Eyes, ears and technology
An evaluation of the use of video-conferencing in BPR workshops

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Abstract

Purpose – The purpose of this paper is to evaluate the effectiveness of video-conferencing as a suitable technology for business process reengineering (BPR) training of 12 health sector participants located in Prince Edward Island, Canada.

Design/methodology/approach – An action research was adopted. The participants received training from a remote BPR consultant located in Northern Ireland (UK), with the assistance of local moderators. The focus of the study is concerned with the quality of the learning experience and the important role played by local moderators.

Findings – Overall, the use of video-conferencing technology provided a valuable learning experience. It was also cost effective and an efficient use of both the consultant's and the participants' time. A key part of the success of the exercise was the role of one of the local moderators who acted as the "eyes and ears" of the consultant.

Originality/value – A general contribution to knowledge is the positioning of the argument developed within the technology diffusion literature. The paper offers important insights into the effective use of video-conferencing technology for BPR training purposes; and Knipe and Lee's evaluation of a video-conferencing experiment in terms of the relationship between the human actors at the remote and local sites is discussed and extended.

Keywords Business process re-engineering, Communication technologies, Cost effectiveness, Video equipment, Conferencing, Learning methods

Paper type Research paper

Introduction and methodology

This paper evaluates the effectiveness of the video-conferencing element of the Coordination and Continuity in Primary Health Care (CoCo) business process

re-engineering (BPR) workshop series and supporting technologies (listserv. and fax) in 1999. The CoCo project was a funded by the 4th Framework European Telematics Applications Programme and involved a range of international participants. This study focuses on the Canadian project participant, PEI Health and Community Services. The evaluation is based on the analysis of questionnaires, focus groups, observation and informal communication conducted with and by the BPR project team and workshop facilitators, and relevant literature. The training program was planned in conjunction with the Atlantic Centre for the Study of Human Health (ACSHH) team led by an education and training consultant[1] based in Charlottetown, Prince Edward Island (PEI), Canada. The evaluation was co-conducted by the education and training consultant and a learning technology consultant based at The University of Edinburgh Management School and Economics[2] using an action research approach:

> Action research means intervention in a world where everything can be happening at once and it is impossible to be sure what arises from what, where there is no ethical way of controlling (or measuring) the "intervening variables" because those "intervening variables" are actually people with their emotional responses, their conceptualisations, their needs, their defence mechanisms, etc. (Taylor, in Armstead, 1999, p. 23).

Positivist models of research (laboratory driven) do not always travel well into the realm of the practitioner (Armstead, 1999), which may be due to the focus of attention being directed towards the intervening variable, at the expense of other processes ongoing within any hypothetical construct. Action research is a method more often found within education, where practitioners reflect on their current practice and seek ways to progress pedagogy through "praxiology" (Armstead, 1999).

The action research evaluation approach adopted was novel in that it was conducted and planned through e-mail and teleconferences. This Trans-Atlantic partnership provided some unique benefits. The University of Edinburgh consultant analyzed the evaluation results, wrote the evaluation report and provided access to a wide range of research resources at The University of Edinburgh. In turn he benefited from access to an extremely rich source of raw data that were vital to conducting the desired learner-centred rather than technology-centred evaluation of the use of video-conferencing in the BPR training event. Furthermore, this "arms length" arrangement arguably afforded the opportunity to conduct a more objective evaluation of the programme than would have been the case if the evaluation consultant had been in attendance at the BPR training workshops.

The BPR Project Team[3] participated in this project because it met their immediate need to find a systematic methodology to redesign services for a new facility. This demand corresponded with Asch's need to fulfill its CoCo deliverable contract and to build expertise in BPR and multi-media training delivery. ACSHH as an organization is in a learner mode which encourages innovation and risk taking. The philosophy of the ACSHH proponents of this project is well reflected in the sentiment "By the time the rules of the game are clear, the windows of opportunity are closed." The decision to employ video-conferencing in the BPR workshops was made by ACSHH for three main reasons:

(1) group communication technology such as video-conferencing afforded the opportunity for connection between geographically distributed participants (in this case the BPR team in Canada and the consultant in Northern Ireland);

(2) ACSHH was interested in developing expertise in using communication technologies for training/consulting; and

(3) the accessibility of video-conference equipment.

It is important to note that this was a pilot project which involved experimentation with a number of new techniques. The BPR methodology had been well tested in the European context and the consultant was highly experienced. However, the video-conferencing approach, whilst based on available knowledge, was untested in a practical sense. Participation in the project required that the BPR consultant, the moderators, and the learners be willing to venture into unchartered territory.

Since the time of this study, there is evidence that video-conferencing is widely used in many different organisations and contexts. It is used in telemedicine, for example to support the professional supervision of trainee orthopaedic registrars (Scott et al., 2006) and doctoral training in medicine (Raffelini, 2006). In the business world, Cisco recently announced that it is to buy online collaboration firm WebEx with Cisco's Chief Development Officer making the following announcement (ZDNet, 2007a, b, c):

> As collaboration in the workplace becomes increasingly important, companies are looking for rich communications tools to help them work more effectively and efficiently [...] "The combination of Cisco and WebEx will deliver compelling solutions accelerating this next wave of business communications" (Charles H. Giancarlo, Chief Development Officer, Cisco, 2007).

It is also increasingly used in universities, colleges and schools (Global-Leap, 2007) for both education and other purposes, e.g. a "Rock Idol" competition (SEGFL, 2007) for schoolchildren and dedicated video-conferencing jobs (www.videoconferencingjobs.com) have stated to emerge. Renewed interest in video-conferencing can also perhaps be attributed to pressure on organisations from government that they reduce their carbon footprint (ZDNet, 2007a, b, c). However, despite advances in the technology, including the availability of video-conferencing robots (Mini-itx, 2007), others question whether video-confernencing has yet reached maturity (BT, 2007). This is a common question with regard to technology implementation in general and this paper argues that examining how a particular technology is employed in a particular context through interaction with human actors is a more important consideration for practioners than whether the "right" type of technology is being used or whether the technology has matured. One reason for this fascination with technology and the high expectations that surround its use may be related to a lack of understanding of the processes of technological change and the predominance of technological determinist viewpoints. This is the belief that the technology will provide ready-made solutions. Another reason is a lack of understanding of how to implement technology effectively in the real world of education and training:

> Traditional innovation and diffusion theories are too much focused on a macro-view and do not pay sufficient attention to the practice of "technology-in-the-making", the permanent process of negotiations that accompany the reshaping of educational practices. A more satisfying approach is rendered by theories under the heading of social shaping of technology. This approach presupposes the heterogeneity of technology and society. Technology and society form a seamless web in which it is impossible to differentiate a priori between technical and social elements. The process of change is a *socio-technical* process of change. Technology is open to analysis as a social practice (van Lieshout et al., 2001, p. 58).

Thus, in contrast to the certainties held out by images of social and technological progress, technological change is revealed to be a highly uncertain and unpredictable process (Williams, 1996). In particular, social needs, and the means by which they may be fulfilled are not fixed but evolving entities, partly in the face of new technical capabilities:

> These problems are particularly acute in relation to radical innovation (as opposed to the incremental enhancement of existing devices with well-established uses), since the potential uses and usefulness of an emerging technology are often not well understood by suppliers let alone by potential users (Williams, 1996).

Innovation is thus not restricted to technology supply, but continues through its implementation, consumption and use (Williams and Edge, 1996; Williams, 1996). An important insight in this area is seen to arise from Fleck's (1989) coining of the term innofusion to highlight the important innovative effort as (industrial automation) suppliers and users adapt supplier offerings to their particular work circumstances. As a result of this process, new user needs and requirements are discovered and further innovation occurs (Fleck, 1989). The potential uses and usefulness of a technology are difficult to fully appreciate at the outset of a process of innovation owing to this importance of innovation around the application and use of technologies; the outcome of the protracted learning processes involving both suppliers and users as technologies are applied and used (Fleck, 1989).

Learning technology and pedagogy

Videoconferencing is one type of the many learning technologies available for use in education and training activities. At the outset it is important to realise that technology studies present the researcher with significant difficulty in terms of definition and analysis:

> It [technology] includes activities as well as a body of knowledge, structures as well as the art of structuring. Our language itself is poorly suited to describe the complexity of technological interactions. The interconnectedness of many of these processes, the fact that they are so complexly interrelated, defies our normal push-me-pull-you, cause-and-consequence metaphors. How does one speak about something that is both fish and water, means as well as end? (Fox and Herrmann, 2000, p. 75).

Video-conferencing is a form of learning technology which represents an intimate method of communication on an individual or small group basis. It does not replace the use of print or other methods used in the conceptualization process. It can be used to encourage construction but its true use lies in encouraging dialogue and increasing the scope for dialogue (Laurillard, 1993). Its main advantages can be summarized as eliminating the need for expensive travel; making the best use of limited time; and allowing genuine dialogue between participants, along with full two-way communication of content (verbal, pictorial objects, etc.).

Whilst exploring the use of video-conferencing in a real setting highlights any problems of use, it may fail to provide enlightenment as to the underlying reasons for the success or failure of any project. On the other hand, carefully controlled psychological experiments which manipulate individual variables create an artificial environment and the results may not be generalisable to real settings. This indicates the difficulties inherent in evaluating the effectiveness of technology-mediated communications for learning. However, a learner-centered rather than a

technology-centered view of the problem should go some way towards presenting a more balanced evaluation (Laurillard, 2002); regarding technology as a "black box" and disregarding the social and cultural elements at work which have an impact on how the technology is used would produce a misleading picture (Pacey, 1983). Furthermore, effective education and training experiences that employ learning technology require the appropriate use of both technology and pedagogy. Carr (1999, in Jackson and Anagnostopoulou, 2001, p. 53) underlines the importance of appropriate pedagogy for student learning, without which technology-driven projects are unlikely to provide improvements in student learning:

> Without appropriate pedagogy, use of high capacity communication services cannot provide significant improvements in learning outcomes. In general, it is the pedagogy that provides for learning, not the technology or the software alone.

This paper therefore begins with a consideration of the learning context in which the video-conferencing element was introduced before going on to examine the video-conference experience and cost effectiveness of the technology.

Establishing the learning context

The video-conferencing technology was used to link participants with the consultant, usually for one hour at the start of each workshop, to generate dialogue which the moderator could then build on in the remaining three hours of each workshop. This pedagogic framework plays a vital role in determining how effective the learning experience is, as evidenced by Laurillard (1993, p. 220):

> The most stunning educational materials ever developed will fail to teach if the context of delivery fails [...] The "context of delivery" means more than a delivery system, such as lectures, or mail or broadcasting. It refers to the provision of whatever support it takes to enable students to achieve the maximum benefit from their study.

Participants as learners

The facilitators found that the 12 participants exhibited a high level of motivation and commitment to the project:

> It did appear from time to time people had to make significant accommodations to be there [...] in my experience [...] other business takes precedent to these kinds of meetings. There was strong motivation, I think (Moderator A).

Most participants were aware that senior management supported the project and thought that this helped to make the project more interesting and worthwhile; there was a plan and a clear direction and supports to keep the process going. It is likely that this was then reflected in higher levels of motivation and commitment from the BPR team than may have otherwise been the case.

Another factor affecting motivation was the requirement for carrying out real work tasks to tight deadlines:

> It [work tasks] really promoted momentum in the project. We had deadlines to meet. The sessions always seemed to be upon us. It motivated all of us to plan agendas, get the work done, and I think those timelines were excellent to move the thing along (Moderator B).

Participants were volunteers but were effectively paid to attend the workshops, either as part of their salary remuneration or time in lieu (for shift nurses). Therefore, motivational levels were not adversely affected through losing salary to attend the workshops.

Participant learners were not only motivated but also well prepared for each session, according to the workshop facilitators. Participants had been given an orientation session, since there were plans to revamp the pharmacy service even before the CoCo initiative came on board, and were involved in planning the design of the sessions:

> They had to adjust to the fact that there would be other people working with them so that was the first little twist but then we arranged an orientation and explained about the project and also gave out all the books on redesign [...] They had an opportunity to actually review the goals that we had set for our project and adjust the goals. They added to the goals and objectives. They also looked at the work plan and made some adjustment (Moderator B).

The participants had been strategically selected according to the possession of appropriate skills from representative groups to enable the tasks to be completed:

> Actually, they were prepared because quite often they were doing real work between sessions. It wasn't like they were studying content. What happened between sessions is that they had chores to do related to the BPR (Moderator A).

It is widely acknowledged that learner preparation such as that of the participant learners is vital to effective learning. For example, Laurillard (2002) advocates that students must receive orientation about the new ideas they will be examining, and that this is just as relevant for learning technology as it is for traditional face-to-face teaching.

However, while participant motivation and preparation were enablers to the project, the BPR Team focus group workshop participants felt that "time constraints" were a major barrier. The actual amount of time spent working on the project was greater than expected and there was not enough time to redesign all the processes involved. The meeting schedule was very rigid because of the length of the sessions (half to full day) and the consultant's limited schedule owing to the time zone difference between Canada and Northern Ireland. There was also a problem with time spent on travelling to the sessions and difficulties with juggling normal work load (appointments and shifts had to be rearranged, extra hours had to be worked and cover had to be found).

Background of participants

Attention was paid to the needs, educational level and background of the participants in a number of ways: through the knowledge and experience of the facilitators gained through working with similar groups of similar composition, through the experience of the consultant who had lead many similar groups through similar workshops, through planning discussions with senior management, local project resource personnel and the chair of the group. The team members were strategically selected by the region to ensure each group was appropriately represented (nurses, doctors, managers, etc.) which was vital for ensuring that the assigned tasks could be completed.

All questionnaire respondents stated that the felt comfortable speaking out and participating in the workshop. There had been initial concern that power issues, between nurses and doctors for example, might inhibit the former from full participation. However, the nursing input was as strong as any other group and the

doctors did not tend to monopolize the discussions. The moderator assisted this process by making a conscious effort to ask for inputs from the various groups so that none of them would feel excluded. Also the nature of the task at hand did not lend itself to exclusion of certain groups:

> I would say that the design of BPR and what they were doing required everyone to be involved (BPR consultant).

Professional groups and senior management represented on the BPR team did not exhibit "territorial" conflicts as might be expected in these situations. Careful selection of group members and carryover of a positive organizational culture likely contributed to this fact although no specific information was collected on this topic in the evaluation.

Learning objectives

Learning objectives were clearly stated in the overall introduction to the series. An agenda was prepared for each session clearly describing the objectives for that session. The overall aim of the workshop series was to familiarize participants with the methodology for BPR as a way of achieving organizational change and development, and to enable them to make practical application of the methodology to the East Prince Health Pharmacy.

The objectives for the workshop series were for participants to have, upon its completion:

- explored the context of the health care system in PEI;
- been familiarized with BPR methodology and have planned how to use it on their own situation;
- been familiarized with a repertoire of tools and techniques that will enable them to apply the methodology;
- developed an initial project plan for BPR;
- shared ideas with others; and
- identified further support and training for themselves.

Training and roles

The video-conferencing experience was a "trial by fire" for both the facilitators and the participants. The participants were provided with an orientation session in relation to all the workshops and the video-conferencing element was introduced as an experimental part of the workshop design. This represented an honest approach to the introduction of video-conferencing which created a more patient attitude among participants and perhaps even the expectation of an exciting and novel learning environment:

> As it was our first time connecting with the whole group in Summerside I explained that we would be experimenting as we go (Moderator A).

However, the moderators did have a clear understanding of each other's roles in the project:

> We all had very different roles and I don't think there was any doubt that there was a need for each one of us to be there [...] [A local staff person] was responsible for note-taking and

[another local staff person] was responsible for the communications and linking with the organization. [One of the facilitators] was being more of the observer in terms of the evaluation of process and [another facilitator] made a big contribution in bringing his evaluation skills and critical, logical thinking to it (Moderator C).

Although the roles of the consultant and moderator were clear to the participants, there was some degree of confusion about the roles of others involved in the project at the facilitatory level:

My observation was [...] I knew what [Moderator A's] role was, it was very clear, she was facilitating, and I think she did a darn good job [...] but I couldn't understand what [Moderator B's] role was and I didn't understand what [Moderator C's] role was [...].

This training program was unique in that it included a number of additional facilitators observing and evaluating the process. This fact did not appear to inhibit participation or group effectiveness possibly because the lead roles of moderator and consultant were clear and continually reinforced in the sessions. However, the above comments illustrate the importance of attending to the communication needs within the group.

Relevance of learning style to the participants

Ramsden (1992) lists the characteristics of the learning context associated with a "deep approach", and among them is teaching that addresses the nature of the subject and its relevance. Action plans were developed at each session, the work was divided up amongst the participants who carried out the required tasks and then reported back to the group at the next workshop. This represented a type of action-based learning; the concepts discussed were applied immediately and bore relevance to the day-to-day tasks of the participants, with subsequent positive effects in participant preparation for each workshop.

The series of workshops combined learning sessions customized to meet the needs of the group with the immediate application of new knowledge. Overall, participants agreed that this approach was an effective method of learning compared to more traditional generic seminars and workshops.

The consultant felt that the participants were committed to a very practical piece of real work which many will go on to implement. The fact that the consultant was actively involved in setting some of the assignments was seen to produce a sense of accountability to her from the participants:

I think what emerged was a sense of accountability back to [the consultant] in terms of the kinds of assignments and that it reinforced the rapport as well besides your personal qualities and skills (Moderator A).

Support and feedback

The importance of pedagogical support and feedback in the learning process is reported by Laurillard (1993, p. 216):

The [teacher-student] discussion [...] may involve only some students in discussion and most in observing the discussion, learning vicariously from those actively taking part. However, it is managed, it is a vital part of the learning process. Without it, students have no opportunity

to stand back from their experience, articulate the [...] knowledge they are acquiring, and receive feedback on how they are expressing it.

The participants reported that there was support to keep the learning process going and feedback was provided at the start of each new workshop session:

> [...] the notes from each meeting and the work were always sent to you right after the meeting so that it was like action learning because [the consultant] did give feedback at the beginning of every session on the work that they had done (Moderator A).

Access to the consultant was organized around the consultant's, rather than the participants' needs owing to cost-effective use of time and time zone differences between Canada and Northern Ireland. Two participants expressed a wish for greater access:

> [...] I wish she could have been essentially here for the entire meeting each time, it would have been very nice [...] to have her here or come in at the beginning of the process, sort of go through what we did and then have her check in at the end − we could send her some things and let her take a look − and then she could comment on that.

However, this view was not quite as clear cut in the questionnaire responses:

> The project outcomes would have been better achieved if [the consultant] had been physically present.

The video-conferencing experience

As the main pedagogical advantage of video-conferencing lies in its ability to encourage and increase the scope of dialogue, it is important to assess how effectively this occurred in practice. The quality of dialogue generated in the video-conferencing sessions was of a high level, particularly after the first session once the participants had become more familiar with both the consultant and the technology. This may have had as much to do with group dynamics as with the technology:

> It was much better than I thought it was going to be. It is similar to how it is with live groups. You can get good live groups and awful live groups and I think this was a good group. They were very civil people apart from anything else. I thought it would be much harder than it was (BPR Consultant).
>
> I observed everyone participating in a very balanced way, very comfortably, and I think that [...] there was a lot of respect for the members of the group. They were respectful of each other's input because they came from various perspectives. I think the dialogue was very good and as they got better with the technology they were right into it. They were interested and involved (Moderator B).

The rapport created by the consultant with the group was another important factor, particularly in taking the participants through the "pain barrier" of the first session:

> I found from the onsite facilitation point of view, the first session was the most painful. Because they engaged with [the consultant], it made a big difference and you could really see the humor. You bantering back and forth with the group and them with you (Moderator C).

An important device used by the consultant here, apart from humor, was to have the names of the participants in front of her so that she could call on different members of

the BPR team. This made them realize that it was important to the consultant that they were present in the group:

> They weren't allowed to hide. [the consultant] would call their names and they would have to appear in front of the camera but they loved the attention (Moderator B).

The majority of participants felt that the video conferences were beneficial as it provided a sense of social presence which assisted with the generation of dialogue:

> I've never seen anything like that before so I thought it was pretty good to be able to see who you are talking to, I liked it.

Technology and technological barriers

Moderators reported initial participant discomfort with the video-conferencing technology. One aspect of this was related to problems with design of the learning environment:

> I would say there was discomfort, initially, and it was awkward [...] because of where the screen was placed and trying to see the screen [...] not knowing exactly where to look and [the consultant] was not really looking at us either because of the way the camera was positioned. But I did not get the sense that anybody was intimidated necessarily in speaking up (Moderator B).

Another aspect of the reported participant discomfort and resistance to initial engagement with the consultant related to the "newness" of the experience and perhaps a learning curve in terms of a lack of knowledge of how to behave in such a learning environment:

> I would say it was like a new experience or just awkwardness [...] I do not know if this was a product of the technology or just a product of getting to know [the consultant], but there was a resistance to really engage with her [...] But [...] over time, the technology became part of the background and it became a member of the group [...] she [the consultant] could have been another person in the room (Moderator A).

The initial discomfort was resolved over time through "learning by doing":

> [...] if there was an initial discomfort people had to face it and learn from it [...] [the consultant] really was very conscientious about establishing rapport, remembering people's names and making sure that each of them was called into the process [...] It was a very conscious attempt to engage the group at a personal level beyond dealing with the content of the training [...] She took every opportunity to give people positive feedback which reinforced her as a positive experience on the television screen (Moderator B).

Another means of allaying the initial discomfort was through taking action on formative evaluation questionnaires distributed at the end of each workshop:

> I think the fact that we had circulated these evaluation-type questionnaires [...] raised people's awareness that there may be limitations in technology but you can accommodate them in some way (Moderator C).
> The other thing that it [formative evaluation] helped me to do was to watch for certain things in the group and so the onsite facilitation was made more aware of dynamics such as power differences [...] this would give us some clues as to what to look for in the group and where I position myself in terms of facilitation at the table. I think that it is a mix of the onsite

facilitation and the on line facilitation that helped to overcome the barriers of her being at a distance (Moderator A).

The initial discomfort was also alleviated by the facilitation skills of the consultant and moderator, coupled with the positive facilitating team dynamics:

> [...] she was very gifted in this area and [...] she was able to transfer a highly developed facilitation skill from face-to-face easily to the technology (Moderator A).
>
> I feel that the communication back-up behind sessions was excellent. Write-ups and email from [the moderator] and the fact that I was on the [email] listserv., I knew what they were emailing to each other even though they did not always require a response from me [...] I felt part of it (BPR Consultant).

Two out of the 12 participants reported that the video-conferencing was a barrier to participation owing to audio time delays, limited picture quality, small screen image and problems with getting connected. One obvious way in which the video-conferencing experience can be unsuccessful is if the equipment required is not available or fails to deliver the material at the time and place demanded by the learner. This did occur in one of the workshop sessions, but a supporting technology was available in the form of a speaker phone (audio-conferencing).

Adaptations to facilitation compared to traditional workshops

Certain adaptations were required on the part of both the consultant and the moderator compared to traditional training sessions. The consultant found she had to slow down her pace and work harder and more consciously to engage participants:

> I was trying [...] to slow down [...] there is obviously a little time delay in what you say and how to respond [...] When you are in a room with people, you can actually pick up things that are going on in the atmosphere. I think I had to work a lot harder to try to sort out how people were feeling, bring people in, and to notice who was quiet and who was lively. I found that it was harder work and required more attention (BPR Consultant).

The moderator found that she had to act as the "eyes and ears" of the consultant and participants:

> [...] being an onsite facilitator but also knowing that [the consultant] was really presenting and was the real group facilitator was very different because I had to sort out where I placed myself in the group. I had to be able to see [the consultant] but I also had to see the group because I was her eyes and ears a lot of the time (Moderator A).

The moderators also had to anticipate the needs of the group:

> There were times when I would see people nodding or not nodding or see people not responding and try to ask a question in the group. It was not like I was totally facilitating the group by myself. I was doing it on behalf of somebody else trying to imagine what [the consultant] needed in order to relate to the group and what the group needed to relate to [the consultant]. So there was a lot of anticipating, which was a new role for me. I have never done that before. So that was a big adaptation (Moderator A).

There was an element of trust involved in this process:

> The other thing for me was in terms of the teaching part of it. I guess it was because it was video conferencing. We only had [the consultant] for a short period of time. If she was here, we would have had her as a resource person for the entire session. You really had to go on

trust that based on our discussion prior to that particular video conference that I would be able to carry the work through the next 2-3 hours after that. I did not have her there to just say "How's this? I've got a question here. I'm stuck." It was a little bit different that way (Moderator A).

Another important adaptation the moderators and consultant had to make was in terms of raising group awareness of the learning process:

I would say that I think that the two-handed match is important and the person who is "live" with the group, it is really important for them to give a commentary of what's happening [. . .] That can actually be an interesting device in regard to heightening the group awareness of process because quite often when you are in a direct presentation with the group, you are figuring out the process and you are absorbing it and making interventions but you actually don't comment where as [moderator] was doing that to me and would draw my attention to things. I actually think it was a rather clever device because it actually made the group think about process and possibly may have made them behave better. They knew [the moderator] was noticing them so they might have been more attentive (BPR Consultant).

Integration with the traditional workshop component and learning style

The video-conferencing component was time-tabled to fit with the consultant's schedule. Owing to the time zone difference the connection was made usually at the start of each session for up to one hour. Each session was planned jointly with the consultant to best advance the group in their BPR work and she received the minutes and any work completed (data collection plans, results of data collection, etc.) following each workshop. The consultant usually provided a high level introduction to the topic of the day, guidance on how to proceed, feedback on the work completed from the previous workshop and an interactive question and answer session. This appeared to combine well with the action-learning style adopted in the BPR project:

[. . .] although it was set up around your availability, and you probably wouldn't have done it that way if you had been here, for adult learners I would say it worked a lot better. The fact that it was learning as you go so each time [. . .] you might have presented something new or a new assignment but there was time in between to work on it. Whereas, if it had been all in a workshop, it would not have had the same relevance. It started out for one reason but it moved into something else. I think it was probably better (Moderator C).

Other technologies

On one occasion, when the video-conferencing failed, audio-conferencing proved a useful back-up technology but the visual aspect provided by video-conferencing made it a more powerful medium for generating dialogue. Again this may have had as much to do with the consultant and moderator's skills as with the technology:

One observation I made was that [the consultant] was able to connect well with the group when she could see them. For example, she would ask people where they were if they were not visible to her. I think this was a very positive aspect of her facilitation skills that would have been more difficult to achieve with just audio. We noticed that it was difficult for [the consultant] to pick up on these things [facial expressions, etc.] However, [the moderator] assumed a "translator role" of sorts in which she interpreted silences or nods, etc. for [the consultant] [. . .] I suppose you could do this in an audio conference but it would be awkward I think [. . .] While not perfect, I see benefits to using video over just audio (Moderator A).

On the occasion when audio-conferencing was used, a rapport had already been created between the BPR team and the consultant so there was a comfort level there:

> It [audio-conferencing] worked fine but was not as good as video-conferencing because you are denied the whole visual information that gives you, It worked out OK because we knew each other. I certainly would not have liked to have had that as my initial introduction to that group and would have preferred video-conferencing (BPR Consultant).
>
> I think there is something fundamental in terms of being recognized visually [...] which is just part of human nature. I think it is more powerful than working with speaker phones [...] (Moderator C).

Another technology employed with participants was Listserv., which was a new experience for many and to which several participants did not have access until well into the sessions. Many problems could not be anticipated prior to implementation but again a "learning by doing" approach was adopted. This was not as successful as the video-conferencing experiment; all participants felt that the list serve was not a very effective, efficient means of communication. The technology was seen as cumbersome, awkward and with too many technical problems. The most annoying problem was related to the incapability of word processing software packages, and difficulties with opening attachments:

> Technical problems [...] I think the big difference was we were dealing with different technologies, we were dealing with technologies within government [...] once you take things from outside government and you start to move them in or you start to move them out then that difference in technology was creating problems – mainly in how documents came across. You would get a document sent to you that everyone on the outside gave through just fine but for everyone within government it came back as gibberish [...] (Moderator A).

However, the listserv. provided a very quick means for the facilitators to circulate meeting agendas and work plans and for group members to receive input on data gathering instruments, etc. Because of time constraints on the part of the consultant, it was only possible to co-plan the next workshop agenda one-two days prior to the event. This necessitated access to a fast means of distribution.

Despite it's problems, the listserv. may have played a part in cementing feelings of group membership and it provided an important means for the consultant to remain up-to-date with the progress of the group:

> [...] it reinforced their sense of themselves as a group between meeting times [...] there is so much involved in other kinds of work activities, it would be easy to forget it had an identity as part of this group. To have the listserv. there and have the communications flowing back and forth kept them together as group members (Moderator B).

A listserv. has potential to provide a useful means of communication. However, this experience indicated some important hurdles to be overcome in order for it to become a successful communication tool. As a result of this experience the facilitators are now in a position to provide a better orientation to listserv. despite its complications. One benefit of the listserv. is that it requires very few human resources. As soon as an agenda is typed it can be immediately forwarded. Faxing information requires more human resources and time, both of which were limited in this project. Although fax as a means of communication was also available, most participants did not use this, although those who did were pleased with the speed and efficiency of the technology.

Cost effectiveness of video-conferencing

There were no capital costs in terms of outlay for use of the video-conferencing equipment in this project as it was available free of charge. The consultant also thought it was a more cost efficient use of her time and was easy to use:

> I could not have gone over there for that length of time. Being available over a 6-8 week period was probably more purposeful to their group in helping them to achieve their goals than going for one week. I think the cost benefit [ratio] was really good [...] I had no one to help me. I had one tutorial and I switched it on (BPR Consultant).

The moderators reinforced these comments:

> It would still have been more cost effective even if we had to pay for the long distance phone charges. This type of equipment has a wide range of uses which is an excellent way to make it very cost effective [...] It did not take much to run. We did have some help from our technical support person (communication between planners and PEI technical support was excellent) but he didn't need to help us much as it is quite easy to use. You do not need a big support team to run it (Moderator A).
>
> I think it is really cost effective. For us to have access to a consultant of [the consultant's] experience and to be able to fit it into your day, although it was a tight schedule [...] this is extremely cost effective. [the consultant] did not need to travel at all and this cuts down the costs (Moderator B).

Learning outcomes

The three main learning outcomes to be achieved by the end of this project were:

(1) for participants to develop an understanding of BPR;
(2) to recognize how it could be used to address the issue of pharmacy redesign; and
(3) to form an initial plan for this redesign.

Prior to the workshop series only one participant had used BPR methodology. Attitudes towards it were predominantly either skeptical or neutral at the beginning of the workshop series. All participants stated that their understanding of BPR methodology had improved as a result of workshop participation and felt that it was a worthwhile exercise. However, some drawbacks of the BPR methodology were noted. Most participants had some difficulties understanding and using the BPR methodology because the steps followed in the sessions were not always connected with the steps outlined in the book provided. Several participants felt that the process being redesigned was too large to be done efficiently in the amount of time allotted. They feel that it would have been much easier and beneficial to break the large process down into sub-sections and work those through the redesign process one at a time. All participants stated that they found the conceptual models very confusing and no one used them (outside of what was done in the sessions) in relation to the project.

Despite these drawbacks all participants felt that patient care would improve upon completion of this project and implementation of the pharmacy system and most felt that the BPR process helped to identify areas with potential for IT solutions. Overall, the majority of participants stated that they were satisfied with the learning outcomes from the project.

Conclusions

The quality of dialogue generated in the video-conferencing sessions was of a high level, particularly after the first session once the participants had become more familiar with both the consultant and the technology. This may have had as much to do with the establishment of an effective learning context, group dynamics and the skills of the consultant and moderator as with the technology, but there seems to be a requirement on the part of participants, at least in this learning situation, for visual stimulation to assist the learning process. Based on the experiences recorded certain recommendations can be made to enhance the use of video-conferencing. Some of these apply to any learning situation but others are more specific to the effective use of video-conferencing technology: establish rapport with participants; list participant names for use in encouraging engagement; resolve discomfort through "learning by doing" (if prior training is not feasible); distribute and act on formative evaluation questionnaires in each workshop, and developing positive facilitating team dynamics (it is an advantage if the consultant and moderator already have a close working relationship); the consultant should use a slower pace of training delivery and be prepared to work harder and more consciously to engage participants; the moderators should act as the "eyes and ears" of the consultant and participants; anticipate needs (and be aware that both are very helpful for raising group awareness of the learning process) and trust the consultant; connect ahead of time in case of technical problems; have a back-up system in place, e.g. audio-conferencing; beware of novelty value – stay focused on the task at hand; match technology with group size; use the technology to its full capacity, e.g. to present supporting materials; pay attention to integration with traditional sessions and chosen learning style; and restrict video-conferencing session to no more than one hour.

The "learning by doing" approach adopted with listserv. was much less successful than with video-conferencing. It proved to be a very cumbersome and awkward technology with too many technical problems to enable efficient and effective use. On a more positive note it may at least have helped feelings of group belonging and helped the facilitators to distribute information quickly with limited time and resources. The experience also helped identify problems that can now be avoided in the future. Participants who used faxes had no such complaints about the technology and some even indicated that it might have been a more appropriate choice than its more advanced e-mail cousin at certain stages in the learning process. It is recommended that the following steps be undertaken in future applications of listservs: ensure all participants are connected to e-mail and have been thoroughly orientated to e-mail prior to adopting a listserv. for group use; determine ability of participants' systems to accommodate attachments; establish clear guidelines for the use of the listserv., i.e. establish word processing package for attachments and guidelines for when to send messages to the listserv. versus individuals; avoid using colored ink and "fancy" backgrounds; provide training in the use of the listserv., i.e. advise users to use caution hitting the reply button (avoid sending a message to the whole group of which you intended for only one person), the listserv. subscribes an individual under one e-mail address so advise users to send only from that address, advise users to unsubscribe from the listserv. if an automated vacation message is used.

The employment of video-conferencing in the BPR workshop series was a cost effective solution to employing the services of an experienced BPR consultant. It also proved to be an effective use of the both the consultant's and participants' time. Video-conferencing is recommended as a cost effective technology solution for this type of learning situation.

Overall, the learning context was established successfully; key elements such as motivation, preparation, consideration of participant needs, support, feedback and relevant learning style were all in place. Recommendations for an even more successful establishment of the learning context in future workshops are: increase time for preparation between learning sessions; make facilitatory roles clear at the outset; undertake video-conferencing training for participants and facilitators prior to sessions; review the video-conferencing technology used in relation to group size; think about how the physical environment may affect the learning process.

The BPR workshop series attained its desired learning outcomes despite an initially somewhat skeptical audience. There were some problems raised with regard to confusion about the BPR methodology and conceptual models and these need to be addressed and redesigned prior to future workshop sessions. The findings of this study concur with those of Knipe and Lee (2002, p. 310), who reported on experiences of using video-conferencing technology in a university setting for a computer-based learning Master's programme:

> If video-conferencing is to be used efficiently and effectively then a good working relationship needs to be established and maintained between organizers at the local and remote sites. The students rely heavily on them to ensure that the video-conferencing equipment is operating properly, is set up correctly, is positioned effectively and that the room provides an environment that is comfortable, well arranged and ready to be used without having to move furniture.

However, they extend Knipe and Lee's (2002) recommendations in terms of the relationship between the human actors at the remote and local sites. In this study, the role of one of the moderators at the local site, who acted as "the eyes and ears of the consultant", was crucial to the effective use of the video-conferencing technology and the overall success of the BPR training workshops. It is argued that this is a crucial role in either training or education settings, which is helped if an established relationship between the local and remote site actors is in place prior to the video-conferencing event.

The main limitation of the research is the small sample size. Suggested areas for future research are: to explore how local moderators can be trained to work effectively with remote actors in video-conferencing scenarios; and to examine the implications for the effectiveness of the learning process in BPR and other training events stemming from the introduction of new video-conferencing technologies.

The main focus of this study is an evaluation of the use of video-conferencing in BPR workshops. It is not advisable to try to evaluate any learning technology in isolation from the learning context of which it is a part, hence the leaner-centered (rather than technology-centered) nature of the preceding discussion. Overall, it can be concluded that video-conferencing worked well in this particular learning context, proving to be a cost effective technology choice and assisting with the attainment of desired learning outcomes.

Notes

1. Bernadette Allen.
2. James Carr.
3. Anne McMurray (BPR consultant), Bernadette Allen (moderator and evaluator), Patsy Beattie-Huggan (moderator), Nishka Smith (moderator) and James Carr (evaluator).

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