"Breaking the rules": A reflective processual analysis of multidisciplinary academic collaboration

Cheryl A. Kier, Caroline L Park, and Kam Jugdev
Centre for Social Sciences,
Athabasca University, Athabasca, Canada

Authors' Contact Information

Cheryl A. Kier, (corresponding author)
Athabasca University, Centre for Social Sciences,
1 University Drive, Athabasca, Alberta, Canada T9S 3A3.
email: cherylk@athabascau.ca

Caroline Park,
Athabasca University, Centre for Nursing and Health Studies,
Athabasca, Alberta, Canada

Kam Jugdev,
Athabasca University, Faculty of Business,
Athabasca, Alberta, Canada

Abstract:

Three academics from different fields collaborated on a study in which we reflected on our group involvement. Although we originally worked together to provide our different perspectives on how to use debates in online courses, we found that our multidisciplinary collaboration evolved into self-study as we each wrote narratives about our own participation which we then discussed and interpreted from our unique perspectives. Despite the fact that our members consisted of someone from nursing, someone from business, and someone in psychology, we all agreed that we engaged in a successful collaboration, as assessed by our desire to work together again and by the joint publication of an article. This paper presents our individual and collective interpretations of our attempts to understand why we were successful in this project, even though we did not follow most of the principles of multidisciplinary collaboration, nor of the usual conventions of our respective disciplines.

Key Words:

Introduction

Innovations often require thinking outside of conservative convention,, as the literature of innovation management (Garcia & Calantone, 2002), management (Crossan & Apaydin, 2010) and strategic management (a subset of management) (Markides, 1997) points out.

> By breaking the rules of the game and thinking of new ways to compete, a company can strategically redefine its business and catch its bigger competitors off guard. The trick is not to play the game better than the competition but to develop and play an altogether different game (Markides, 1997, p. 9).

In "breaking the rules" of conventional thinking and practice, individuals, teams, and organizations can develop unique and creative products, services, or plans of action (strategies). For example, according to FastCompany (2012), Apple remains the most strikingly innovative company (FastCompany, 2012). continuing to disrupt the market by developing new products that competitors cannot keep up with.

In this paper we present an interpretation of our multidisciplinary collaboration on a small qualitative study which was on the use of the debate as an instructional teaching tool in our respective distance education courses (Park, Kier, & Jugdev, 2011). The goal of this paper is to focus on our collective and individual reflections of the effectiveness of our collaborative efforts. The scope of this paper excludes a review and interpretation of the pedagogy on debates as an instructional method. We begin with an explanation of our motivations to engage in collaborative research followed by a brief literature review of multidisciplinary teams. We then discuss our unconventional methodology, in which we we found that we had inadvertently broken conventional rules of collaboration, our analysis of results, and conclusions.

Biographies

Cheryl A. Kier is an Associate Professor of Psychology in the Centre for Social Sciences at Athabasca University. Her research interests are in the psychology of families and in ways to improve online classes. She has also developed a recent interest in qualitative collaborations.

Caroline L. Park is an Associate Professor and Chair of Graduate Programs in the Centre for Nursing and Health Studies at Athabasca University. Her research interests are in mobile technology to improve clinical education experiences and interdisciplinary research teams. She is interested in creative ways to engage online students in graduate studies.

Kam Jugdev is a Professor of Project Management and Strategy in the Faculty of Business at Athabasca University. Her research interests span project management as a source of competitive advantage, project lessons learned, communities of practice, and project management education.

Background: Motivation to collaborate

Although we each assigned debates in our online courses, which was the original reason for our getting together, since we come from different disciplines and teach different types of courses, each of us came to this idea from different viewpoints..

Cheryl's participation began when a colleague overheard her thank Kam for presenting ideas about online debates, a technique that Cheryl had also used in designing a course. This colleague suggested that the three of us get together to share and compare ideas. Thus a productive partnership was born. Kam joined because she enjoyed collaborative research because she greatly respected the colleague who suggested the three of us collaborate on examining our approaches to online debates. She also valued an interdisciplinary approach and looked forward to hearing the perspectives of others from different fields. For Caroline, one of her sidelines of research is studying interdisciplinary research teams. The thought of the triangulation of three female academics' experiences of using debate in online education appealed to her. She believed our diversity in backgrounds could be very instructive.

At first we thought that we differed in numerous ways. Caroline instructs graduate students in nursing courses, Kam works in the MBA program, and Cheryl teaches undergraduate psychology students. Caroline and Cheryl received their PhDs in the 1990s and Kam in 2003. Among us we spanned the roles of assistant, associate, and full professor. We also differed in our levels of experience with qualitative and quantitative research. Two of us live in Calgary, while one resides in Winnipeg.

Despite our differences in disciplines, goals, and backgrounds, over time we found we had much in common as well. We are all female, middle-aged academics who work at the same distance university and are involved in writing and delivering online courses. We shared a desire to be innovative as a way to enhance student learning, and a wish to improve critical thinking among our students. We also shared an interest in the value of debate as an instructional/learning tool, and in group work and the collaborative process.

A review of the advantages and challenges of multidisciplinary teams

"Collaborative-research teams have the potential of addressing complex social problems by bringing together researchers with different expertise and perspectives" (Ritchie & Rigano, 2007). In this paper we have called ourselves a multidisciplinary team because we each come from different disciplines and joined these disciplinary perspectives to think about online debate. There is much in the literature on terms that refer to the integration of discipline-specific knowledge such as interdisciplinary and transdisciplinary. We will know through our analysis of the outcomes of this work whether our project demonstrated a summative recitation of discipline-specific knowledge (multi-disciplinarity) or whether we became interdisciplinary and connected as we integrated and modified our knowledge into a collective idea. We were not aiming to achieve trans- disciplinary knowledge, but we were open to that possibility. In our process we developed a unique holistic outcome blending perspectives from three fields into something new, different from our disciplines.

The National Science Foundation in the U.S. (2011) reported that multidisciplinary, collaborative research, which is on the rise and contributes to team solidarity (Ritchie & Rigano, 2007), as the way of the future of research in the social, behavioral, and economic sciences. MacEachern (2009) pointed out, "Much attention is paid to collaborative research in Canada these days" (p. 1) . It is being encouraged as a way to ensure funding (Dodson et al., 2010), and is said to accomplish things that cannot be done by individual researchers alone (Bellanca, 2009). As stated by Surowiecki (2004), "Under the right circumstances, groups are remarkably intelligent, and are often smarter than the smartest people in them" (p. xiii) . Several universities are creating interdisciplinary departments, including the University of British Columbia in Vancouver, Canada, the Centre for Interprofessional Education and Research at St. Louis University, St. Louis, Missouri, U.S.A., and the Faculty of Health and Social Care, Centre for Learning and Workforce Research at the University of the West of England in Bristol, United Kingdom (Park, 2008). Thus it is important for researchers interested in in multidisciplinary research to know what is involved in this research and how to conduct it.

The literature tends to suggest that while interdisciplinary teams can be worthwhile, there can be sacrifices and costs associated with it. These include time (Berry, 2011; Choi & Pak, 2007; Naiman, 1999; Ratcheva & Vyakarnam, 2001; Stokols, Misra, Moser, Hall, & Taylor, 2008; Weaver, 2008), institutional attitudes (many prefer disciplinary work rather than interdisciplinary work) (Boden & Borrego, 2011; Lin, 2008), and sometimes publication record and career advancement (Choi & Pak, 2007; Kessel & Rosenfield, 2008; Rhoten & Pfirman, 2007).

Stokols et al. (2008) claim, "Even proponents of team science initiatives note that they are highly labor intensive; often conflict-prone; and require substantial preparation, practice, and trust among team members to ensure a modicum of success." (p. 3). Park (2008) agreed, and indicated that "Experience has shown that most group activity is fraught with difficulties." (p. 282). So what makes for successful multidisciplinary teams?

Successful collaborations

Developing and maintaining successful collaborative research teams involves an awareness of individual strengths and abilities as well as group processes. Thompson (2009) believes that "collective communication competence" (p. 278) is key to successful interdisciplinary group work. She described a case study of one such team that she observed for four years. Time together was one of the vital ingredients she found helpful to group communication. While face-to-face meetings may not be necessary, as long as groups communicate electronically or by some other means (Choi & Pak, 2007), there can be challenges associated with virtual groups. In the literature on virtual groups, some have objected that electronic communication could never replace face-to-face meetings or the casual encounters that people have when they share a place of work. Ratcheva and Vyakarnam (2001) claim that when meetings are held via computer, there are fewer exchanges of information and it takes longer to make decisions compared to in-person meetings (Ratcheva & Vyakarnam, 2001). This may be partly due to the lack of non-verbal cues (Olson & Olson, 2000; Ratcheva & Vyakarnam, 2001; Stokols et al., 2008).

A second factor touted by Thompson (2009) was trust. This was also emphasized by several other researchers (Klein, 2008; Violina, 2009; Wagner et al., 2011; Weaver, 2008). Difficulty in developing trust is one of the reasons Bercovits and Feldman (2011) argue against teams working at a distance. They claim that such teams are less productive (although they do not describe what they mean by this) because it is harder (more costly) to arrange meetings and to exchange knowledge and ideas. They argue that without face-to-face meetings, teams will not be able to get to know one another well enough to develop trust and smooth working relationships. Stokols et al. (2008) suggest that because trust is such an essential component in group work, meeting face-to-face before beginning to work together is a good idea (Stokols et al., 2008). Ratcheva and Vyakarnam (2001) argue that non-verbal cues may help people bond and develop trust. Although they recognize the importance of electronic communication, Choi and Pak (2007) claim that team members can make optimal use of information and communication technology/tools if they already know one another (Choi & Pak, 2007).

Thompson (2009) reported that developing a balance between social talk and task-talk was important for smooth group work. This was similar to "backstage communication" (Thompson, 2009, p. 288), in which members' ability to step back from the task at hand and discuss other issues or topics helped increase feelings of connectedness in the group. Humor was useful to diminish anxiety and to increase group cohesion.

Thompson (2009) also discussed the importance of "demonstrating presence," which she described as involving "an expressed motivation to learn, listen, and see the world differently through engagement in collaborative learning experiences" (p. 287). This kind of receptive presence may be seen as similar to the online teaching model of the community of inquiry wherein the educational experience is based on social, cognitive, and teaching presence (Garrison, Cleveland-Innes, & Fung, 2010).

According to Thompson (2009), a major negative impact on group communication is an ego-based "jockeying for power" (p. 292)., in which individuals try to assert their own superiority to another member. Thompson wondered if gender issues played a role in the example she gave, but she did not have enough information to pursue this line of inquiry further in her paper. Another obstacle to the communicative success of the group included different degrees of "debating expertise" (p. 290), which Thompson thought was related to team members' insecurity and need to protect their egos. Unspoken jealousies and perceived threats to someone's position can undermine group commitment (Park, 2008).

Importance of proper technology

Although Olson and Olson (2000) argue against groups working at a distance, some of the issues they raise may no longer be relevant. For example, Olson and Olson reported that when remote groups had visual as well as auditory connections, their productivity was no different from face-to-face groups. Access to this technology is much more common today, and the quality has greatly improved as well. Stokols et al. (2008) stress the importance of well-functioning technology in order for meetings to run

smoothly (Stokols et al., 2008). However, Freedman suggested that "Our bias toward groups is counterproductive. And technology is making the problem worse" (Freedman, 2006).

Majchrzak, Malhotra, Stamps, and Lipnack (2004) believe that virtual teams can work more efficiently than face-to-face ones. The availability of electronic communication and heightened awareness of the need to communicate clearly can reduce some barriers of face-to-face meetings such as expecting all the work to be done at the meeting itself and feeling the need to show "excessive politeness" (p. 134) .

Strategies for multidisciplinary research teams

Strategies for building multidisciplinary research teams involve individual abilities as well as the team's collective efforts.

Individual adaptability and openness are characteristics of effective interdisciplinary team members (Stokols et al., 2008), as is what van Rijnsoever and Hessels (2010) call "global innovativeness" (p. 465). They define the term as meaning "the degree to which an individual is receptive to new ideas and makes innovation decisions independently of the communicated experience of others" (p. 465). They found that individuals with this trait are more likely than others to collaborate within disciplines, but not among disciplines. Surowecki also stresses that "independence of the influence of others" (p. 47) enables each member can contribute from his/her own perspective, including background knowledge, interpretative abilities, and analytical skills, thus avoiding the pitfall of groupthink.

Appreciating the diverse perspectives of scholars from different disciplines may be crucial to the success of interdisciplinary teams (Pohl & Hadorn, 2008; Stokols et al., 2008)and can be very motivating for researchers (Park, 2008). Good communication may be a way to help understand diversity (Stokols et al., 2008). Researchers seemed to agree that the development of trust and connection tend to be more challenging in interdisciplinary teams than in other teams, so it may require more time and effort. Teams can strive to engage in functional conflict (if necessary) versus dysfunctional conflict. In functional conflict, members may be dissatisfied with each other, yet the conflict enhances the performance goals of the project because it has not turned into personality clashes (Larson & Gray, 2011).

Guidelines for successful outcomes

Frequency counts of publications and other quantitative measures are only a partial measure of the success of interdisciplinary work (Choi & Pak, 2007). Webster (2008) found that virtual teams were more "successful" than face-to-face teams in that members were more satisfied with the process and results. This was due partly to the perceived greater flexibility and freedom of virtual teams, and partly due to the ability to work from home and balance their time. When Bercovits and Feldman (2011) undertook empirical analysis of over a thousand teams reporting "invention disclosures" (p. 84) , they found no evidence that geographic distance played a role in the number of patents applied for and actually was correlated with a larger amount of royalties generated.

However, it is important to note that these may not be the criteria for success of other virtual teams. In fact, Surowiecki (2004, p. 281) claims achieving "wisdom" is a successful outcome.

Methodology

Along the lines of other research teams that focused on the process of collaboration as a tenet to their methodology (Woods, Boyle, Jeffrey, & Troman, 2000), we collaboratively discussed and interpreted our reflective narratives of our team work. In our prior collaboration on the debate as an instructional learning tool, we used a narrative approach whereby we held a series of meetings by phone and followed these with individual written narratives on our respective uses of the debate. Our reflective narratives addressed the pedagogical purposes of the debate for our courses, including learning outcomes and the process each of us went through to teach course concepts using this technique. We each wrote one-page narratives on our personal stories of how and why we became members of this collaboration and then we examined ways we each used the debate. We used a similar approach in this paper in that we combined teleconferences with written reflections.

During our initial teleconferences, we agreed that what we were doing was analyzing ourselves. At first, we did not realize the extent to which we would end up doing so. For the current paper, however, we focused on the process of collaboration. We iteratively interpreted our collaboration and discussed the similarities and differences. As we reflected on other collaborations, we concluded that despite good intentions, initiatives can falter unless subsequent meetings are pre-arranged, and a commitment demonstrated to follow through (e.g., with making the contributions agreed to).As we analyzed our first narratives, we agreed a process on what we would do next, and we prescheduled our next meeting.

We discussed our prior experiences in collaborative research and began to share more about ourselves as people. We talked about how hard it can be to develop an interdisciplinary team of researchers, the challenges of simply sharing our writing with others, let alone collaboratively writing a paper. We agreed that our narratives were our data and we noted that what we were doing was a case study of our process. We talked becoming more comfortable with trying methodological approaches outside of our respective comfort zones.

To exemplify, in our prior study, we had used the term "mash up" to describe one part of our data analysis. A mash up originates from computing sciences and refers to "a web application that is developed by composing content or data, application logic, and user interfaces originating from disparate web sources" (Yu, Benatallah, Casati, & Daniel, 2008, p. 45). This word has morphed in the music scene to mean blending two pieces of music into an original new product, but in our case, we used this term to refer to the way we pulled content into our narratives. We used our written narratives about debate, our verbal discussion on teleconference, and our qualitative findings from each of our debate experiences to create one new blended presentation. During our conference call about this, we discussed that Cheryl had made a huge leap forward in her qualitative approach to the mash up, which Cheryl attributed in part to her overall enjoyment with writing. Caroline's narrative, which flowed smoothly from idea to idea,

had the coherence of a strong academic paper (minus the references). . Kam indicated that she really struggled with the mash up. As a relatively structured, linear person, she first used the Internet to try to understand what kind of a qualitative approach this was. She interpreted the mash ups as reflecting the "world views" of each team member. She questioned whether she had done it "correctly" or not. In doing so, her narratives also reflected her feelings about the process. Since Kam's area of expertise is in project management, she was most comfortable taking a step-by-step methodical approach to research projects.

After several telephone call meetings and narrative exchanges, we felt that we had created something that would be useful to others. Our work on using debates in online teaching was published. Because we had enjoyed working together, we met again to reflect on the process we had undertaken.

Individual interpretations of our collaboration: Breaking rules

We decided to interpret our multidisciplinary teamwork from a disciplinary perspective. Kam's interpretation of our collaboration follows and is based on a strategic management and project management lens. This is followed by Caroline's perspective from nursing, and Cheryl's psychology-based interpretations.

Kam's interpretation: A strategic and project management perspective of multidisciplinary collaboration

As we were discussing our team work processes, I thought of Mintzberg's classic book "Strategy safari: A guided tour through the wilds of strategic management" (Mintzberg, Ahlstrand, & Lampel, 1998). Mintzberg, who takes a more fluid and freer form approach to strategy than is typical, helped provide a framework to view our teamwork as an emergent strategy that involved considerable reflective learning, as well as learning by sharing ideas with each other.

I was more familiar with the more methodical steps of project management whereby a project is initiated, planned, executed, and closed. Our current collaboration did not follow this traditional sequence. Although each team member may have had an individual plan of the direction we seemed to be heading, we did not have such an agreed upon plan at the outset, but we had come to the table with open minds and a willingness to try something different. For example, my experiences in collaborative research involved keeping notes and a clear identification of the tasks that each person was working on. In my discipline-specific collaborations, team members worked sequentially more than they did concurrently. In contrast, the process on this research project involved discussing our next steps by phone but not always documenting them clearly for everyone to see. This process strongly emphasized concurrent work whereby after each meeting, all three of us wrote our individual interpretations, shared them with each other before the next meeting, and then discussed the interpretations at the next meeting. Although I felt somewhat uncomfortable with this approach because it lacked the structure and clarity that I was used to, I was willing to try it. We were also introduced to different research terms and discourse than we were used to(e.g., case study, interpretive analyses, and triangulation); for example while no one on the team

had used mash ups before, yet when Caroline mentioned it, all three were willing to try it.

To summarize, as a team, we used an emergent strategy. We experienced new terms and approaches to the study and throughout, were willing to give the process our best efforts.

Caroline's interpretation: The right circumstances for multidisciplinary research perspective

When I read Kam's perceptions of what our interdisciplinary process meant to her as a professor of project management, I thought, "Wow! This is what we really mean about different perspectives." I have been reading and thinking about multidisciplinary research for a few years now and at the beginning of this process with Cheryl and Kam, I attempted to bracket everything I had learned so that we could just evolve as a team, without someone always saying, "Well, this is what *they* say." I did not want to lead or drive this process. Now, as we reflect and analyze individually about the process, this must be the time for me to bring in the ideas in the brackets.

Taking the headings from a chapter I wrote several years ago, I began to review/analyze our process (Park, 2008).

Building the team

I had stated that usually an individual begins as a leader of the group and facilitates the group's encounters. This person engages in team building, which is an important process for multidisciplinary research groups, yet is difficult to accomplish because group members are so different from one another .

It is also evident that teams may need to work on issues regarding how they work together, given their different backgrounds. For example, disciplines may conflict on whether to use qualitative or quantitative techniques (Thompson, 2009). Terms and definitions are often different, so these must be discussed and understood. It helps if each team member is familiar with what the other disciplines can bring to the table (Choi & Pak, 2007).

I suggested that "rules of engagement" (Park, 2008, p. 289) may need to be set before a team begins working together, although Barry, Britten, Barber, Bradley, and Stevenson (1999) believe bonding and confidence building should be established first.

Reflexive strategies can be used to explore the anxieties of group members, their expectations, ways of working, and hopes for the group (Savin-Baden, 2004). I encouraged such reflection, as it helps individuals to learn not only others' perspectives, strengths, and weakness, but to become more acquainted with their own, as well. Here is how I emphasized the importance of reflection:

> The utilization of reflexive practices such as shared written personal perspectives on the research topic, shared reflection about process and findings, and aggregated interpretation within such multidisciplinary research groups, holds the highest potential to establish the 'right circumstances' for successful outcomes and experiences (p. 282).

Similarly, Thompson (2009) encouraged "reflexive talk" (p. 287) as a successful ingredient in teamwork . She found that such discussions helped the team maintain trust and self-confidence, and may have prevented groupthink. In the group she observed, it also helped prevent conversations from becoming argumentative.

In our current experience, we had one member who had little experience in qualitative research and there was some review of terminology needed, but her questions were important in helping us focus on our own design.

Choosing a research question and developing a proposal

Defying what I had argued in my chapter, we did not have a research question until the end, when we tried to put all of our narrative and analysis into a research document. We looked for appropriate journals for publication after we were finished. Because we generated the data as we went along, there was really no possibility of a quantitative work.

Collecting the data

My chapter had suggested that during data collection, there should be continuous checks that the group members are communicating effectively, that research goals are agreed upon, that group members are clear on their respective roles and responsibilities, and regularly aware of the progress being made by all involved to complete the study successfully. "None of [this] can be taken for granted" (Mountz, Miyares, Wright, & Bailey, 2003, p. 43). Our current team did discuss and negotiate continually. Indeed, we taped our discussions and included some of the points of discussion as data. We all had the same roles, but we negotiated method. Analyzing and making meaning of the data

In my chapter I emphasized that each person should review and analyze the data individually before the group members come together to develop collaborative meaning from the data. Simply reaching consensus may be insufficient, as the collective creative thinking and knowledge sharing process can lead to an outcome greater than that of the individual contributions. The aim is to achieve "'communitas,' making meaning" (Park, 2008, p. 291). Negotiation of understanding(s) occurs, as members discuss their perspectives based on their unique academic backgrounds.

As a team, the three of us did review and analyze data individually before bringing our interpretations together. We created as many "meanings" as we could and negotiated a consensus. In fact we are doing that again in our explanation of the process through individual analysis and joint conclusion.

Writing, reporting and disseminating the results

Stokols et al. (2008) suggest decisions regarding roles and authorship should be decided at the start of the project to avoid disagreement later (Stokols et al., 2008). Alas, we did not discuss authorship until the end. It was felt that one participant had driven the process, while trying not to, and was thus assigned first authorship. Our writing was long and to some extent tedious but it was collaborative. The drafts went around and around and we all added, deleted and edited.

In sum, despite what I had written earlier, we did not necessarily have the "right" circumstances for multidisciplinary teamwork. Upon reflection, our group process was

only partially like what I had written about. We came together serendipitously without any idea that we would collaborate. We had no formal leader; in fact, leadership moved back and forth over time. We did not set out any rules nor discuss roles or authorship at the beginning. We did, however, talk and write about who we were, and why we had used debate in our courses.

Cheryl's interpretation: A scientific interpretation of multidisciplinary collaboration

Throughout my career in psychology, I have been reminded that psychology works hard to be taken seriously as a science (Tavris & Wade, 2003). I have abided by the assumptions inherent that the scientific method used in psychology is the same one used in chemistry, physics, biology, and other natural sciences. I have always tried to remain objective (Cowens, 2006), detached from the subject of study (Smith & Davis, 1997), and value-free (Glesne & Peshkin, 1992). It is quite different for me, therefore, to be reflecting on the process in which I am the participant. The scientific method assumes that causal effects exist and can be found by measuring objective variables (Smith & Davis, 1997). Yet we had nothing to measure in our group discussions. Our reflections were quite subjective; each of us had our own interpretations of what we were doing. Replication of effects is important for a science, as is assessing the validity of measures (Golafshani, 2003). Replication and validity were irrelevant in what we did. Our own thoughts were the object of scrutiny; how could these be replicated or assessed? Generally statistics of some sort (descriptive and/or inferential) are used to support the findings (Golafshani, 2003), but again this was irrelevant to our work. One of the criticisms that research psychologists have about Freud's theories, for example, is that they are not subject to empirical test (Tavris & Wade, 2003). Our reflections certainly couldn't be tested empirically!

The scientific method involves a series of steps in which the researcher must decide on a problem to solve or make an observation, develop a hypothesis, test the hypothesis by recording observations, and then draw a conclusion (Cowens, 2006). We did not develop a hypothesis in advance, nor did one really develop until near the end of our work together. There was little to observe, although I suppose one could argue that we were observing our own thoughts. We recorded them on paper, but I'm not sure an empiricist would be able to subject them to frequency counts or intensity levels. We did not provide operational definitions for anything. In fact, this caused some difficulty for Kam who felt uneasy not knowing exactly what a mash up was. It was not possible to revise or replicate our thoughts, so in the end, we did not follow the rules of a scientific study.

However, I believe the three of us would describe our multidisciplinary virtual group as successful both in process and in outcome; we produced a joint paper relating our integrated perceptions and practices with online debate, and we all enjoyed the process, agreeing that we would like to collaborate again in the future.

Conclusion

Although we are all experienced academics and are familiar with strategy and project management, the right circumstances for multidisciplinary research, and the

scientific method, in this collaboration we did not follow the protocols set by any of these areas. And yet, we experienced successful teamwork and successful outcomes. The literature suggested that interdisciplinary teams involve a large number of barriers, yet we were all willing to give our time and effort to this project, and were willing to work with any limitations we experienced or found.

Although several authors suggested that trust building was required or vastly improved by holding face-to-face meetings, we managed to build trust despite our meetings being held at a distance. We never conducted any face-to-face meetings and did not know one another well before the collaboration. Before working together on the online debate project, Caroline and Kam had been on a couple of committees together, and Kam and Cheryl had been to a few group lunches and workshops in common. Caroline and Cheryl had met once, but Caroline did not even remember this meeting. As a group we did not follow the elements of good strategy as described by Mintzberg (1998). We did not have a solid plan to follow, we were not very structured in documentation or other aspects of our project, and we worked concurrently as well as sequentially.

Although a review of the literature revealed that multidisciplinary groups work best if there is a leader to encourage diversity of opinions and to encourage the group, we did not have one. We did not set "rules of engagement" Park (2008p. 289) at the start, so there was no negotiation of roles, division of labour, or the process of our working together.

The scientific method was not followed, and the data were qualitative rather than quantitative.

How can successful interdisciplinary teams be characterized?

In a preliminary sense, we posit that effective interdisciplinary collaborations involve a combination of the individual attitudes and behaviors of members with the group process activities.

We believe that our team was successful and transdisciplinary because we developed a holistic outcome from three disciplinary perspectives about the value of online debate that is blends our perceptions in unique ways, into something that was not known before, yet belongs to none of our disciplines alone.

Our recommendations to other collaborative teams would be to "break the rules." Do whatever brings your team together and everyone's individual ideas into a coherent whole. Work with people who share your work ethic and your openness. Trust and honest communication will follow.

References

Barry, C. A., Britten, N., Barber, N., Bradley, C., & Stevenson, F. (1999). Using Reflexivity to Optimize Teamwork in Qualitative Research. *Qualitative Health Research, 9*(1), 26-44. doi: 10.1177/104973299129121677

Bellanca, L. (2009). Measuring interdisciplinary research: analysis of co-authorship for research staff at the University of York. *Bioscience Horizons, 2*(2), 99-112. doi: 10.1093/biohorizons/hzp012

Bercovitz, J., & Feldman, M. (2011). The mechanisms of collaboration in inventive teams: Composition, social networks, and geography. *Research Policy, 40*(1), 81-93. doi: 10.1016/j.respol.2010.09.008

Berry, G. R. (2011). Enhancing Effectiveness on Virtual Teams. *Journal of Business Communication, 48*(2), 186-206. doi: 10.1177/0021943610397270

Boden, D., & Borrego, M. (2011). Academic departments and related organizational barriers to interdisciplinary research. *Higher Education in Review, 8*, 41-64.

Choi, B., & Pak, A. W. (2007). Multidisciplinarity, interdisciplinarity, and transdisciplinarity in health research, services, education and policy: 2. Promotors, barriers, and strategies of enhancement. *Clinical & Investigative Medicine, 30*(6). Retrieved from http://cimonline.ca/index.php/cim/article/view/2950

Cowens, J. (2006). The scientific method. *Teaching PreK-8, 37*(1), 42-45.

Crossan, M. M., & Apaydin, M. (2010). A Multi-Dimensional Framework of Organizational Innovation: A Systematic Review of the Literature. *Journal of Management Studies, 47*(6), 1154-1191.

Dodson, M. V., Guan, L. L., Fernyhough, M. E., Mir, P. S., Bucci, L., McFarland, D. C., . . . Jiang, Z. (2010). Perspectives on the formation of an interdisciplinary research team. *Biochemical and Biophysical Research Communications, 391*(2), 1155-1157. doi: 10.1016/j.bbrc.2009.11.040

FastCompany. (2012). The world's 50 most innovative companies Retrieved February 27, 2012, from http://www.fastcompany.com/most-innovative-companies/2012/full-list

Freedman, D. H. (2006, February 15). What's next? The idiocy of crowds. *Inc.com*, from http://www.inc.com/magazine/20060901/column-freedman.html

Garcia, R., & Calantone, R. J. (2002). A critical look at technological innovation typology and innovativeness terminology: A literature review. *Journal of Product Innovation Management, 19*(2), 110-132.

Garrison, D. R., Cleveland-Innes, M., & Fung, T. S. (2010). Exploring causal relationships among teaching, cognitive and social presence: Student perceptions of the community of inquiry framework. *The Internet and Higher Education, 13*(1–2), 31-36. doi: 10.1016/j.iheduc.2009.10.002

Glesne, C., & Peshkin, A. (1992). *Becoming qualitative researchers: An introduction*. White Plains, NY: Longman.

Golafshani, N. (2003). Understanding reliability and validity in qualitative research. *The Qualitative Report, 8*(4), 597-607. Retrieved from http://www.nova.edu/ssss/QR/QR8-4/golafshani.pdf

Kessel, F., & Rosenfield, P. L. (2008). Toward Transdisciplinary Research: Historical and Contemporary Perspectives. *American Journal of Preventive Medicine, 35*(2, Supplement), S225-S234. doi: 10.1016/j.amepre.2008.05.005

Klein, J. T. (2008). Evaluation of Interdisciplinary and Transdisciplinary Research: A Literature Review. *American Journal of Preventive Medicine, 35*(2, Supplement), S116-S123. doi: 10.1016/j.amepre.2008.05.010

Larson, E. W., & Gray, C. F. (2011). *Project management: The managerial process* (5th ed.). New York, NY: McGraw-Hill.

Lin, H. (2008). Opportunities and Challenges for Interdisciplinary Research and Education. *Journal of Natural Resources and Life Sciences Education, 37*, 83-92. Retrieved from http://cropsoil.psu.edu/documents/lin/lin-2008-idre.pdf

MacEachern, A. (2009). Learning to do collaborative research. *University Affairs*. Retrieved from http://www.universityaffairs.ca/learning-to-do-collaborative-research.aspx

Majchrzak, A., Malhotra, A., Stamps, J., & Lipnack, J. (2004). Can Absence Make a Team Grow Stronger? [Article]. *Harvard Business Review, 82*(5), 131-137.

Markides, C. (1997). Strategic innovation. *Sloan Management Review, 38*, 9-24.

Mintzberg, H., Ahlstrand, B., & Lampel, J. (1998). *Strategy safari: A guided tour through the wilds of strategic management.* New York, New York: The Free Press.

Mountz, A., Miyares, I., Wright, R., & Bailey, A. (2003). Methodologically becoming: power, knowledge and team research *Gender, Place and Culture, 10*(1), 29-46. doi: 10.1080/0966369032000052649

Naiman, R. J. (1999). A Perspective on Interdisciplinary Science. *Ecosystems, 2*(4), 292-295. doi: 10.1007/s100219900078

Olson, G. M., & Olson, J. S. (2000). Distance Matters. [Article]. *Human-Computer Interaction, 15*(2/3), 139-178.

Park, C., Kier, C., & Jugdev, K. (2011). Debate as a learning tool. *Canadian Journal of Learning and Technology 37*(3), 1-17.

Park, C. L. (2008). The right circumstances for multidisciplinary research. In P. Liamputtong & J. Rumbokd (Eds.), *Knowing differently: Arts-based and collaborative research* (pp. 281-295). NB: Nova Scotia Publishers, Inc.

Pohl, C., & Hadorn, G. H. (2008). Methodological challenges of transdisciplinary research. *Natures Sciences Sociétés, 16*(2), 111-121. doi: 10.1051/nss:2008035

Ratcheva, V., & Vyakarnam, S. (2001). Exploring team formation processes in virtual partnerships. *Journal of Manufacturing Technology Management, 12*(6/7), 512-523.

Rhoten, D., & Pfirman, S. (2007). Women in interdisciplinary science: Exploring preferences and consequences. *Research Policy, 36*(1), 56-75. doi: 10.1016/j.respol.2006.08.001

Ritchie, S. M., & Rigano, D. L. (2007). Solidarity through collaborative research. [Article]. *International Journal of Qualitative Studies in Education (QSE), 20*(2), 129-150. doi: 10.1080/09518390601159610

Savin-Baden, M. (2004). Achieving reflexivity: moving researchers from analysis to interpretation in collaborative inquiry. *Journal of Social Work Practice, 18*(3), 365-378.

Smith, R. A., & Davis, S. F. (1997). *The psychologist as detective.* Upper Saddle River, NJ: Pearson.

Stokols, D., Misra, S., Moser, R. P., Hall, K. L., & Taylor, B. K. (2008). The Ecology of Team Science: Understanding Contextual Influences on Transdisciplinary Collaboration. *American Journal of Preventive Medicine, 35*(2, Supplement), S96-S115. doi: 10.1016/j.amepre.2008.05.003

Surowiecki, J. (2004). *The wisdom of crowds.* New York, NY: Random House/Doubleday.

Tavris, C., & Wade, C. (2003). *Psychology* (7th ed.). Upper Saddle River, NJ: Pearson.

Thompson, J. L. (2009). Building Collective Communication Competence in Interdisciplinary Research Teams. [Article]. *Journal of Applied Communication Research, 37*(3), 278-297. doi: 10.1080/00909880903025911

van Rijnsoever, F. J., & Hessels, L. K. (2011). Factors associated with disciplinary and interdisciplinary research collaboration. *Research Policy, 40*(3), 463-472. doi: 10.1016/j.respol.2010.11.001

Violina, R. (2009). Integrating diverse knowledge through boundary spanning processes – The case of multidisciplinary project teams. *International Journal of Project Management, 27*(3), 206-215. doi: 10.1016/j.ijproman.2008.02.008

Wagner, C. S., Roessner, J. D., Bobb, K., Klein, J. T., Boyack, K. W., Keyton, J., . . . Börner, K. (2011). Approaches to understanding and measuring interdisciplinary scientific research (IDR): A review of the literature. *Journal of Informetrics, 5*(1), 14-26. doi: 10.1016/j.joi.2010.06.004

Weaver, T. E. (2008). Enhancing multiple disciplinary teamwork. *Nursing Outlook, 56*(3), 108-114.e102. doi: 10.1016/j.outlook.2008.03.013

Woods, P., Boyle, M., Jeffrey, B., & Troman, G. (2000). A research team in ethnography. [Article]. *International Journal of Qualitative Studies in Education (QSE), 13*(1), 85-98. doi: 10.1080/095183900235744

Yu, J., Benatallah, B., Casati, F., & Daniel, F. (2008). Understanding mashup development. *Internet Computing, IEEE, 12*(5), 44-52.