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Developing a Virtual Interdisciplinary Research Community in Clinical Education: Enticing People to the "Tea-Room"

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Abstract

Background: Many interdisciplinary collaborative research programs in the health sector are adopting the community of practice concept within virtual environments. This study explores the factors that affect the members of a geographically dispersed group of health professionals in their attempt to create an interprofessional Virtual Community of Practice (VCoP) from which to promote clinical education research.

Method & Findings: A survey was used to determine participants' degree of computer competency. System logs recorded members' access details and site activity. Member perceptions and beliefs were established using focus groups. While members stated they were enthusiastic about the VCoP, the primary use was viewing. Their online behaviour indicated that on average it took six visits to generate a post. This suggests a stronger focus on viewing (consumption of) information than on contributing (construction of) information.

Conclusions: We believe it is crucial for members to contribute during the initial phase of any pre-structured VCoP in order to overcome the consumption-construction dilemma. It is during this initial phase that members will decide on the community's value. If the community cannot offer added value, members who engage are likely to consume for a time and then leave.

Keywords: Virtual communities of practice; Virtual research environments; Clinical education research; Research cultures; Interprofessional research

Introduction and rationale

Geographically distributed dispersed interdisciplinary teams are becoming an essential component of research programs within the health sector [1,2,3]. This is not surprising given the interprofessional nature of health research. However, much of the interdisciplinary research that occurs in health is often ad hoc [4]. An emerging view is that structured interdisciplinary research projects must become the standard rather than the exception [4,5]. This is essential if we are to create the multidimensional platforms required to address the complex problems currently facing the health sector [6]. Unfortunately, research collaborations of disparate members operating across disciplinary, institutional, and geographical locations often result in members feeling unsure and confused about the project purpose, outcomes, and tasks to be undertaken [7].

To mitigate these effects, Rolls, Kowal, Elliott, et al. [8] argue the importance of a sense of participation and value. They suggest the Community of Practice (CoP)

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concept provides a means of overcoming many obstacles associated with interdisciplinary collaboration. The CoP concept focuses on shared goals where the project purpose operates as a self-organizing approach allowing members' roles and contributions to be defined by their areas of expertise [9,10].

Growing access to digital technologies has seen many CoPs move to virtual platforms, which offer a new way of undertaking research activity [11,12] by overcoming the confines of time and distance and by allowing researchers access to continuous information and communication sharing across broad geographical areas [13]. Technology-supported CoPs have become particularly common within the academic environment and, in particular, the health sector [8,9,14,15].

The Study

Within the University of Otago, clinical educators are employed across various geographical and discipline areas throughout New Zealand. This creates a primary challenge to structured interdisciplinary research, exacerbated by teaching responsibilities that require the clinical educators to remain in their respective centres. An obvious solution was to explore the possibility of creating a networked infrastructure that allowed practitioners to interact over the Web. While such groups or communities are often informal, their situated nature offers a context where knowledge is developed through a natural process of reflective and collaborative involvement [16]. It was felt that by adopting a CoP approach we would be inviting members to engage and self-organize rather than requiring them to comply with departmental or institutional requirements. This was aligned well with what Lave and Wenger [17] had found regarding the establishment of relationships around things that matter to members.

In July 2009, a small group of clinical education researchers from the Dunedin and Christchurch region proposed, through their networks, the idea of an interprofessional collaboration of clinical education staff from within the health science sector at the University of Otago. The initial idea was comparable to the work of Richardson and Cooper [1], which looked "to provide a space in which to create a virtual community that would become embedded into and contribute to the growth of a strong multidisciplinary research culture" (p. 175).

The number of potential members for such a group was difficult to ascertain, since University of Otago clinical educators and researchers work in many cities, full- or part-time, and across many disciplines. However, initial respondents were encouraged to propagate the message to other clinical education colleagues and to any other likely participants (e.g., teaching and science colleagues). The networking generated an email list of 84 members, and the Collaboration for Interprofessional Clinical Education Research at Otago (CICERO) was formed.

Given the aim of CICERO and the fact that it was a practitioner-driven initiative, it seemed applicable to adopt CoP principles. The increasing use of technology to support CoP was seen as a valid means of overcoming the barriers of time and distance. The challenge was to create a virtual CoP (VCoP) that would facilitate the development of an interdisciplinary research community. An evaluation of the

likely success of such a VCoP was made difficult by the lack of publications on VCoP effectiveness, despite the increased use of technologies to support CoPs and the proposed benefits of collaboration [15]. However, work by Bos, Olson, and Olson [18] was helpful in establishing some guiding principles in the design and construction of the community.

The guiding principles included the following:

- The activities that members engage in need to be partitionable. Collaborating through computer technology is difficult if the tasks being undertaken are tightly coupled or highly ambiguous.
- There needs to be clear and common understanding of the purpose and activities of the community.
- The digital tools that underpin the VCoP need to be sophisticated enough to meet the needs of the group and sufficiently similar that the work areas have a degree of uniformity.
- There needs to be a shared spirit of collaboration.

It was felt that CICERO would benefit from adopting a virtual space as a vehicle to facilitate interprofessional collaboration and to foster clinical education research. Criteria for membership of CICERO included clinical education involvement and/or an interest in collaboration and research into clinical education. Rather than simply asking members to submit feedback on the applicability of a virtual site, it was decided to undertake a more systematic approach to explore members' views, beliefs, and use of the site. From a research perspective, we were interested in: 1) members' views on using a virtual environment, 2) plotting their use of the site, and 3) determining whether members' views on the use of the VCoP could explain how the site was used.

The study followed an adaptation of the four-stage CoP development cycle of Urquhart, Brice, Cooper, Spink, & Thomas [15]

- Building stage: The creation of a virtual environment.
- Engagement stage: Members join the site, establish profiles and collegial relationships, and join special-interest groups.
- Active stage: Working groups emerge, which enhances collaboration.
- Adaptive stage: Through the enhanced collaboration, new knowledge is produced. (p. 54)

The investigation focused on the initial start-up period. The early experiences of members within a developing community were perceived to be pivotal in how members ultimately valued the community and in their commitment to it. The concern was that while those who found value in the site would continue to use it, members who did not find value would leave after a short time. To ensure that the data were not skewed, data collection was restricted to the initial six weeks from site initiation.

Method

The study utilized Action Research (AR). Action research is defined as any type of

research that shifts control for the study from the academic or professional researcher to the people who have traditionally been considered the subject of the inquiry [19]. According to Guiffrida, Douthit, Lynch and Mackie [20] "it is conducted *with* rather than *on* practitioners, clients or other stakeholders" (p. 282). Research surrounding the development of a VCoP where collaboration underpins the success of the community would seem well suited to an action research methodology. Specifically, this study utilizes second-person action research where people come together to inquire into issues of mutual interest. While there are champions that initiate early action, the intention is to help create a community of inquiry in which all participate in decisions about the process as well as the content of the research [21, 22]. Action Research's democratic process allowed us to focus on participation as a social process of community-based knowledge construction and "intimately welded to the context and the activity in which and by means of which it is constructed" [23]. Separating researchers from community members was not seen as desirable or possible since the researchers were members of the target academic community and the project was being undertaken within the CICERO VCoP environment. This afforded the researchers the advantage of soliciting open and honest interactions from a very early stage, which was a considerable help when we were customizing the VCoP. Furthermore, information and consent forms outlined clearly that participation in the study was an opportunity for members to contribute to the development of the CICERO website, and that the researchers would necessarily be participants in some aspects of the research. To achieve this, a discussion area for member feedback was created on the site; members could add comments relating to the site structure, content, and functionality. This feedback was acted upon each week with a number of changes being made to the navigation, structure, terms, and graphics, and extra areas being created. Some suggestions that were noted could not be actioned. These related to requests that went beyond customization and required changes at a program level.

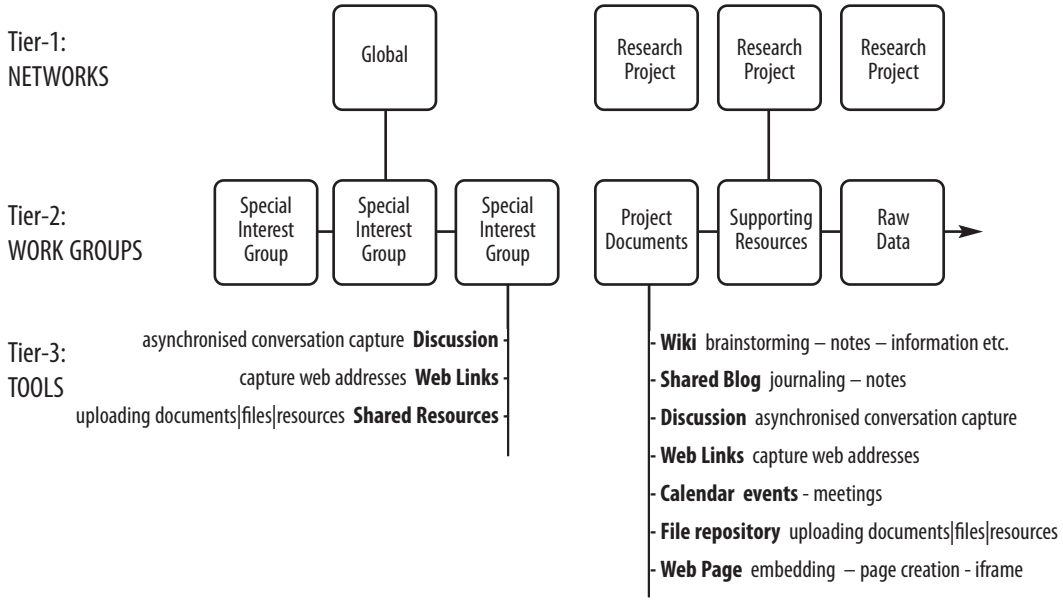
Development of a virtual research environment (VRE) website

A number of platforms were reviewed before Webcrossing was selected. The selection criteria were that the environment should be private, people- rather than information-centric, have the required tools, and allow the incorporation of other Web services. A level structure was a key navigational requirement. At the top level we required a general or global area to which everyone had access, together with the ability to create (on-the-fly) separate areas for members who wished to use the site for collaborative research projects. A second level was needed to group tasks or phases relevant to the top level. Within these areas, members could access a third level, which contained the tool sets that allowed members to engage in collaborative activities. Figure 1 is a diagram of the structure, highlighting the relationship of the three levels.

From the basic structure each of the "work group" areas was established. This process was informed by CICERO users. The result was a basic skeleton of what we believed was required for roll-out. Members were then invited to register on the site. As part of registration they were required to complete a profile comprising contact

Figure 1

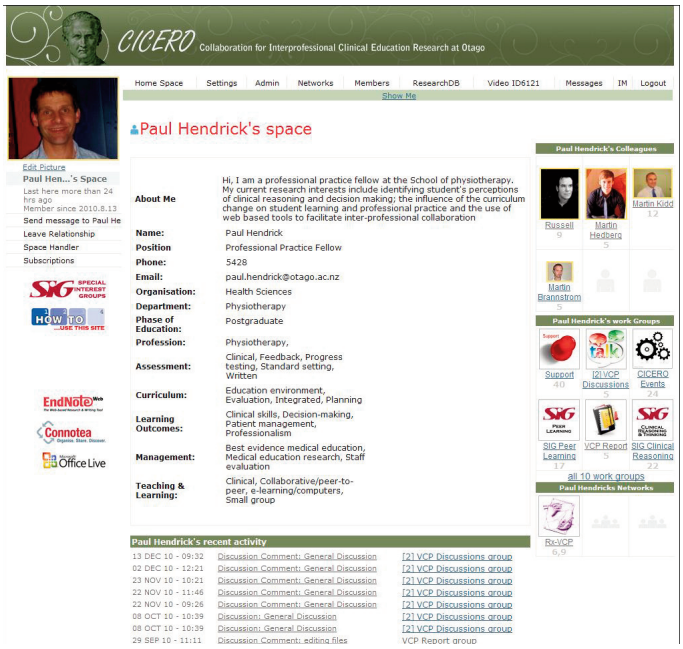
Diagram of the CICERO VCoP structure



details and areas of interest. They were also asked to select appropriate networks and work groups for their areas of interest. Once logged in, members were taken to a personal home page that showed their current membership in research collaboration groups, work groups, and networks, as shown in the following screenshot (Figure 2). In this member's home page view, his profile details are presented, together with a list detailing his recent activity on the site. On the right are current colleagues, work groups, and networks (research projects).

Figure 2

Screenshot of a member's home page on the CICERO VCoP



Due to the complexity of the site, it is not possible to describe in any detail the array of screens and tools that make up the CICERO VCoP environment. The site allows members to engage in a range of activities including discussions, sharing resources and data, scheduling activities, sharing research journals and Web links, collaborative idea development, and co-authoring.

VRE website: Participant selection and recruitment

The 84 members of CICERO were invited to take part in a one-day clinical education research colloquium in February 2010. Sixty people participated in the colloquium, which was an open forum that aimed to determine the needs of this research population, and to discuss challenges and solutions. One identified challenge was finding the best way for participants to communicate with each other: the proposed solution was the development of a CICERO website.

All the colloquium attendees were invited to join the CICERO network: 44 attendees, 1 test user, and 1 admin user chose to register on the website by November 5, 2010. The site offered two main activities: to support collaborative research projects and to support the development of a variety of special interest groups. Based on feedback from the colloquium, a number of areas of common research interest were set up *a priori* as special interest groups (SIG). These included professionalism, patient safety, peer learning, e-learning, feedback, admissions, assessment, and interprofessional practice/interprofessional education. Each SIG had two work spaces: a discussion forum and a space for knowledge sharing (i.e., a resource folder). The SIGs were available for all registered CICERO members to join and to participate actively in. A member of a SIG could also invite other CICERO members to participate within that area of research interest. The area of the virtual site that supported collaborative research projects included this project "Developing a virtual interdisciplinary research community in clinical education," one on "Characteristics of undergraduate health professionals (CUHP)," and one on feedback. A network of managers with administrative functions was also active on the website.

Web habits survey

A five-question survey was used to ascertain CICERO members' perceptions of activity on the Web, and their ability and interest in using the World Wide Web for collaboration. The survey adopted questions from survey instruments was developed by Jacobsen [24] and Salaway, Caruso, Nelson, et al. [25].

Survey development and recruitment

The survey instrument was developed in accordance with Likert methodology, commonly employed in health, medicine, and medical-education research [26-28]. A five-question survey was compiled with a Likert response scale of five (two positive, one neutral, and two negative alternatives). McNair, Drage, Ireland, et al. [29] support the need to pilot a survey to avoid incorrect inferences and to test face validity prior to field use. The Web habits survey was piloted by six CICERO members from a range of faculties. The six test users were encouraged to give feedback on the survey according to the following questions:

- Did you find the questions easy to interpret?
- How did you find using the scales for each question?
- Did you feel the questions were relevant?

Following feedback, consistent with action research methodology, the questionnaire was modified by adding information to help respondents more easily interpret the questions. The modified survey was then sent to all CICERO members, excluding the administrators of the site and the authors of this article, between October 8 and 15, 2010.

VRE website data (naturally accruing data)

Data were extracted from activity logs from the VRE platform between September 7, 2010, and November 5, 2010. The joining dates were compared with the dates when invitations to join were sent out (September 7, 14, 16, and 24, 2010).

- Percentages for how many people filled in contact details, provided a photo, wrote a short biography, stated areas of interest, and joined networks were also derived from the data.
- A "colleague connections" function on the website, aimed at facilitating collaboration between members, was used to categorize according to the number of colleague connections they made.
- System data were extracted for how many registered on each network received. A mean of "joined networks" per member was calculated.
- Activity within SIGs and research projects was divided into "visit," "discussion," "file upload," and "file download," and compared. (A "visit" was defined as someone linking to a group and viewing its contents. A "discussion" was defined as adding a discussion thread or a message to the discussion board, which are recorded by the system as a "post.")

Focus group recruitment

CICERO members who had completed the survey were invited to participate in a focus group that explored how educators viewed the website as a tool to help promote networking and collaboration between members of CICERO. Invitations were issued through the CICERO website. CICERO members who were part of the Rx-VCP group were not eligible to participate in the focus groups.

Focus group methods

Participants took part in a 90-minute video-conference focus group, involving three participants at the Dunedin site with the facilitator, and one participant in Wellington. The focus group was audiotaped, and data were transcribed verbatim. Participant responses were elicited for the following questions.

- Why did you join CICERO?
- What are your views on interprofessional collaboration within your area of research?
- Describe how you see the role of CICERO for you.
- How would you describe CICERO as a tool in your area of research?
- What motivates you to use the CICERO website?
- What challenges do you face in using the CICERO website?

Focus group data analysis

According to Bogdan and Biklen [30], action researchers who use qualitative approaches need to integrate standard procedures used to ensure trustworthiness of the data, which include use of memos, peer-debriefing groups, and member checking. During the focus group, the facilitator and a co-researcher noted keywords and recurring themes to ensure an accurate rendition of data. Immediately following the focus group, the facilitator and co-researcher discussed their initial overall impression of member perceptions based on the focus group participant responses. The subsequent focus group transcription was reviewed for content validity by the facilitator. Thematic analysis of the transcription was carried out independently by three researchers, one of whom was not in attendance at the focus group [31]. Co-researchers met regularly to discuss evolving themes which were then challenged, debated, and clarified to ensure trustworthy representation of the data [32]. Completed themes that emerged from the data were then compared between researchers, and a final picture of the perceptions of CICERO members about the website was drawn.

Findings

Demographic data

The 44 members of CICERO comprised 23 males and 21 females from medicine, physiotherapy, higher education, dentistry, nursing, pharmacy, and dietetics. All members fitted the criteria for inclusion in CICERO. The VCoP members described their employment positions as: professional practice fellow (n=13), senior lecturer (n=15), associate professor (n=2), postgraduate student (n=1), associate director of nurse education (n=1), faculty (n=1), lecturer (n=2), clinical non-university (n=1), associate dean (medical education) (n=1), senior teaching fellow (n=1), research fellow and dental education support officer (n=1), and other (n=5).

Survey results

At the time the Web habits survey was taken, the website had 40 registered members. That number (n=40) included the two survey developers and two administrators who were excluded from participating in the survey. Of the remaining 36 eligible members, 20 members completed the online survey; that is, a 56% response rate. No explanatory data were gathered from members who did not complete the survey. All survey participants completed each of the sections of the online survey. Table 1 shows the members' perceptions of their use of the World Wide Web. Across the five statements, most respondents viewed their use of the Web positively.

Website results

System logs were used to extract user behaviour concerning networking, community engagement, and contributions to discussions and resource collections. All user behaviour was logged, including the activity of the researchers of this study. Given that the researchers involved in this study were active members of CICERO it was important to include their activity data. This comprised the researchers' normal

Table 1

Members' perceptions of their activity, and their ability and interest in using the World Wide Web

Statement	Strongly agree % (*n*)	Agree % (*n*)	Neutral/Neither agree nor disagree % (*n*)	Disagree % (*n*)	Strongly disagree % (*n*)
1. I consider myself to be World Wide Web savvy:	20% (4)	65% (13)	5% (1)	10% (2)	0% (0)
2. I consider myself to be an active user of the World Wide Web:	40% (8)	55% (11)	0% (0)	5% (1)	0% (0)
3. I consider that the World Wide Web is a good tool for research collaboration	20% (4)	55% (11)	25% (5)	0% (0)	0% (0)
4. I use the World Wide Web to collaborate with my colleagues for research purposes:	5% (1)	35% (7)	40% (8)	10% (2)	10% (2)
5. I would like to use or explore the use of the World Wide Web to collaborate with my colleagues for research purposes:	30% (6)	50% (10)	20% (4)	0% (0)	0% (0)

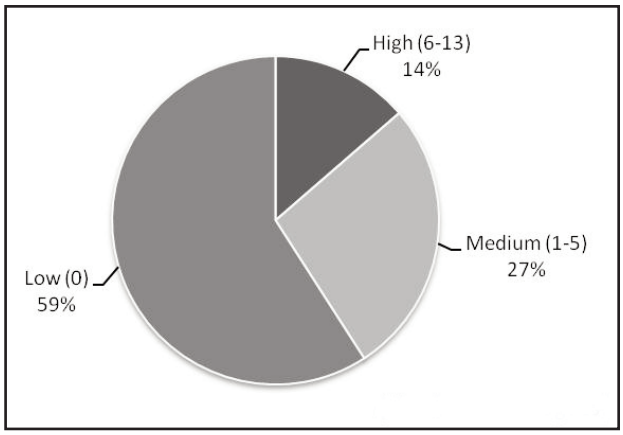
CICERO activity in both the SIGs and research project area. Alterations to the website involved change at the server level rather than via the CICERO interface and therefore did not generate log activity. The creation of additional areas and the control of functionality were produced within the site and subsequently logged. However, this study was restricted to access, views, and posts. While the creation of new groups and control of functionality was accepted as usual activity within a virtual site, administrator changes to site configuration were not relevant to the current study.

Website results: Networking

CICERO members made a range of colleague connections (CC) over the period of this study. Numbers of colleague connections fell into three categories: high (members with 6–13 CC), medium (members with 1–5 CC), and low (0 colleague connections). The percentage of members in each category is shown in Figure 3.

Figure 3

Number of colleague connections



Website results: Community engagement

Table 2 shows the number of participants who joined each of the research projects and SIGs over the period of the study. On average, each member joined 3.8 networks.

Website results: Contributions

The total number of visits (how many times someone linked to the network), discussions (added messages and discussion threads—recorded as a post), and file downloads and uploads (recorded as a post) were collected from the three research projects and the nine SIGs networks on the CICERO website. Visits were the most common activity within SIGs and within the research projects. In both the research projects and the SIGs there were more file downloads than there were discussions and file uploads (active participation). On average, it took 33 visits to produce a discussion within the research projects and 18 visits within the SIGs. The spread of activity is shown in Figure 4a and 4b.

Table 2

Community engagement

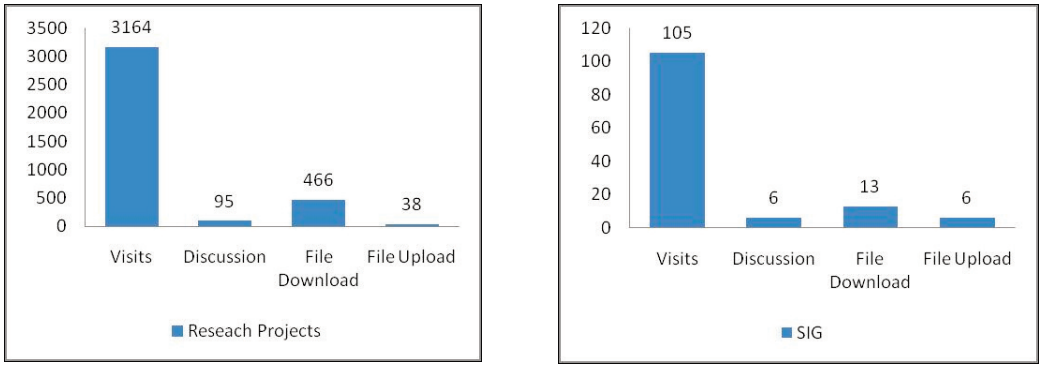
Network	Number of joined members
Rx-CUHP	8
Rx-VCP	5
RX-Feedback	4
SIG-Professionalism	16
SIF-eLearning	18
SIG-Feedback	9
SIG-Peer Leanring	15
SIG-Patient Safety	9
AIG-Assessment	18
SIG-Admissions	6
SIG-Clinical Reasonsing	21
SIG-IPP-IPE	10
CICERO Events	20
Management	6
All networks	**165**
Joined networks/Member	**3.8**

Focus group results: Perceptions of the CICERO website

The 20 members who completed the online survey were invited to participate in a focus group, facilitated in Dunedin but also open via videoconferencing to members in Christchurch and Wellington. The challenge of finding a time that suited all poten-

Figures 4a and 4b

Activity within research projects and SIGs



tial participants, combined with video problems in Christchurch, resulted in the recruitment of only three participants in Dunedin and one in Wellington (response rate of 20%). Reasons for non-participation were video failure (n=1), inconvenient time (n=13), and annual leave (n=2).

An analysis of the focus group data as described in the data analysis section revealed the following themes:

Environment: Participants agreed that the environment in which academics and clinical educators function in the university context presents an opportunity for the development of a VCoP such as CICERO:

> I mean there's a lot of commonality in education across the board, whether it's between physio and medicine or between classics and medicine.

> There's a huge need to move education research forward. Umm, I mean it's just a black hole as far as the university is concerned. So anything that stimulates interest in that has got to be good.

The demands of scope-specific clinical education were seen by participants as constraining interprofessional collaboration:

> I mean … there's such a concentration on your own little area, your research area or your teaching area that there's actually very little room for that cross-fertilisation of ideas generally.

Gaining access to competitive university funding in New Zealand is influenced, in the case of Performance-Based Research Funding (PBRF), by research output. University leaders encourage strategies to increase academic output and quality. In terms of the influence of the CICERO website on this funding environment, one participant suggested:

> I think if we had our teaching and research in mind, umm, you know, [CICERO] can make the job much easier for us and get PBRF outputs … that kind of debate really needs to be brought to the fore in PBRF and that might change the views of those who mark our [PBRF] portfolios.

Value and opportunity: The environment in which clinical education researchers function opens up potential opportunities and value to a VCoP such as CICERO, according to participants. CICERO gives members an opportunity to create links across the university:

> I think the potential of CICERO to support [research] is really quite good.

> The opportunity to network, I guess … it would be good to have opportunities where people who have completed research, to present to that involved group, whether that's through a teleconference, video conference, or via the web or whatever so that we know what's

> out there and who's doing what and what they've found, so that it's actually shared with the rest of the group.

In a similar vein, one participant suggested that whatever the format, it is the opportunity to act, interact, and react with others that is important:

> I don't think the medium matters as much as getting the interactions … if someone from CICERO has been to a resource and found it valuable and said, "look at this paper" or "look at this resource," then it's been vetted by somebody you trust.

The theme of taking advantage of opportunities to interact was taken a step further with the reference by one participant to CICERO functioning like a tea room:

> I kind of liken it to a tea room. If cup of tea time comes along and you've got the opportunity to go and share with colleagues that might not necessarily be in your same area of work but have got something to say that's interesting and is parallel alongside what you're doing then you say "hey, cup of tea time, I'm right there." I want to engage with other people in that room and discuss whatever's being discussed, knowing that it might not be where you are currently but an idea will come up in that arena … you would change the direction potentially or you could support somebody along the way by saying, "Well, have you thought of this?"
>
> I'm not going to miss my "cup of tea" because my productivity after that experience will then improve.

Organization and leadership: Participants took the opportunity to point out challenges to the effective use of the CICERO website, and to offer some suggestions for improvement. The challenges revolved around two components: the so-called "macro" elements, such as leadership within the website groups, and the organization of the CICERO structure; and the "micro" elements, such as utility of the site, its layout, and ease of use. One participant had some concerns about leadership within CICERO groups:

> Where is the governance and where is the guardianship? At the moment it sounds to me as if it may well be depending on the goodwill of one person. Are there any rules of engagement for this group? Is this something relying on champions?

This participant went on to devolve responsibility for that leadership to someone else:

> Who am I to say, 'Come on, guys, let's do something!'

Participants suggested some solutions to the lack of early activity within some CICERO website groups:

> The clinical reasoning [SIG] obviously at the moment is an empty space. Maybe it would be better if that, in some ways, didn't exist until a group of people decided that it would be actually quite useful and then you'd get like a kick-start to it.
>
> I do think the research groups are not working because there's no one to facilitate them and you may be relying on someone in the SIG to [lead]. We should look at having someone centrally stimulating the group to interact.

Participants commented on the "micro" components of the website, particularly on the lack of destination signposting:

> I just think the layout of the site is not particularly intuitive.
>
> I looked at it and was trying to see what was there without really knowing what to expect. So therefore you don't really know if you've missed something or if there's just nothing there.
>
> For the number of projects there are and the number of people involved, there seem to be five different ways to organise the information and I didn't ever know whether I was in the right spot and I assume I wasn't because I didn't find anything.

Participants also made suggestions for improvement:

> It [the resource] is as valuable as we make it and it's got to be easy to use, or to be accessible and really intuitive and you get something back.
>
> Keep it simple [and] really well signposted.

According to one participant, it is possible that ease of use of the systems that are in place is intrinsically linked to leadership issues:

> Until you have a reason for bringing the things together, until you've got a reason for communicating, then you won't get the full value of the systems that are there, and once you've got that then there starts to be some organic growth and it will suddenly become valuable.

Discussion

The main aims of this study were to evaluate the effectiveness of a VCoP to facilitate interprofessional collaboration and research within a community of practice (CICERO) of the health science teaching discipline at the University of Otago; and to explore the perceptions, beliefs, and behaviours of CICERO members in relation to their use of website technology. The study was implemented using an action research methodology whereby research data were published on the VCoP at its inception with a view to making changes to the website as a result of the research findings. Such a methodological approach has not been employed previously to study CoP website development or interprofessional networking. The approach specifically allows explo-

ration of participant views and behaviours and their specific effects and interrelationships within a virtual environment. The results showed that most CICERO members had a positive interest in research and interprofessional collaboration using the World Wide Web. However, there was little participant activity on the website over the study period; that is, there was disparity between members' views on the potential utility of the VCoP and their actual behaviour on it. Focus group analysis suggests that, in spite of enthusiastic recognition of the potential opportunities and value of a site such as CICERO, there are perceived or actual barriers to interprofessional research collaboration using a VCoP, and that the way forward may involve some modifications to both the context and structure of the website.

A total of 44 CICERO members joined the VCoP website from the 84 who were invited to join. By joining, these members expressed their interest in the VCoP concept and therefore represent a cohort that is likely to be interested in interprofessional collaboration using a VCoP. There were no data gathered on the 40 individuals who chose not to join the CICERO website, so their reasons for nonparticipation are not known. This group might have been different from the cohort who took part in the research with respect to views on interprofessional collaboration through a virtual environment. The demographics of the 44 who joined the VCoP demonstrate a distinct diversity in employment positions. Most members fall under the employment category of Professional Practice Fellow (30%) or senior lecturer (45%). A Professional Practice Fellow (PPF) is an employment position within the University of Otago with a primary responsibility for teaching. Although in most instances research performance and publication are not primary requirements of this position, PPFs often engage, either as participants or co-investigators, in research projects relating to their teaching activities. It is possible that the large number of PPFs in the membership could influence research collaboration within the CICERO group by lowering the overall level of research experience. It is also possible, however, that PPFs view the CICERO group as a convenient way to facilitate research within their daily work, and therefore are prepared to collaborate with others in this environment where they would otherwise not do so at all.

There was some concern that inclusion of various academic positions increased the already diverse composition of the CICERO community. Ryberg and Christiansen [35] stressed that there was a cost associated with diversity by emphasising that uniformity of language and norms among members must be achieved for the success of a VCoP. While we were aware of this challenge, for non-researchers such as PPFs, such diversity might help remove perceived barriers to collaboration.

Web habits survey

The Web habits survey aimed to explore CICERO members' perceptions concerning their activity on the Web, and their ability and interest in using the World Wide Web for collaboration. A majority of the respondents rated themselves "active users" (95%) and "savvy" (85%) using the World Wide Web. On average, the respondents also believed the World Wide Web to be a useful tool for supporting academic research activity. These findings are not surprising considering that the cohort of

the study joined the website voluntarily. Richardson and Cooper [1] stated that interdisciplinary collaboration is an essential component of research programs within the health sector. Interdisciplinary collaboration also provides for multiple perspectives [6] that can be facilitated by the diversity of professions among the CICERO members. There are opportunities for interprofessional research to emerge from VCoP collaboration between CICERO members, even though only 40% of participants stated they were currently using the World Wide Web for interprofessional research (Table 1).

Website behaviour

System data were extracted from the website to provide information about CICERO members' activities on the site, using similar methodology to that used by Rolls et al. [8] and Curran et al. [34] when exploring patterns of activity on a VCoP. The results indicated that most members joined at least one network (Table 2); however, with respect to active networking—that is, making colleague connections (Figure 3)—59% of all members did not make a single colleague connection over the trial period. Activity within the research projects and SIGs when CICERO members were logged on to the website was divided into "visits," "discussion," "file upload," and "file download" (Figures 4a and 4b). The results show there were few discussions, or file uploads and downloads, in relation to the number of visits in both the research projects and the SIGs. As well, CICERO members visited SIGs or research projects much more often than they contributed to their contents. In addition, there were more file downloads than there were uploads and discussions, which indicates that members did not share information to the same degree as they received information. One reason for this might be that members felt uncomfortable engaging in collaborative tasks and participating in discussions, as identified by Sargeant, Curran, Jarvis-Selinger, Ferrier, Allen, Kirby, and Ho [35].

While many survey respondents rated themselves as able and frequent users of the World Wide Web, their behaviour on the site did not reflect this high rating, particularly in terms of active and unique contributions to the website (discussions). Collegial links were made, and many members investigated different SIGs and research groups, again without committing to active participation. Researchers in this study looked to the focus group participants for an explanation of the apparent differences in perceptions and behaviour regarding CICERO members' activity on the website.

Focus groups

Input from the focus groups indicated that the environment in which clinical education researchers at the University of Otago work brings about a need for a virtual tea room—a site where colleagues could drop in casually, listen and contribute, network and sample, to help them decide where their energies would be best spent in clinical education research. The focus group participants recognized the value and potential of a VCoP, and were prepared to give the CICERO website "a go." They also identified some reasons for the amount of active engagement not reflecting their

views of opportunity and value. Focus group participants suggested that the same environment that gave rise to the need for the VCoP also constrained its success. The same workloads and logistics that prevented traditional research meetings also meant that collegial engagement in a virtual environment would succeed only if its format was intuitive, easy to use, and efficient. Participants in the focus group suggested that ways to navigate through the site should be obvious through clear signposting, and in particular indicated a desire to know where they were headed before they embarked on the virtual journey. Preece, Nonnecke, and Andrews [36] described how members of VCoPs struggle with software and how such perceived barriers can have a negative impact on activity within a VCoP. This is consistent with other studies [34,35]. Colleagues needed to see that entering the website would result in something tangible for them, be it new ideas, project support, or academic outcomes, so they could justify the time spent navigating through it.

Facilitators play a key role in online environments by enabling interaction [37]. Focus group participants strongly advocated leadership within website groups to facilitate activity; and guardianship of the CICERO structure to ensure its sustainability. In other words, they suggested the "tea room" needed a champion to guide both the overall activity and the individual groups within the room.

Participatory nature of the study

The decision to undertake this research project within the VRE CICERO website was perceived as both expected and advantageous given that we were both demonstrating transparent collaborative research and also modelling ways of using the site to undertake collaborative research. Within our research project area, CICERO members could view documentation on methods, recruitment, and ethics approvals; read and contribute to discussions; and monitor schedules. However, the area for raw data collected from participants was password-protected to provide access only to members of the research project. This Ethics Committee stipulation, although at odds with action research methodology, ensured the essential anonymity, where appropriate, of participants, which supports candid qualitative data creation.

At no time did we receive any comments that members were uncomfortable with the site operating as a research study, or that the research team (their colleagues) affected the sharing of their views or impinged on the way they used the site. The research team perceive participatory research (researching one's own communities) as more valid and less intrusive than those from outside the community.

Limitations

The total number of staff involved or interested in clinical education throughout the university is unknown. No records are available to show how many eligible people did not receive the initial email invitation in July 2009. There may be colleagues interested in interprofessional collaboration in clinical education research who remain outside the CICERO network. There was no follow-up of the 40 clinical education colleagues who opted not to join the CICERO website after expressing an interest by email. Their reasons for not joining are unknown.

The Web habits survey was developed specifically for this study and so had not previously been used. Its pilot use in the survey tested its face validity. However, the content validity is unclear because the survey had not been used previously. It is also worth noting that the survey was implemented during a student examination week when university teachers' workload was at its peak. The members might have given their teaching assignments priority rather than participating in activities concerning the website, which could be a factor in the small response rate. The survey might have gained a greater response than 56% if undertaken at another time. It is uncertain if the results of the survey reflect all members' views about the website.

Only four CICERO members from the 20 who completed the online survey (20%) participated in the focus groups. A total of 11 of 20 eligible members (55%) initially made themselves available for the focus groups, but scheduling and technology problems meant that only four (20%) participated. This response could be viewed as a limitation, but the researchers endeavoured through triangulation and question construction to generate an authentic perspective on the CICERO website from the members' point of view.

Future research

The study highlights three areas for further research:

- The design and construction of websites that support Virtual Community of Practice (VCoP).
- How to generate value in the initial start-up phase of a new community.
- Procedures for evaluating the impact of VCoPs as a catalyst for promoting interprofessional collaboration.

There is an opportunity for future research into the website design factors that engender and foster interprofessional collaboration within a virtual CoP. In particular, research could include the role of purpose, incentive, and benefits within the early phase of a community's development. The factors that contribute to engagement in a VCoP, and evidence as to whether a VCoP promotes interprofessional research, are not currently found in the literature.

Conclusion

The successful creation of a Community of Practice is highly dependent on the initial start-up period. Having a shared interest and a set of resources is not enough to guarantee success. While initial interest in the idea of a Community of Practice for interprofessional collaboration of clinical education staff was high, it did not manifest itself in activity within the virtual environment. A key question that surfaced very early in the study was what was causing the discrepancy between intention and practice. Member feedback from the focus groups inferred two key reasons for initial caution: 1) that the website presented technical barriers, and 2) that there was a lack of facilitation on the site. However, these views may not reveal the whole story. If technical barriers existed, we would not have seen the degree of member access and site navigation that the system recorded. The concern over facilitation also

seems puzzling, given that members knew the site was a collaborative space that required a proactive approach, with each individual responsible for contributing.

It is our view that poor uptake in the early stage of the project was more likely associated with unease about the purpose and relevance of any contributions. The initial establishment of the community did not state clearly the benefits of engagement for individual members, or the sorts of activities that would secure those benefits. This is illustrated by the greater activity associated with the research projects on the site (visits=3164 | posts=624) compared with the activity in the special interest groups (visits=105 | posts=25). Clearly, leaving members to discover both purpose and benefit is not an incentive to develop commitment and engagement.

It may be that too much effort was directed toward the development of a community that would eventually render benefits to its members, rather than on nurturing meaningful engagement at the member level, which, over time would cultivate a strong active community.

Many communities of practice eventually agree on purposes and reap benefits. However, including statements of purpose, incentives, and benefits within the design would have gone some way to overcoming the early-stage confusion that we experienced in the establishment of CICERO.

References

1. Richardson, B., & Cooper, N. (2003). Developing a virtual interdisciplinary research community in higher education. *Journal of Interprofessional Care, 17*(2), 173-183.
2. Lewis, L., Koston, Z., Quartley, M., & Adsit, J. (2010). Virtual communities of practice: Bridging research and practice using Web 2.0. *Journal of Educational Technology Systems, 39*(2), 155-161.
3. Haythornthwaite, C., Lunsford, K.J., Bowker, G.C., & Bruce, B. (2006). Challenges for research and practice in distributed, interdisciplinary, collaboration. In C. Hine (Ed.), *New infrastructures for science knowledge production.* Hershey, PA: Idea Group.
4. Aboelela, S.W., Larson, E., Bakken, S., Carrasquillo, O., Formicola, A., Glied, S.A., Haas J., & Gebbie, K.M. (2007). Defining interdisciplinary research: Conclusions from a critical review of the literature. *Health Services Research, 42*(1 Pt 1), 329-346.
5. Newswander, L.K. (2010). Definitions of interdisciplinary research: Toward graduate-level interdisciplinary learning outcomes. *Review of Higher Education, 34*, 61-84.
6. Short, A., Jackson, W., & Nugus, P. (2010). Expanding clinical research capacity through a community of practice (CoPER). *Nurse Education in Practice, 10*(1), 52-56.
7. Collin, K., Paloniemi, S., & Mecklin, J.-P. (2010). Promoting inter-professional teamwork and learning: The case of a surgical operating theatre. *Journal of Education and Work, 23*(1), 43-63.
8. Rolls, K., Kowal, D., Elliott, D., & Burrell, A.R. (2008). Building a statewide knowledge network for clinicians in intensive care units: Knowledge brokering and the NSW Intensive Care Coordination and Monitoring Unit (ICCMU). *Australian Critical Care, 21*(1), 29-37.
9. Andrew, N., Ferguson, D., Wilkie, G., Corcoran, T., & Simpson, L. (2009). Developing professional identity in nursing academics: The role of communities of practice. *Nurse Education Today, 29*(6), 607-611.
10. Henrich, K.J., & Attebury, R. (2010). Communities of practice at an academic library: A new approach to mentoring at the University of Idaho. *Journal of Academic Librarianship, 36*(2), 158-165.
11. Kamel Boulos, M.N., & Wheeler, S. (2007). The emerging Web 2.0 social software: An enabling suite of sociable technologies in health and health care education. *Health Information & Libraries Journal, 24*(1), 2-23.
12. Olson, G.M., Zimmerman, A., & Bos, N. (2008). *Scientific collaboration on the Internet.* Cambridge, MA; London: MIT Press.
13. Colbeck, C.L. (2000). Reshaping the forces that perpetuate the research-practice gap: Focus on new faculty. In A.K.P. Eckel (Ed.), *Moving beyond the gap between research and practice in higher education* (pp. 35). San Francisco: Jossey-Bass.

14. Jacobsen, F., Fink, A., Marcussen, V., Larsen, K., & Hansen, T. (2009). Interprofessional undergraduate clinical learning: Results from a three year project in a Danish interprofessional training unit. *Journal of Interprofessional Care, 23*(1), 30-40.
15. Urquhart, C., Brice, A., Cooper, J., Spink, S., & Thomas, R. (2010). Evaluating the development of virtual communities of practice that support evidence based practice. *Evidence Based Library and Information Practice, 5*(1), 48-63.
16. Lorenz, E., & Barlatier, P. (2007). Report on Methods for studying communities of practice. EU Network of Excellence. URL: http://www.dime-eu.org/files/active/0/Lorenz_Barlatier.pdf [May 2010].
17. Lave, J. & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation.* Cambridge: Cambridge University Press.
18. Bos, N., Olson, J., & Olson, G. (2008). *Science on the Net. Collaboratory for Research on Electronic Work* (CREW). URL: http:// http://soc.ics.uci.edu/Resources/SOC-HCIC-Paper.pdf [October 8, 2010].
19. Herr, K., & Anderson, W.P. (2005). *The action research dissertation: A guide for students and faculty.* Thousand Oaks, CA: Sage.
20. Guiffrida, D.A., Douthit, K.Z., Lynch, M.F., & Mackie, K.L. (2011). Publishing action research in counseling journals. *Journal of Counseling and Development, 89*(3), 282-287.
21. Marshall, J. (2011). Images of changing practice through reflective action research. *Journal of Organizational Change Management, 24*(2), 244-256.
22. Reason, P., & Bradbury, H. (2001). *Handbook of action research : participative inquiry and practice.* London: SAGE.
23. Salomon, G., & Perkins, D.N. (1998). Individual and social aspects of learning. *Review of Research in Education, 23*(1), 1-24.
24. Jacobsen, D. (1998). *Adoption patterns and characteristics of faculty who integrate computer technology for teaching and learning in higher education.* Unpublished dissertation for the degree of PhD, University of Calgary.
25. Salaway, G., Caruson, J.B., Nelson M.R., & Ellison N.B. (2008). *The ECAR Study of Undergraduate Students and Information Technology.* URL: http://net.educause.edu/ir/library/pdf/ers0808/rs/ers0808w.pdf [March 2010].
26. Carifio, J., & Perla, R. (2008). Resolving the 50-year debate around using and misusing Likert scales. *Medical Education, 42*(12), 1150-1152.
27. Dittrich, R., Francis, B., Hatzinger, R., & Katzenbeisser, W. (2007). A paired comparison approach for the analysis of sets of Likert-scale responses. *Statistical Modelling: An International Journal, 7*(1), 3-28.
28. Göb, R., McCollin, C., & Ramalhoto, M. (2007). Ordinal methodology in the analysis of Likert scales. *Quality & Quantity, 41*(5), 601-626.
29. McNair, A., Drage, K.J., Ireland, A.J., Sandy, J.R., & Williams, A.C. (2009). Piloting a patient-based questionnaire to assess patient satisfaction with the process of orthodontic treatment. *Angle Orthodontist, 79*(4), 759-765.
30. Bogdan, R.C., & Biklen, S.K. (2007). *Qualitative research in education: An introduction to theory and methods.* Needham Heights, MA: Allyn & Bacon.
31. Boyatzis, R.E. (1998). *Transforming qualitative information: Thematic analysis and code development.* Thousand Oaks, CA; London, UK: Sage Publications.
32. Creswell, J.W., & Miller, D.L. (2000). Determining validity in qualitative inquiry. *Theory into Practice, 39*(3), 124-130.
33. Ryberg, T., & Christiansen, E. (2008). Community and social network sites as technology enhanced learning environments. *Technology, Pedagogy and Education, 17*(3), 207-219.
34. Curran, J.A., Murphy, A.L., Abidi, S.S., Sinclair, D., & McGrath, P.J. (2009). Bridging the gap: Knowledge seeking and sharing in a virtual community of emergency practice. *Evaluation and the Health Professions, 32*(3), 312-325.
35. Sargeant, J., Curran, V., Jarvis-Selinger, S., Ferrier, S., Allen, M., Kirby, F., & Ho, K. (2004). Interactive on-line continuing medical education: Physicians' perceptions and experiences. *Journal of Continuing Education in the Health Professions, 24*(4), 227-236.
36. Preece, J., Nonnecke, B., & Andrews, D. (2004). The top five reasons for lurking: Improving community experiences for everyone. *Computers in Human Behavior, 20*(2), 201-223.
37. Sargeant, J., Curran, V., Allen, M., Jarvis-Selinger, S., & Ho, K. (2006). Facilitating interpersonal interaction and learning online: Linking theory and practice. *Journal of Continuing Education in the Health Professions, 26*(2), 128-136.