitators can intentionally support design-mode discourse to ele-

vate collective KB, ultimately, aimed at improving the care of patients and their families, and societal capacity of palliative care.

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