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# Virtual Knowledge Brokering: Describing the Roles and Strategies Used by Knowledge Brokers in a Pediatric Physiotherapy Virtual Community of Practice

Hurtubise, Karen MRSc, PT; Rivard, Lisa PhD, PT; Héguay, Léa MSc; Berbari, Jade BSc; Camden, Chantal PhD, PT

## Informations sur l'auteur

**Ms. Hurtubise:** Doctoral Student, Faculté de médecine et sciences de la santé, Université de Sherbrooke, Sherbrooke, QC, Canada. **Dr. Rivard:** Postdoctoral fellow, School of Rehabilitation Science, Faculty of Health Sciences, and CanChild Centre for Childhood Disability Research, McMaster University, Hamilton, ON, Canada.

**Ms. Héguay:** Research Assistant, Faculté de médecine et sciences de la santé, Université de Sherbrooke, Sherbrooke, QC, Canada. **Ms. Berbari:** Research Coordinator, Centre de recherche du centre hospitalier universitaire de Sherbrooke, QC, Canada. **Dr. Camden:** Assistant Professor, École de réadaptation, Faculté de médecine et sciences de la santé, Université de Sherbrooke, Sherbrooke, QC, Canada, CanChild Centre for Childhood Disability Research, McMaster University, Hamilton, ON, Canada, and Centre de recherche du centre hospitalier universitaire de Sherbrooke, QC, Canada.

**Correspondence:** Chantal Camden, PhD, PT, Faculté de médecine et des sciences de la santé, École de réadaptation, Université de Sherbrooke, 3001 12e Avenue Nord, Sherbrooke, QC J1H 5N4, Canada; e-mail: [chantal.camden@usherbrooke.ca](mailto:chantal.camden@usherbrooke.ca)

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## Abstract

**Introduction:** Knowledge transfer in pediatric rehabilitation is challenging and requires active, multifaceted strategies. The use of knowledge brokers (KBs) is one such strategy noted to promote clinician behavior change. The success of using KBs to transfer knowledge relies on their ability to adapt to ever-changing clinical contexts. In addition, with the rapid growth of online platforms as knowledge transfer forums, KBs

must become effective in virtual environments. Although the role of KBs has been studied in various clinical contexts, their emerging role in specific online environments designed to support evidence-based behavior change has not yet been described. Our objective is to describe the roles of, and strategies used by, four KBs involved in a virtual community of practice to guide and inform future online KB interventions.

**Methods:** A descriptive design guided this study and a thematic content analysis process was used to analyze online KB postings. The Promoting Action on Research in Health Sciences knowledge transfer framework and online andragogical learning theories assisted in the coding. A thematic map was created illustrating the links between KBs' strategies and emerging roles in the virtual environment.

**Results:** We analyzed 95 posts and identified three roles: 1) context architect: promoting a respectful learning environment, 2) knowledge sharing promoter: building capacity, and 3) linkage creator: connecting research-to-practice. Strategies used by KBs reflected invitational, constructivism, and connectivism approaches, with roles and strategies changing over time.

**Discussion:** This study increases our understanding of the actions of KBs in virtual contexts to foster uptake of research evidence in pediatric physiotherapy. Our results provide valuable information about the knowledge and skills required by individuals to fulfill this role in virtual environments.

Knowledge transfer in pediatric rehabilitation—that is, the uptake of research findings to improve interventions for children with disabilities—remains challenging.<sup>1,2</sup> Physiotherapists report considerable barriers to incorporating research evidence into their daily practice; these include a lack of time, access to relevant databases, and confidence in appraising and implementing research findings.<sup>3–5</sup> These barriers may be overcome using active, multicomponent knowledge transfer strategies that are more effective in changing practice behavior than passive dissemination or single strategies.<sup>5</sup> Two active knowledge transfer strategies have recently gained wider support in the literature for their effectiveness: communities of practices (CoP)<sup>6–9</sup> and knowledge brokers (KBs).<sup>5,10</sup>

CoPs are defined as a group of people who share a concern and interact regularly to learn how to improve something they do.<sup>11</sup> Crucial characteristics of effective CoPs include a “domain of interest,” a “community” that shares an interest, and a “practice.”<sup>11</sup> CoPs are reported to ease knowledge management and learning, and foster sharing of tacit knowledge.<sup>9</sup> CoPs can contribute to improving health care measured through cost savings, increased professional competencies, the reduction of geographical and organizational barriers and professional isolation, and the implementation of new processes and technologies.<sup>9,12</sup> Virtual methods seem to be effective in supporting CoP knowledge sharing and communication among CoP members, notably through the use of virtual forums and electronic sharing of resources.<sup>9,12</sup>

Virtual CoPs (vCoPs) are comprised of three groups: the core, the active, and the peripheral members.<sup>13</sup> Most members are peripheral, rarely participating actively, but gaining insight from reading discussions, whereas active members participate occasionally in the CoP but not to the extent of the core group.<sup>13</sup> A common model in health care is to have a core group composed of a coordinator and clinical leaders, who act as facilitators, have content and resource expertise, and enable social processes (eg, create an engaging climate).<sup>14</sup> Some evidence suggests that a face-to-face meeting of the vCoP members can be important before meeting through virtual methods, whereas other studies have demonstrated that groups, who met solely or largely in virtual environments, can also function quite effectively.<sup>9</sup> The literature highlights that the purpose of the vCoP and the circumstances under which it is initiated play a critical role in determining these facilitating factors.<sup>9</sup>

KBs are individuals positioned at the interface between researchers and knowledge users who can enhance communication to facilitate research uptake, and bridge the research-to-practice gap.<sup>2</sup> KBs, by their very nature, are conceived as being embedded in the conceptualization of CoPs. They lead to the development of ideas, or management of a particular common interest shared by their colleagues, and facilitate learning. Sometimes, the CoP is physically situated within a common space, but KBs may also be separated from their peers physically and rely on communication other than face-to-face interactions.<sup>15</sup> The findings of a recent study on the use of pediatric physiotherapist KBs to promote the uptake of evidence-based measurement tools into clinical practice, which incorporated virtual communication elements (ie, online forum), suggest that the CoP environment may be particularly supportive of the KB strategy in a physiotherapy setting.<sup>10</sup> The role of KBs has been described in three basic forms: as a “linking agent” between research and knowledge users; as a “knowledge manager” in the creation, dissemination, and application of knowledge to promote evidence-based learning related to practice; and as a “capacity builder” through skills development and training to improve access to evidence.<sup>16</sup> KBs must possess skills in entrepreneurship, effective communication, and negotiation, and an ability to find and critically assess relevant research.<sup>5</sup> Our understanding of the effectiveness of specific activities undertaken by KBs is limited, but studies suggest that typical KB activities may include, but are not limited to needs assessments of individual learners or organizations as a whole; collection, appraisal, synthesis, and adaptation of evidence-informed knowledge to clinical settings; determination of organizational barriers and facilitators, development of required educational resources; collaboration, problem-solving, networking, and linking with individuals to share information including at the policy level; as well as ongoing evaluation of the effectiveness of chosen strategies with modifications as required.<sup>15,17–19</sup>

Knowledge brokering can be adapted to different clinical and organizational contexts, to better meet the needs of different settings and provider groups.<sup>2</sup> Although recognized in the literature as being effective in supporting behavior change, the KB role, particularly within CoPs, remains poorly understood, as detailed descriptions of the strategies used by KBs in specific contexts are scarce. With the proliferation of technology and the increased promise of a virtual CoP as an effective knowledge transfer strategy, it is also critical to understand the role of KBs within virtual contexts more specifically.

Our aim was to describe the roles identified by KBs working within a vCoP. Specifically, we sought a better understanding of the roles played by KBs within the vCoP, the work activities performed to enact those roles, their role evolution, and the facilitation strategies they used over a 5-month period.

## METHODS

### Program Context

The vCoP was developed for physiotherapists in Québec, Canada, who comprised the “community.” The vCoP “domain of interest” was physiotherapy management of children with motor coordination problems (Developmental Coordination Disorder) and the “practice” referred to physiotherapy evidence-based assessment, goal setting, and intervention management for children with coordination difficulties.

The core group of the vCoP consisted of the research team, which included two pediatric physiotherapy clinician-researchers and a research assistant, along with the clinician KBs. The active and peripheral members were pediatric physiotherapy clinicians in the organizations served by the participating KBs.

Four physiotherapists functioned as KBs for the vCoP. All KBs were experienced, had clinical knowledge of children with motor difficulties, and had received approval from their employers to participate in the vCoP. After KB consent, the research team met with KBs in person to discuss their anticipated role, as well as expectations and time commitment for the project. KBs were informed that their responsibilities would include asking and responding to posted questions, promoting online discussions, fostering networking, sharing information, raising current practice issues, and acting as mediators between clinicians and the research team. As the purpose of our study was to learn from the KBs what functions and activities were important to their role, rather than being prescriptive, initial instructions to KBs encouraged them to determine the specific activities that they deemed most helpful, based on the needs of their clinical organizations and colleagues. The study team was available to the KBs on an ongoing basis throughout the project, in person, by phone or by email, as KBs determined their individual roles and as their roles evolved.

Therapists consenting to participate registered with the vCoP (private access) and took part in two 1-day workshops presented 6 months apart. The workshops targeted physiotherapists in Quebec, interested in pediatric rehabilitation. The primary aims were to educate physiotherapists in the assessment of children with motor coordination difficulties, the setting of therapeutic goals, and the use of best practices intervention approaches, as requested by our clinical partner, a pediatric rehabilitation center known for providing province-wide continuous education. The first workshop, facilitated by two physiotherapists, with expertise in pediatric coordination disorders, clinical and health services research (LR and CC), focused primarily on the definition, identification, evaluation, and best practice management of pediatric coordination difficulties. Small group activities facilitated by the KB's, initiated connections between the physiotherapists' participants, promoted sharing of current and ideal practices for children with coordination difficulties, and encouraged reflection on the influential factors that promoted the implementation of best practices. The second workshop, offered 6 months later and facilitated by CC, was guided by vCoP members identified needs, targeted intervention best practice for children with coordination disorders, and allowed for further sharing of clinical resources.

Between the two workshops, a private online forum was made available to physiotherapists who had participated in the first session. Physiotherapists were encouraged to post general and child-specific questions, as long as no specific child identifiers were disclosed, respond to questions posted by other vCoP members, and share evidence, clinical tools, and resources by attaching the documents or including web-links to their posts.

## Study Methods

This study used a descriptive design and was part of a larger participatory action research project evaluating the use and impact of a vCoP.<sup>20</sup>

## Data Management and Analysis

A three-phase content analysis framework guided this mixed analysis, and included 1) condensing the data, 2) displaying the data, and 3) drawing and verifying conclusions. 21 KB online written forum responses, called “postings,” were collated over the 5-month lifespan of the vCoP (December 2014–April 2015), along with the date of responses. KB postings were transferred into Excel and sorted by posting date (before and after February 23, 2015, the midway point of vCoP access, coinciding with the introduction of themed topic weeks by vCoP leaders). As per the mixed thematic analysis guidelines, after the reading and re-reading of the data segments, the Promoting Action on Research in Health Sciences (PARIHS), a well-known knowledge transfer framework, was chosen by the research team as the basis on which to construct the initial coding guide. In the PARIHS framework, the research implementation process is represented as a function of the nature and type of evidence, the qualities of the context in which the evidence is being introduced, and the way in which the process is facilitated 22 and reflected the trends identified in our study data segments. The first author (KH) then condensed the data by coding postings (codes and subcodes), using this PARIHS coding guide. Codes and subcodes, as well as their associated definition, which related to the first two domains (evidence, context), are defined in [Table 1](#).

<b>TABLE 1.</b>		
<b>Codes as Per the PARIHS Framework Evidence and Context Domains</b>		
<b>Codes</b>	<b>Subcodes</b>	<b>Definition</b>
Evidence: all sources of knowledge and information related to, or useful to conceptualize an issue <sup>22</sup>	Research evidence	Findings arising from well-designed experiments from researchers in the field
	Clinical experience	Practice knowledge and professional craft
	Patient experience	Patient or caregiver reported experiences and perspectives
	Information from the local context	Specific data unique to a service or organization (eg, team composition, available local community resources)
Context: where evidence is being implemented <sup>19</sup>	Leadership	Existence of clear team roles, lines of accountability, and a quality improvement vision
	Culture	Values, actions, and beliefs of the organization, its service mandate, and strategic direction as conceived by the management team
	Receptive context	Physical (eg, space and equipment), social (eg, professional networks), and structure (eg, decision-making processes) systems and boundaries

TABLE 1. Codes as Per the PARIHS Framework Evidence and Context Domains

Subcodes under facilitation related to the process by which individuals interact and engage with evidence and try to implement it within their context.<sup>22</sup> For this reason, and as suggested by Kitson et al. (2008), we chose to treat “facilitation” as an intervention. These facilitation subcodes, identified from the study data, outlined, and defined in Table 2, were then linked to adult learning theory in virtual environments, and represented the strategies used by KBs.<sup>23,24</sup>

<b>Code</b>	<b>Subcodes</b>	<b>Definitions</b>
Facilitation: techniques by which things are made easier by one person for another <sup>19</sup>	Invitational	Participants are believed to be of benefit to one another and are invited to participate in the learning environment <sup>23</sup>
	Constructivism	Participants' previous knowledge is valued and promoted <sup>23</sup>
	Connectivism	Participants connect with the information and resources through technological processes, and emphasis is placed on nonhuman appliances, hardware, software, and network connections for behavior change <sup>23</sup>

TABLE 2. Codes as Per the PARIHS Framework Facilitation Domain

KH assigned at least one code to each posting and subsequently identified the KB roles by categorizing activity (ie, evidence and context codes and subcodes from initial coding template) and strategy codes (ie, facilitation subcodes emerging from the data and added to the template). A thematic map was then created to display the data, illustrating the roles and how they related to the activities and strategies. To draw and verify conclusions, the thematic map was validated by the KBs who were not part of the initial coding to verify its relevance and the logic of the thematic relationships. Themes (ie, KBs' role) emerged from the categorizing of all codes and subcodes and a description was provided for each resulting themes. A second researcher (CC) validated the codes and themes, and their interpretation.<sup>25</sup> Any disagreement in interpretation between reviewers was discussed until consensus was achieved. After the review process, the thematic map was adjusted to illustrate the relationships between codes and emerging themes. Descriptive statistics were used to identify any changes in the frequency of roles during the vCoP “lifespan.” We calculated frequencies by identifying the number of specific subcodes, dividing by the total number of codes in each of the 2 specific time frames (December 2014 to February 23, 2015 or February 24, 2015 to the end of April 2015). We then transformed these frequencies into percentages.

Ethical approval for the project was obtained from the ethics committee of the research center of the University of Sherbrooke in Shebrooke, Quebec. All participating KBs and vCoP members provided consent.

## RESULTS

Of the 65 physiotherapists who participated in the first workshop, 59 (91%) agreed to participate in the study. Of these, 45 (68% of the total number of study participants) participated in both workshops and the online forum. The therapist worked in both urban (46%) and rural (54%) centers and practicing in 6 different settings (school, local services centre, private practice, rehabilitation centers, and long-term care facilities). They generated 48 posts (32% of total posting activity) and online forum visits 351 visits (51% of the total visits).

For this study, we analyzed the 95 posts (53 before, and 42 after the vCoP midpoint) originating from the KB's. Eight percent of these postings started new threads, whereas the remaining 92% were posts within already existing threads. These posts could be divided into three types: responses to questions, providing additional information relating to the topic being discussed, or posing questions. Postings often contained more than one idea resulting in multiple codes. Postings were therefore separated into segments, resulting in 278 posting segments. Detailed below are the themes we identified.

### KB Activities Related to Evidence and Context

The KB activities related to evidence, context, and facilitation included but were not limited to, asking relevant questions, suggesting resources, sharing relevant clinical experiences and research, rating the quality of the evidence for participants, identifying emerging evidence, and providing examples/suggestions regarding ways in which evidence had been, or could be, integrated into the practice contexts. [Figure 1](#) highlights the evolution of these three codes over the 5-month lifespan of the vCoP.

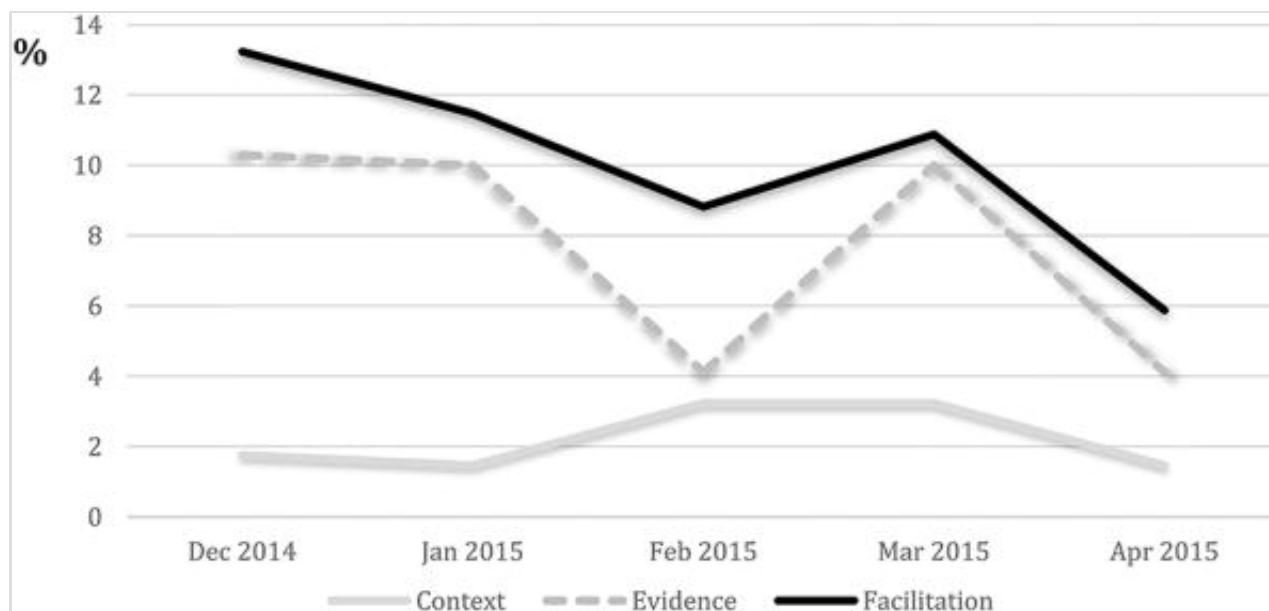


FIGURE 1. Frequencies of evidence, context, and facilitation codes

The “evidence” dimension generated 123 codes. This quote, highlighting sharing of research evidence and rating the quality of the evidence, is an example of KBs' activities relating to the evidence domain:



I am adding another article... this intervention [is classified] as a “yellow-light” meaning we must continue to evaluate it in a systematic manner. [KB 4]

Figure 2 identifies the frequencies and evolution of the “evidence” subcodes, and illustrates that “clinical experience” dominated throughout the vCoP; “research evidence” decreased in the second half of the vCoP, whereas the “information from local context” increased.

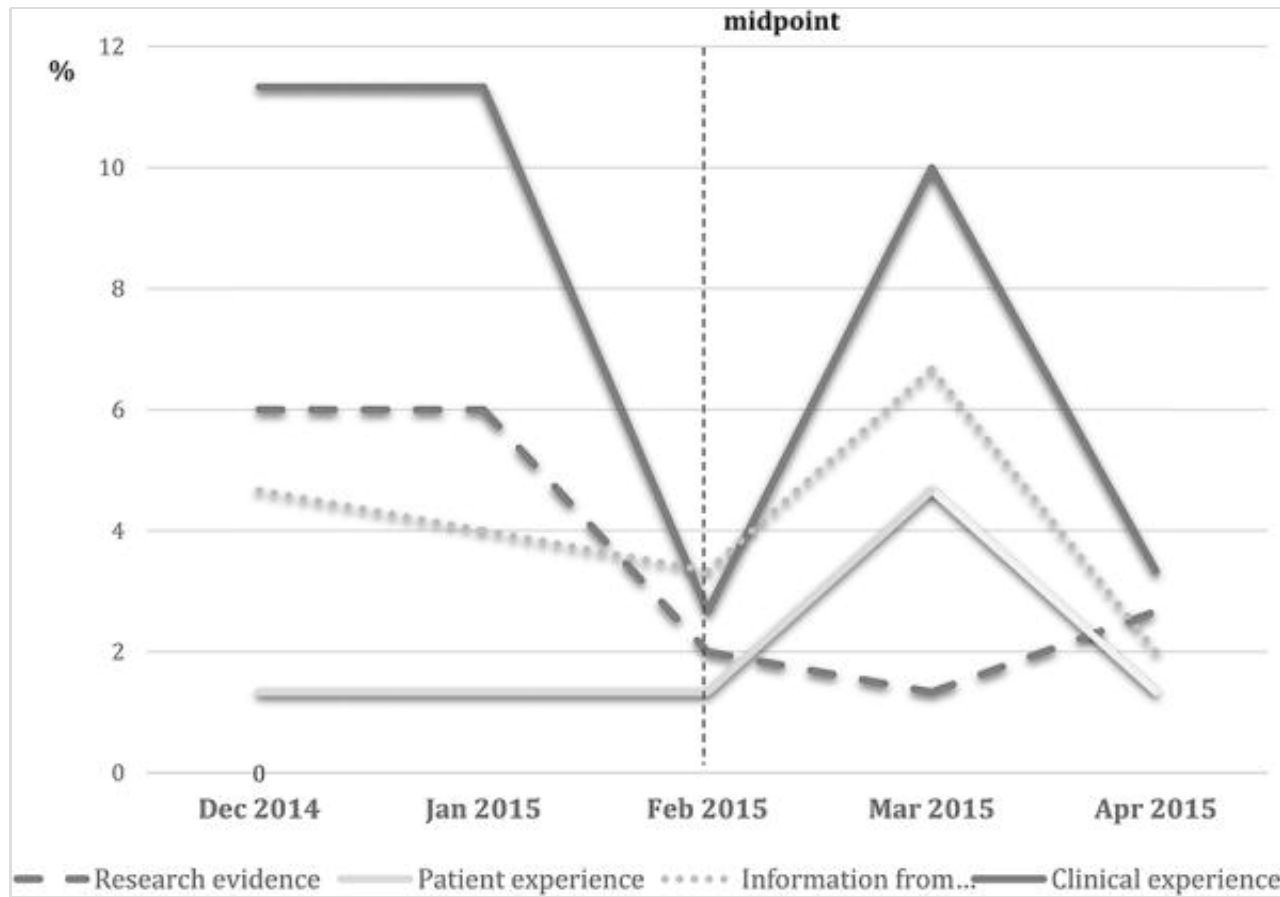


FIGURE 2. Frequencies and evolution of the “evidence” subcodes

We coded 47 posting segments in the “context” dimension. The frequencies and evolution of the subcodes are summarized in Figure 3.

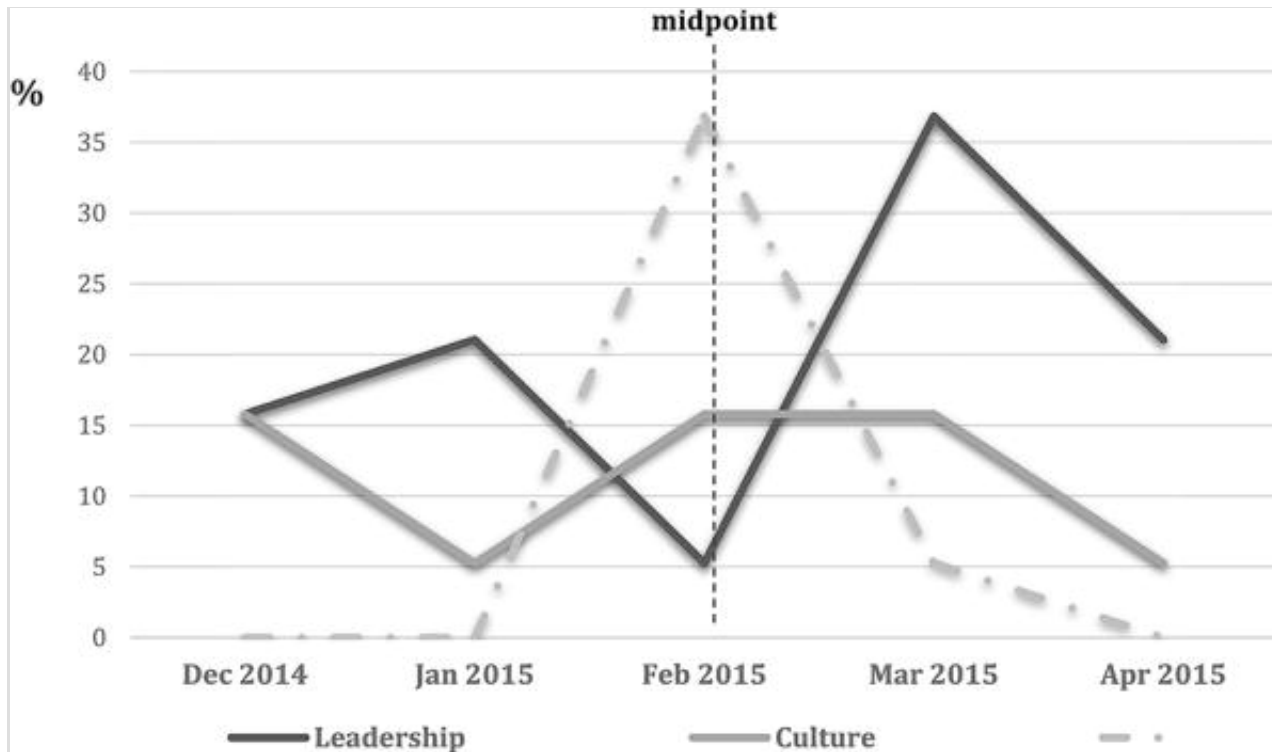


FIGURE 3. Frequencies and evolution of “context” subcodes

“Leadership” was the dominant subcode throughout the vCoP with a substantial increase noted in the second half. “Culture” and “receptive environment” did increase during the second half of the vCoP. This quote illustrates “leadership” (initial two sentences), and “culture” (final sentence):

Just this morning, our DCD program team met to review our current follow-up practice with this population. Our workshop and this vCoP created pause for thought regarding our current service model. Too often we seem to “create” needs in these families by referring them to groups without meeting their immediate needs. [KB 3]

### KB Facilitation Strategies

Most posting segments ( $n = 162$ ) were coded to the “facilitation” dimension. [Figure 4](#) summarizes the frequencies of subcodes linked to adult learning approaches and their evolution over time.

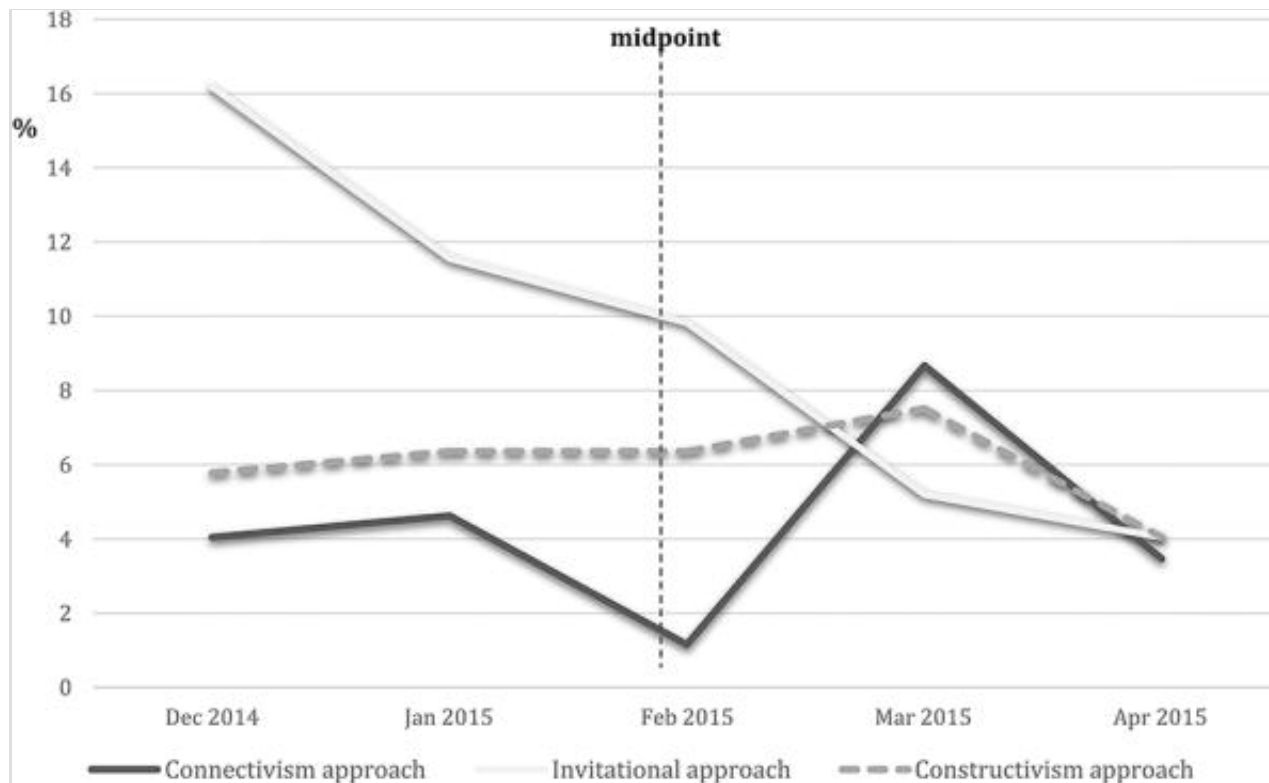


FIGURE 4. Frequencies and evolution of “facilitation strategies”

The “invitational approach” dominated the “facilitation” code, yet decreased in the second half, whereas both the “constructivism” and “connectivism” approaches increased during this same time frame.

### KB Roles

KB roles were identified at the intersections of the PARIHS dimensions. The thematic map (Figure 5) summarizes these roles and how they relate to the dimensions of the PARIHS framework and linked to the andragogical approach related to the strategies used. For the purpose of this conceptualization, the roles are neatly positioned at the intersection of the two PARIHS dimensions to which they relate. However, as experiences in the double coding of many data segments and as represented by the figure, substantive overlap does exist between these dimensions and roles.

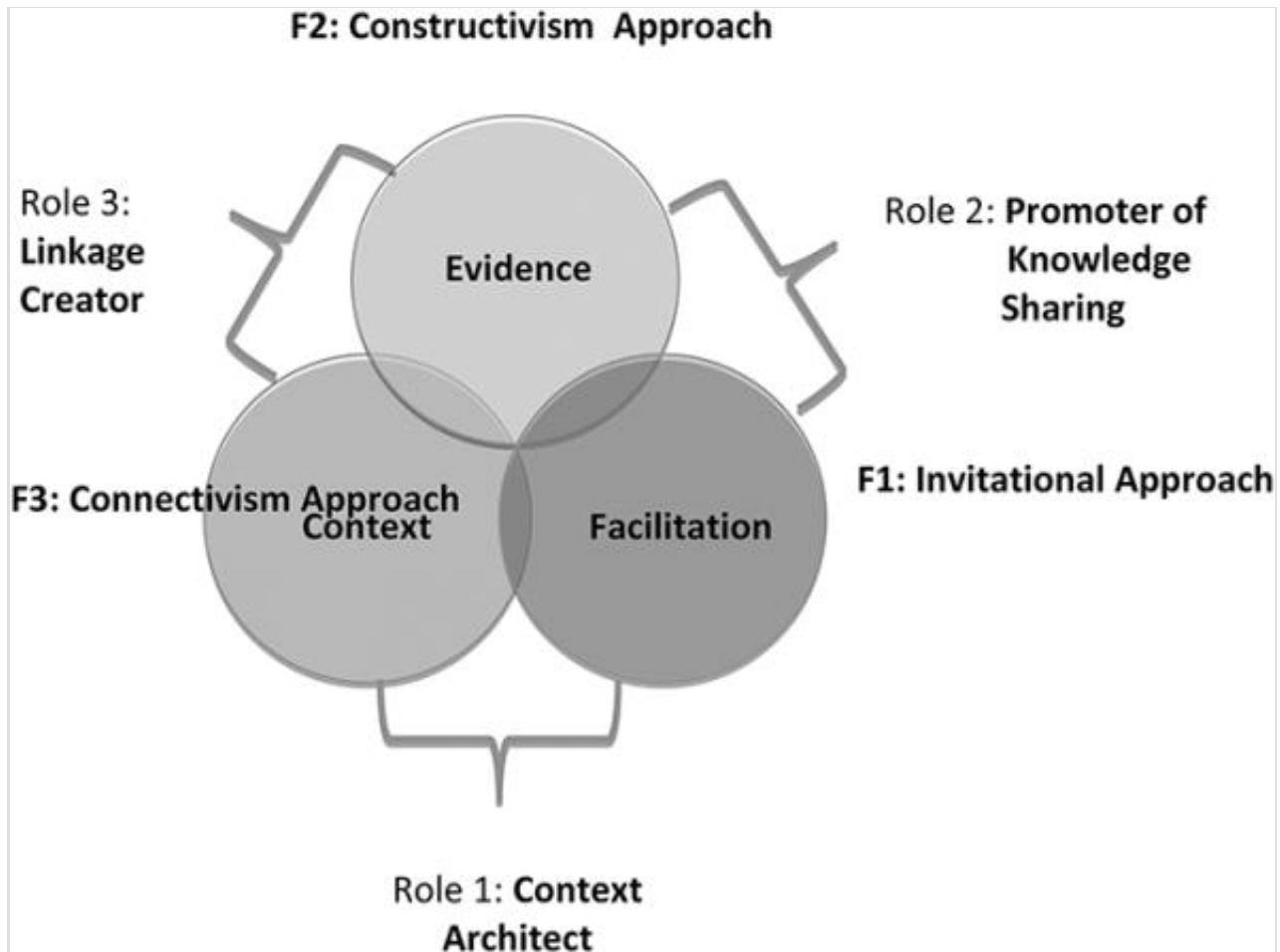


FIGURE 5. Thematic map of KB roles related to the PARIHS framework and andragogical approaches. Evidence includes research, clinical and patient experience, and local information; context includes organizational culture, team leadership, and receptive context; facilitation (or F) includes adult learning approaches such as the invitational (F1), constructivism (F2), and connectivism (F3) approaches

Figure 6 illustrates the changes over the time in the predominant role.

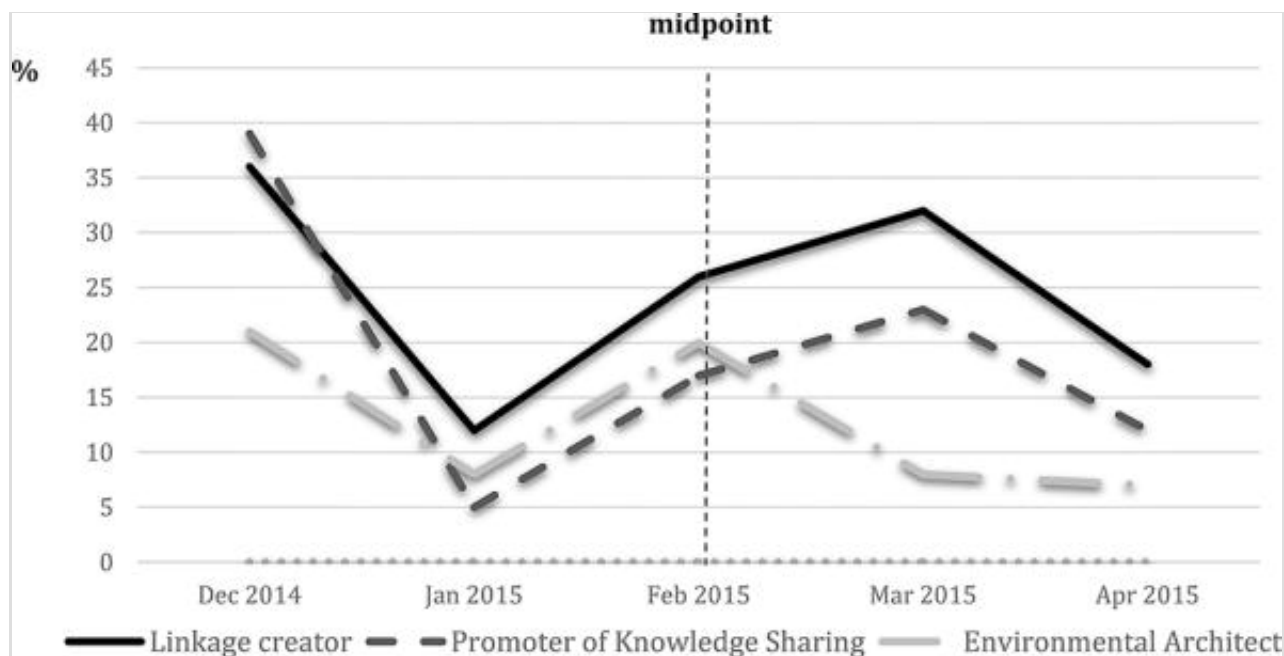


FIGURE 6. Frequencies and evolution of the KB roles

Each of these roles and their changes, in particular the strategies used, over vCoP 5-month lifespan will be discussed in further detail in the next sections.

### Context Architect: Promoting a Respectful Learning Environment

The KBs' discourse demonstrated an effort to facilitate a nurturing, respectful, and helpful learning environment, and highlighted both encouragement and a positive tone intended to engage vCoP members:

I see that in the Intervention section [of the vCoP], we have had many contributions about developing group interventions. This is fantastic! [KB 3]

KBs also attempted to create a sense of community. Inquiries about the experience and knowledge of physiotherapists were frequently used. This excerpt demonstrates a sense of interest in others, which was critical to engagement and community building:

I have a question for you: What groups do you run at [your center] for children with DCD? It is always helpful to know what others are doing. [KB 2]

As part of this role, KBs attempted to foster trust and safety within the learning environment, with narratives demonstrating a commitment to delivering on promises, showing vulnerability, and pledging to change their own clinical behaviors and practice:

I must admit, I have never tried [this assessment tool]. As I read your posts, I have decided that I will try it or at least

learn more about, as it seems to be worthwhile. [KB 1]

Modeling professional behavior and providing encouragement were the initial dominant strategies used by KBs to create the desired environment. KBs tended to use invitational approaches, inviting the vCoP colleagues to share their knowledge through direct invitation, questioning, and thanking members publicly. As time progressed, the KBs' discourse demonstrated less focus on this role (decreasing from 35 to 21%) and less reliance on the "invitational approach."

### **Promoter of Knowledge Sharing: Building Capacity to Use Evidence in Practice**

KBs' narratives highlighted attempts to build capacity by creating and valuing a sense of connection, focusing on all types of evidence. KBs highlighted benefits of the virtual connections between vCoP members beyond direct patient care as examples arose:

Wow! It is great to know that our community of practice can act as support for us in our discussions with our managers!  
[KB 2]

KBs promoted knowledge exchange in broad-based requests for consultation in tool development or outcome selection to promote collective knowledge utilization:

We are thinking of adopting the [tool] in our service. Have any other centers used [this tool] in this way before? [KB 3]

KBs requested information from the research team such as updates on the psychometric properties of screening tools or the release of new editions of outcome measurements, as requested by vCoP therapists. KBs called directly on vCoP members with specific expertise to address some questions. Finally, KBs promoted knowledge sharing through the distribution of information on useful websites, relevant publications or resources, and professional development opportunities. KBs predominantly (44% of the time) used a connectivism approach to share and promote knowledge sharing. Invitational facilitation strategies were also used frequently (32%), mostly in the initial phase of the vCoP.

### **Linkage Creator: Linking Research and Application to the Practice Environment**

The KBs' discourse demonstrated how connections were made between evidence and context, and how information shared could be implemented into different practice environments. KBs demonstrated a respect for the uniqueness of practice contexts, seeking to understand how evidence was implemented in different settings, whereas highlighting how they implemented evidence in their own practice.

KBs shared their expertise on critically appraising literature and linking it to their context:

[That new assessment tool] is very interesting. However, based on my clinical experience, one must be very cautious in diagnosing this population at such a young age and therefore I would only use it discerningly as to not confuse parents. What do others think? [KB 1].

Personal practice case examples were also provided to help therapists integrate evidence into practice and demonstrated the KBs' willingness and openness to learn from others. Narratives demonstrated KBs' progress with knowledge integration into their own practice, obstacles that arose, and their ongoing search for a solution:

I wanted to share with you a recent situation. Although I had used the draft template letter we have discussed in our CoP for this child, she still was not being provided the appropriate accommodations to help her be successful in her physical education program. [Her school] still did not seem to understand of her needs. Do any of you have other suggestions or more effective ways to explain to teachers the needs of these children? [KB 2]

KBs modeled critical reflection to demonstrate information scaffolding (ie, applying new concepts to previously integrated knowledge). The following KB statement about teaching a child to ride a bicycle without training wheels highlights such critical reflection through scaffolding:

Through clinical experience, I have realized that the older the child is when we start bicycle riding the more difficult it is for him/her to learn the task. It seems that their height (and a higher center of mass) and their weight hinders their learning. [KB 1]

Finally, to further scaffold the information, KBs occasionally provided feedback to respectfully steer therapists back to evidence-based learning and practice promoted through this vCoP when posts deviated from the evidence, such as this excerpt related to teaching skating:

I particularly like the exercise progression you suggested with the child wearing skates to specifically work on skating abilities. Personally, I have never recommended [skating aids], nor have I used them as I believe they go against the principle of working on the "real" task. One can make the parallels with bicycle riding where the child must relearn the whole motor pattern when the training wheels are removed. [KB 1]

Most commonly, KBs used strategies related to a constructivism approach (51%) to tie theory to practice realities. As highlighted by the previous quotes, these strategies included questioning and eliciting opinions from the larger group, a willingness to model their own reasoning approach to clinical situations, inviting critical reflection on evidence, linking theory to practice, and steering knowledge integration. The invitational approach (29%) initially used in this role decreased as the vCoP evolved.

## DISCUSSION

This study describes the role of KBs in a vCoP and provides a greater understanding of the facilitation strategies used and their evolution over time in an online environment. The results of this study highlighted three overlapping KB roles that emerged at the junction of three dimensions (evidence, context, and facilitation) of the PARIHS framework.

The KB roles we identified of context architect, promoter of knowledge of sharing, and creator of linkages share commonalities with roles described in the literature. More specifically, the role of promoter of knowledge sharing we identified aligns with aspects of the “knowledge manager” role, in the duty to disseminate knowledge, the “capacity builder” role to improve access to evidence, and as “linking agent” between researchers and clinical experts with knowledge users.<sup>16,19</sup> In our study, KBs created links between researchers and practitioners.<sup>5</sup> The role of “linkage creator” also relates to the “knowledge manager” in bridging the knowledge-to-practice gap and demonstrating the application of evidence.

The KB role of context architect, that of promoting a nurturing learning context, is one that has not been discussed in the brokering literature. It is recognized that virtual communities may differ from conventional organizations, notably as there is no concrete reward system in place to reinforce the mechanism of mutual trust, interaction, and reciprocity among individuals.<sup>24</sup> Online knowledge sharing activities cannot be successful without the active participation of online members, and a lack of motivation from knowledge contributors impedes knowledge sharing.<sup>24</sup> For vCoPs, the issue of active participation is crucial and creating and maintaining an open positive environment can lower the barriers to participation among members, making this a KB role, which appears to be particularly important in virtual environments. However, it seems plausible that the role of context architect might also be a necessary condition for the success of nonvirtual environments, and is an aspect of the KB role that is worth exploring further.

Facilitators can play a crucial role in addressing the challenges of establishing and nurturing a CoP <sup>26</sup> and in successful research implementation in different practice contexts.<sup>5</sup> Tarnizi et al <sup>26</sup> report that the most difficult tasks in CoPs are to encourage new members to participate in the discussion, create and maintain an open positive environment, and build cooperative relationships among members. These responsibilities are vital to increasing the sense of community, accountability, and responsibility necessary for vCoP sustainability.<sup>26</sup> Although some of these tasks mirrored those fulfilled by the context architect and the promoter of knowledge sharing roles in our study, the role of Linkage Creator, bridging the gap between evidence and the practice setting, distinguished the role of our KBs from that of facilitators. However, given the significance of the context architect role and the facilitation skills required to fulfill the role to ensure the sustainability of vCoPs, facilitation training and tools, in particular for virtual environments, should be designed to support KB activities and evaluated for their ability to sustain the vCoP over the longer term.



The use of conceptual frameworks is advocated in the literature to address the complexity of the knowledge transfer process.<sup>5</sup> The PARIHS was previously used to describe KB training in a brain injury team, and their implementation into the clinical program.<sup>19</sup> However, this study did not use PARIHS to describe the KBs' roles, making the comparison difficult with our study. Our study also adopted a broader definition of the “evidence” dimension to include local information to help conceptualize the issue at hand, and of the “context” dimension to include the receptivity of the practice environment to implement evidence, reflecting recent refinement of the PARIHS framework.<sup>22</sup> Furthermore, the “facilitation” dimension was viewed as an intervention and linked to adult learning theories, and was focused on virtual learning environments, an approach, which has been previously suggested in the literature.<sup>27</sup> An invitational approach was most commonly used by the KBs in our vCoP and transcended all the roles. This approach, which recognizes the importance of the learning environment in modulating participant learning, aligns well with previously discussed facilitator tasks and responsibilities, including encouraging members to participate in discussion, creating and maintaining a positive environment, and building cooperative relationships to increase the trust required for knowledge sharing. Modeling of desired behavior initially dominated the facilitation strategies used by KBs and can be linked to a variety of the learning approaches. However, questioning was also used increasingly throughout the vCoP. Further study is required to explore the effectiveness of these approaches and strategies in promoting behavior change in addition to learning, including whether particular approaches are more efficient and effective for participant learning profiles, and whether approaches and strategies evolve based on KB experience and training.

The evidence pertaining to the effectiveness of online learning environments is growing and could be used as a catalyst to further explore the roles of, and strategies used by KBs in vCoPs. For example, the quality, quantity, and timing of questioning, and of information dissemination in virtual discussion forums have demonstrated an influence on higher-order thinking in students,<sup>28,29</sup> in addition to potentially improving self-reflection and practice change in clinicians.

The study design limits generalizability to contexts other than our vCoP. Although data saturation was achieved, a selection bias could exist because of the small number of KBs. The primary author who analyzed the data was a KB and has some knowledge and experience in online learning that could have impacted her analysis of the data. Finally, the short study duration may have limited the observable scope and evolution of KB roles, approaches, and strategies. Moreover, it must be noted that substantive coding overlap was experienced the coding of the PARIHS dimension and the KB role identified categories. Although this may be perceived as a limitation of the thematic map that arose from this study, it also illustrates the dynamic nature of KBs roles and responsibilities, which was, in fact, the main focus of this study.

## Conclusion

The use of KBs is being recognized as a promising knowledge transfer intervention to change clinicians' practice behavior. However, little evidence exists in the literature regarding KB roles, or strategies used, in virtual contexts. This study was a first attempt at describing the roles and strategies used by four KBs in a vCoP with pediatric physiotherapy members. In light of the continuing difficulty of bridging the knowledge-to-practice gap in pediatric physiotherapy, and the growing knowledge on learning in virtual environments, ongoing study in this area is warranted.

## Lessons for Practice

[Black Square] KBs fulfilled three main roles in a virtual community of practice aimed at changing pediatric physiotherapist practice: 1) context architect, 2) promoter of knowledge sharing, and 3) linkage creator.

[Black Square] The identified knowledge broker roles can be found at the intersections of the PARIHS Framework: Evidence, Context, and Facilitation.

[Black Square] The Invitational Approach, focused on welcoming and inviting participation from members, dominated knowledge broker facilitation strategies.

[Black Square] Training KBs in online facilitation techniques and strategies, aligned with adult learning theory, can assist in preparing them for their various roles, help maximize learning of health care professionals, and thus improve education practices in virtual environment.

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## REFERENCES

1. Ketelaar M, Russell DJ, Gorter JW. The challenge of moving evidence-based measures into clinical practice: lessons in knowledge translation. *Phys Occup Ther Pediatr*. 2008;28:191–206. [SFX Link resolver](#) | [Bibliographic Links](#) | [Context Link](#)
2. Schleifer Taylor J, Verrier MC, Landry MD. What do we know about knowledge brokers in paediatric rehabilitation? A systematic search and narrative summary. *Physiother Can*. 2014;66:143–152. [SFX Link resolver](#) | [Bibliographic Links](#) | [Context Link](#)
3. Grimmer-Somers K, Lekkas P, Nyland L, et al. Perspectives on research evidence and clinical practice: a survey of Australian physiotherapists. *Physiother Res Int*. 2007;12:147–161. [SFX Link resolver](#) | [Buy Now](#) | [Bibliographic Links](#) | [Context Link](#)
4. Schreiber J, Stern P, Marchetti G, et al. School-based pediatric physical therapists' perspectives on evidence-based practice. *Pediatr Phys Ther*. 2008;20:292–302. [Ovid Full Text](#) | [Bibliographic Links](#) | [Context Link](#)
5. Zidarov D, Thomas A, Poissant L. Knowledge translation in physical therapy: from theory to practice. *Disabil Rehabil*. 2013;35:1571–1577. [SFX Link resolver](#) | [Bibliographic Links](#) | [Context Link](#)
6. Grimshaw J, Eccles M, Thomas R, et al. Toward evidence-based quality improvement. *J Gen Intern Med*. 2006;21(suppl 2):S14–S20. [Context Link](#)
7. Grimshaw JM, Shirran L, Thomas R, et al. Changing provider behavior: an overview of systematic reviews of interventions. *Med Care*. 2001;39:II2–II45. [SFX Link resolver](#) | [Bibliographic Links](#) | [Context Link](#)
8. Li LC, Grimshaw JM, Nielsen C, et al. Use of communities of practice in business and health care sectors: a systematic review. *Implement Sci*. 2009;4:16. [SFX Link resolver](#) | [Context Link](#)
9. Ranmuthugala G, Plumb JJ, Cunningham FC, et al. How and why are communities of practice established in the healthcare sector? A systematic review of the literature. *BMC Health Serv Res*. 2011;11:273. [SFX Link](#)

[resolver](#) | [Full Text](#) | [Bibliographic Links](#) | [\[Context Link\]](#)

10. Russell D, Rivard L, Walter S, et al. Moving cerebral palsy research into practice: do knowledge brokers make a difference. *Dev Med Child Neurol*. 2009;51(suppl 2):76. [SFX Link resolver](#) | [Buy Now](#) | [\[Context Link\]](#)

11. Wenger E. Communities of practice: a brief introduction. 2011. Available at:

<https://scholarsbank.uoregon.edu/xmlui/handle/1794/11736>

. Accessed October 22, 2014. [\[Context Link\]](#)

12. Poissant L, Ahmed S, Riopelle RJ, et al. Synergizing expectation and execution for stroke communities of practice innovations. *Implement Sci*. 2010;5:44. [SFX Link resolver](#) | [\[Context Link\]](#)

13. Wenger E, McDermott R, Snyder W. *Cultivating Communities of Practice: A Guide to Managing Knowledge*. Boston, MA: Harvard Business School Press; 2002. [\[Context Link\]](#)

14. Merrill HS. Best practices for online facilitation. *Adult Learn*. 2003;14:13–16. [SFX Link resolver](#) | [\[Context Link\]](#)

15. Rivard LM, Russell DJ, Roxborough L, et al. Promoting the use of measurement tools in practice: a mixed-methods study of the activities and experiences of physical therapist knowledge brokers. *Phys Ther*. 2010;90:1580–1590. [SFX Link resolver](#) | [Bibliographic Links](#) | [\[Context Link\]](#)

16. Ward VL, House AO, Hamer S. Knowledge brokering: exploring the process of transferring knowledge into action. *BMC Health Serv Res*. 2009;9:12. [SFX Link resolver](#) | [Full Text](#) | [Bibliographic Links](#) | [\[Context Link\]](#)

17. Canadian Health Services Research Foundation. The theory and practice of knowledge brokering in Canada's Health System. 2003. Available at:

[http://www.cfhi-fcass.ca/migrated/pdf/Theory\\_and\\_Practice\\_e.pdf](http://www.cfhi-fcass.ca/migrated/pdf/Theory_and_Practice_e.pdf)

. Accessed June 7, 2016. [\[Context Link\]](#)

18. Dobbins M, Robeson P, Ciliska D, et al. A description of a knowledge broker role implemented as part of a randomized controlled trial evaluating three knowledge translation strategies. *Implement Sci*. 2009;4:23. [SFX Link resolver](#) | [\[Context Link\]](#)

19. Glegg S. Knowledge brokering as an intervention in paediatric rehabilitation practice. *Int J Ther Rehabil*. 2010;17:203–210. [SFX Link resolver](#) | [\[Context Link\]](#)

20. Camden C, Rivard L, Hurtubise K, et al. Can a community of practice improve physical therapists' self perceived practice in developmental coordination disorder? A quality improvement study. *Phys Ther*. In press. [\[Context Link\]](#)

21. Miles MB, Huberman AM, Saldana J. *Qualitative Data Analysis: A Methods Sourcebook*. 3rd ed. London, UK: SAGE Publication Inc; 2014. [\[Context Link\]](#)

- 22. Kitson AL, Rycroft-Malone J, Harvey G, et al. Evaluating the successful implementation of evidence into practice using the PARIHS framework: theoretical and practical challenges. *Implement Sci.* 2008;3:1. [SFX Link resolver](#) | [\[Context Link\]](#)
  
- 23. Melrose S, Park C, Perry B. *Teaching Health Professionals Online: Frameworks and Strategies.* Athabasca, Alberta, Canada: Athabasca University Press; 2013. [\[Context Link\]](#)
  
- 24. Chiu C-M, Hsu M-H, Wang ET. Understanding knowledge sharing in virtual communities: an integration of social capital and social cognitive theories. *Decis Support Syst.* 2006;42:1872–1888. [SFX Link resolver](#) | [\[Context Link\]](#)
  
- 25. Carpenter C, Suto M. *Qualitative Research for Occupational and Physical Therapists: A Practical Guide.* Oxford: Blackwell Pub; 2008. [\[Context Link\]](#)
  
- 26. Tarmizi H, De Vreede GJ, Zigurs I. Identifying challenges for facilitation in communities of practice. *IEEE.* 2006;1:26a. [\[Context Link\]](#)
  
- 27. Rycroft-Malone J. Theory and knowledge translation: setting some coordinates. *Nurs Res.* 2007;56:S78–S85. [Ovid Full Text](#) | [Bibliographic Links](#) | [\[Context Link\]](#)
  
- 28. Bradley ME, Thom LR, Hayes J, et al. Ask and you will receive: how question type influences quantity and quality of online discussions. *Br J Educ Technol.* 2008;39:888–900. [SFX Link resolver](#) | [\[Context Link\]](#)
  
- 29. Mazzolini M, Maddison S. When to jump in: the role of the instructor in online discussion forums. *Comput Educ.* 2007;49:193–213. [SFX Link resolver](#) | [\[Context Link\]](#)

Keywords: knowledge brokering; pediatric physiotherapy; virtual community of practice; knowledge transfer; knowledge translation; performance improvement CE

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**TABLE 2.**  
Codes as Per the PARIHS Framework Facilitation Domain

Code	Subcodes	Definitions
Facilitator: techniques by which things are made easier by one person for another <sup>23</sup>	Institutional	Participants are believed to be of benefit to one another and are invited to participate in the learning environment <sup>23</sup>
	Constructivism	Participants' previous knowledge is valued and promoted <sup>23</sup>
	Connectivism	Participants connect with the information and resources through technological processes, and emphasis is placed on nonhuman appliances, hardware, software, and network connectors for behavior change <sup>23</sup>

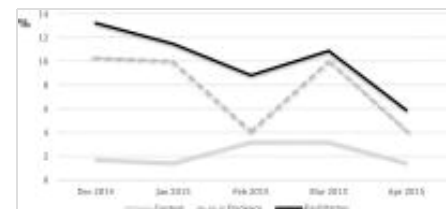


Figure 1

Table 2

**TABLE 1.**  
Codes as Per the PARIHS Framework Evidence and Context Domains

Codes	Subcodes	Definition
Evidence: all sources of knowledge and information related to, or useful to conceptualize an issue <sup>22</sup>	Research evidence	Findings arising from well-designed experiments from researchers in the field
	Clinical experience	Practice knowledge and professional craft
	Patient experience	Patient or caregiver reported experiences and perspectives
	Information from the local context	Specific data unique to a service or organization (eg, team composition, available local community resources)
Context: where evidence is being implemented <sup>19</sup>	Leadership	Existence of clear team roles, lines of accountability, and a quality improvement vision
	Culture	Values, actions, and beliefs of the organization, its service mandate, and strategic direction as conceived by the management team
	Receptive context	Physical (eg, space and equipment), social (eg, professional networks), and structure (eg, decision-making processes) systems and boundaries

Table 1

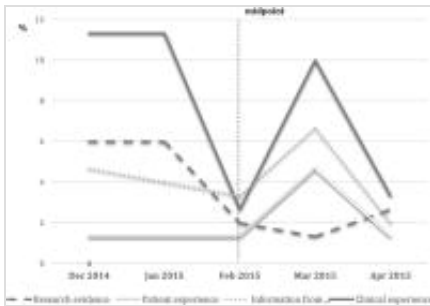


Figure 2

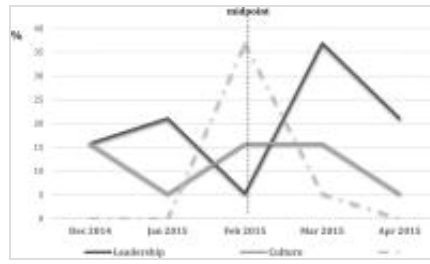


Figure 3

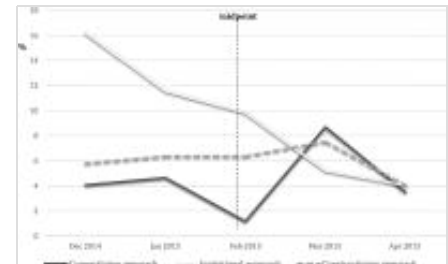


Figure 4

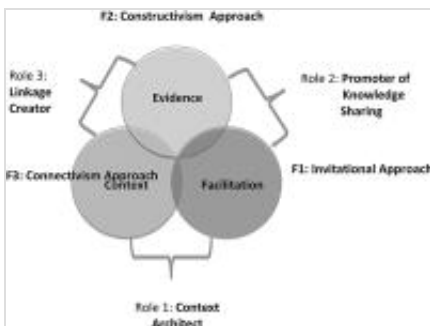


Figure 5

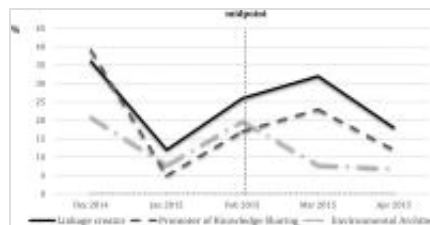


Figure 6

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