A Qualitative Study of First Year Science Students and their Instructors Adjusting to Learning and Teaching With Inquiry: The McMaster University Case Example

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Abstract

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Since the late 1980's, there has been a call to implement active learning strategies into higher education teaching and learning, and a concomitant impetus for universities to graduate students with critical thinking, interpersonal and communication skills (i.e., Boyer Commission, 1998; National Research Council 1996; and the National Science Foundation, 1996). To achieve these objectives, these Committees advocate that students should have opportunities to work in small groups with peers to "have access to supportive, excellent undergraduate education in science, mathematics, engineering, and technology, and [to] learn these subjects by direct experience with the methods and processes of inquiry" (National Science Foundation, 1996).

McMaster University has recognized that first year science students had few opportunities to engage in small group, self-directed research skills development while spending their time in primarily content-driven, high enrollment lectures. In response, McMaster's academic administrators developed policies and programs to remedy these problems including implementing courses using an inquiry teaching style for undergraduate students. The central goal of these courses was to "inculcate the concept of 'student as active learner' throughout the entire undergraduate experience: undergraduates should not learn primarily as passive recipients of information, but as active participants in their education to better develop critical thinking and communications skills" (Centre for Leadership and Learning, 1999). This initiative encompassed the Humanities, Social Science and Science faculties over a three-year period and was to be offered in all years, culminating in all students completing a research project in their final year. The focus of this paper was to describe how the students and instructors adjusted to learning and teaching in the first attempts at offerings of the inquiry courses for first year science students.

Context for Introducing the Science Inquiry Courses: The University's decision to focus on inquiry courses was heavily influenced by the Boyer Commission Report (McMaster University Planning Committee, 2000). While acknowledging that McMaster was a research intensive institution, the University Planning Committee also noted that, if stronger linkages were developed between research and teaching, students would have the opportunity to be presented with "cutting-edge content in the field [which would] also allow students to develop the generic, critical thinking, inquiry, research and communication skills that are inherent

elements of the scholarly life and that form the foundation of a well-educated student" (p. 4). However the Planning Committee also noted that this linkage would take time, organizational commitment and budget reallocations to ensure that the goal of high quality undergraduate education was achieved (McMaster University Planning Committee, 2000).

A second organizational initiative for the Inquiry Project came from an external funding agency, the McConnell Foundation. Canadian universities were invited by the Foundation to compete for grants that would be strategic in helping the universities translate active learning initiatives into durable practices. The McConnell Foundation recognized that the "knowledge economy" required workers to move between learning and work environments and these transitions required more collaboration and problem-based learning strategies than in previous decades (J.W. McConnell Family Foundation, 2001). The Centre for Leadership in Learning at McMaster was awarded a three-year grant to assist in the "major challenge [of] helping professors to change their approach to teaching" (p. 2).

There were two key stakeholder groups who were interested in having the inquiry programs evaluated. The first group consisted of the University administration (i.e., Provost, Dean of Science, and University Planning Committee), and the Centre for Leadership and Learning who were responsible for reporting to the McConnell Foundation on the Project's progress. The University Administration stakeholders were interested in faculty development. The second group was the faculty members who became instructors in the course: their goals are centered on developing a course design that was workable for them and provides first year science students with the opportunity to engage in small-group, problem-based learning. It became clear in the process of this case study that the stakeholder groups' goals were separate yet interrelated and this overlap was been instrumental in the success of Inquiry.

Instructors' Perspective on Developing the Inquiry Course: Initially, the Science Inquiry course was developed from a loose collaboration between the Centre for Leadership in Learning (DR), the instructors who taught the course in its first year (DH, ML) and the Dean of Science's office. Additional support came from research data that provided the instructors with the students' perspective (KT). Prior to the start of the course, there was some uncertainty about how to best design the course. The instructors were asking themselves: what would be the most appropriate vehicle for first year students to acquire research skills; what was an appropriate skill set for this level of student; and, what was the role of the instructor in working with this group of students in this instructional format. The instructors realized that learning through inquiry was 'messy': they were limited in how much course structure they could implement with the students in the beginning of the semester; they had to be responsive to the students' needs as they arose; and they learned "on the job" how best to meet those needs. Most importantly, students could not be given a week by week course outline at the beginning of the semester since it signalled to the students that the instructor was setting the learning objectives and the students were not truly self-directed. As a result of these concerns, the instructors felt that taking a flexible approach to course design would allow them to respond to the students' needs as they were discovered.

However, the Science Inquiry instructors came to an initial agreement on some basic elements of the course design. The course was to be offered only to first year, science program students as an elective in the second academic term. The instructors agreed to: work as facilitators with class sizes of 20 students for one instructor; students would break into smaller groups of four to five students within each class section to work on small group projects on a group project of their choosing; use computer-based discussions via a computer-mediated

conferencing system called LearnLink (a customization of the First Class Software); and having all sections use the common topic of global warming. The topic of global warming was chosen since none of the professors were experts in the field and they would be in a learning process with their students. Students would not rely on their professors to "have" the answers, but rather help the students learn research skills. Since the instructors were attempting to be as flexible as possible to experiment with the strategies to meet the students learning needs, a qualitative study was decided to best describe the instructors' and students' experiences of the course.

<div align="center">Methods</div>

Convenience Sampling: Information from a total of 33 students was evaluated using the data collection techniques outlined below. The data from these students represents 55% of the total enrolment of science inquiry courses for that year.

Data Collection: Data was collected in the following manner:

1. Participant observation: One of the authors (KT) enrolled in the course as a student and was subject to the same course requirements, including grading, as the students were. However, it was important to strike an appropriate balance between being enrolled as a student who was registered in an undergraduate science program and being a 'mature' student with previous university degrees. She was able to fashion a role whereby she acted as a peer tutor, which meant that she could offer her thoughts as to what we may wish to do next or model research behaviours (e.g., how to conduct a literature review, offer to post meeting minutes on LearnLink after the first group meeting), but she would "sit on her hands" and deliberately not take a leadership role with her group members in their small group project. In the larger class group, she would only tentatively offer opinions when she felt that the class had tried to make sense of the material but were 'stuck' in knowing what other possible alternatives they could pursue. Queries about her status in the course by her classmates were met with the honest but brief explanation that she was a student enrolled in the course who was getting a credit but that she was also conducting research on how students experienced the course.

2. Focus Group Interviews: At the end of the semester, a message was posted on LearnLink to invite students to participate in focus group interviews. Six students (6/15 or 40%) in one section and nine students (9/18 or 50%) in another section agreed to participate in group interviews conducted during the students' regular class time. The interviews were audio taped with the students' written informed consent and each lasted for about one hour. Although there was an interview guide students were asked open-ended questions to compare their initial expectations of the course with their current understanding. The researcher interviewed in a manner consistent with qualitative methodologies, which included using a conversational style as much as possible, asking open-ended questions and attempting to let the respondents talk about their experiences in their own words. Also, the researcher confirmed emerging themes by offering content from previous interviews and her own reflections. The addition of previous students' comments and the researcher's tentative notions and insights helped generate some validity of the patterns and themes that were developing.

3. Key Informant Interviewing: Instructors were interviewed informally on an "as-needed" basis. The goals of these interviews was to gain some insight into the instructors' pedagogical goals for the project and also to inform them of some of the general issues

and concerns that some students may have expressed during class time or during the focus group interviews.

4. Content Analyses of computer-mediated discussion group text: All text messages available on the course messaging system, LearnLink, were reviewed for their relevant themes.

Data Analysis: Qualitative methodologies look at 'what is' in a situation and focus on how people 'make sense' of situations (Glaser and Strauss, 1967; Loftland, 1971; Morgan, 1997; Strauss and Corbin, 1998; Morse and Richards, 2002). Data analysis compares subjects or cases to determine how they fit together and how they differ (Glaser and Strauss, 1967; Loftland, 1971; Morgan, 1997; Strauss and Corbin, 1998; Morse and Richards, 2002). The collection of data, coding, data analysis and theme generation happened simultaneously in this study (Glaser and Strauss, 1967; Loftland, 1971; Morgan, 1997; Strauss and Corbin, 1998; Morse and Richards, 2002). The strong suit of this approach is an "orderly presentation rich in descriptive detail" (Loftland, 1971, p. 59) that allows the researcher to identify themes based on an intimate understanding of the material. Focus group interviews were listened to two or three times by the researcher (KT) and then transcribed verbatim. Notes from interviews and from reviewing the LearnLink messages were also reviewed throughout the data collection process to generate tentative themes and notions. These tentative findings were introduced in subsequent respondent interviews to refine the developing themes.   Multiple data collection methods were used to triangulate data sources thereby improving the reliability and validity of the findings. In addition, data collection and analysis were conducted simultaneously with findings being reviewed with involved faculty members and students so that emerging themes could be validated directly by participants. This continuous process of data collection, data analysis and theory generation allowed the researchers to develop a coherent explanation of events.

Results
Theme One: Inquiry Provided Students with Academic Social Support Systems

Analysis of the data illustrated that first year university students often struggle with their adjustment from secondary school to university. In fact, some students felt that Inquiry was an opportunity to reconstruct social support systems, available to them in high school, which had facilitated their previous academic success. These supports included getting to know their classmates and professors in small group settings and in computer-based discussions. Many students also cited wanting to learn **how** to research as a reason for taking Inquiry: they saw the opportunity to work in inquiry-based, small groups as an opportunity to develop these skills. For example, some students talked about the advantages of group work in the following passages:

"Yes, this course definitely stimulated my interest in group work. I find it much better than regular 50 minute lectures. I discovered that you can learn much more when you have 'more heads than one'. All last semester it was just me and my textbook, now I see that working in groups is not only more fun, but is also very helpful."

"We had several group activities. These were also effective because they taught me the importance of working in groups and the importance of self-discipline and trust. It is hard to trust all of your group members and it isn't possible to cover up for someone who isn't doing their work. I learned a lot about cooperation and team work."

As for getting to know their professors, students talked about the following:

"(F)irst term, I didn't go to any of my profs, I didn't know any of them. But the second term, I don't know, cause I saw the relationship with (the professor). I just thought professors were totally mean and wouldn't help me but, ya know (laughs). But after (the Inquiry professor), I think it's all right, I would approach my profs now."

Other students stated the following from the focus group interview:

"Focus Group Student One: He's really organized with what he's doing, like he knows (the subject) and doesn't overwhelm us.

Focus Group Student Two: Yeah, and he understands you have other courses, that they might be another priority and he understand that, and he doesn't pile it on, and make something due on the same day that you have a test or anything like that. He'll kind of rearrange the due dates to meet your schedule.

Focus Group Student Two: He's flexible

Focus Group Student One: Yeah, that's it.

Focus Group Student Two: Very flexible."

The ability to interact with fellow students and professors appeared to facilitate learning because, by the students' admissions, they felt more confident in their ability to learn. In addition, interacting directly with professors who are accomplished researchers, but unfamiliar with the substantive area of global warming, may have given the student role models to augment their internalized notions of reasonable and competent research behaviours. Unlike the knowledge transmission model of their lectures and text books, where the content is usually delivered stripped of its research context, these professors modelled the uncertainty, the rough guesses and debate that the students experienced in their own small group research process while also showing the students their heuristics and "rules of thumb" for making headway in learning a new topic.

Many students stated that they enjoyed using computer-based discussion groups on LearnLink. Students also developed computer literacy skills since they were required to submit personal and group evaluations electronically. Some advantages to LearnLink cited by the following three student quotes include the following:

"I found that LearnLink was useful because it maintained a consistent connection between everyone in the course. We got updates and were able to share our ideas. It is like having a continuous discussion for four months straight. It (wa)s fun."

"I got most of my assistance from other people in class and from Learn Link"

"Getting more acquainted with Learn Link was a good source to help each other with finding resources."

The most frequent comment about LearnLink was the students enjoyed using it because they could be social with their peers and their professors. One group of students exchanged quotes with each other on topics unrelated to their group project. Other students cited that being able to read messages from other students, which addressed issues with which they were personally struggling, made them feel more confident in tackling their own problems. It may be that having a forum to exchange ideas with other students facilitated individual learning indirectly, since the students had an opportunity to normalize their fears and expectations of themselves and others.

Theme Two: Students Preferred Active Learning Strategies to

Passive Learning Strategies

As stated in the previous section, students enjoyed engaging with fellow students on the computer-mediated discussion group LearnLink because they were able to engage with their peers outside of class time. Students also made it apparent that they preferred and learned more when they could actively engage with the materials. For example, one section had their professor personally lead tours of the library with the objective that each student would search out one journal article for their topic during that session. The students who participated in these sessions later claimed that they would be able to find a journal article independently during the focus group interviews. In contrast, in the second section, the entire class attended a presentation by library staff that had no hands-on experience for the students. The students in the second section overwhelmingly stated that they found the session to be frustrating since they could not use the library's search capacity for themselves. Fewer students felt they could find a journal article on their own than in the first section. Many of the second section students spontaneously stated during the focus group interview that the library tour would have been more effective if it had been a hands-on session with peer support to answer questions when they were stuck, as they had experienced during their LearnLink tutorial.

Theme Three: Ensuring the Students had Opportunities to be Self-directed and Active Learners Needed a Delicate Balancing of Instructor Authority and Student Autonomy

In one section, the researcher behaved as a peer tutor to the group. Students claimed to the instructor that having a 'mature' student available for questions was helpful to them. In my experience, students would often express ideas and opinions about the course that they would be reluctant to share with the professor for fear of appearing to criticize or challenge the instructor's role. However, in my informal meetings with the professor, I would often pass on these concerns and ideas which gave the professor an opportunity to unobtrusively deal with these issues either during class time or on LearnLink. Similarly, the professor would have issues with the students (e.g., the students were not submitting the LearnLink self-evaluations, or not booking meeting times with the instructors) and, as a peer tutor, I could find out what impediments were stopping the students from following through and then deal with those issues. It seemed that the role of the peer tutor, although at times delicate, could be used to reduce some of the students' fears of the "authoritarian" professor who inhibits some of the their self-directed behaviours and attitudes while also increasing some of the students' assertive behaviours.

In terms of the small groups, the researcher's experiences are best described by my final self-evaluation submitted at the end of the term.

"We've produced an instrument that, with some fine tuning of the variables and scales, would produce meaningful data. I would like to point out that Sharon and George initially suggested the (general population) survey (on the Drive Clean Program) with Debbie enthusiastically agreeing. I was the reluctant on thinking that, perhaps, maybe we could do a poster session (about the Drive Clean Program). My experience of building the instrument has been interesting. My role has been to provide them with the "real world" research behaviours, expectations, resources, etc., and then get out of their way so they can decide what they want to do. So I think we've been successful in generating a viable product which represents a group effort. […] I feel I've been successful in maintaining a balance between encouraging the group to extend their expectations of what they are capable of, helping them stay focused when slightly off track, and staying out of their "process" of being self-directed about their knowledge.

As this quotation reflects, the required skills in being able to balance the students' genuine need to know something that would be out of their realm to understand, with the hardy belief that the students are better off discovering new knowledge and skills for themselves.

Theme Four: Students Re-discovered How to be

Academically Successful in this Course

The initial impressions of the professors when reviewing the focus group transcripts were that the students "seemed young" and were struggling with developing skills that they felt the students would have developed prior to entering university (e.g., time management, basic library skills, and computer usage). The students also recognized that they needed basic skills to be successful and felt that Inquiry offered them the opportunity to develop them. The following quotation from one of the focus groups reflects this opinion.

> Focus Group Student: "Well, I picked it basically because I thought that it would be of value, like throughout whatever I planned to do. I would always have the background knowledge…the knowledge that we get in this course would be able to stay in the background so we could work on it.
> Interviewer: Sort of like a foundation…
> Focus Group Student: Yeah, yeah [….] like its not a specific field that I will never have any use for, rather the opposite
> Interviewer: So you thought this would be a course that would be really useful in terms of developing maybe more skills instead of just knowledge?
> Focus Group Student: Yeah, yeah"

Students were also struggling with how to organize their time and develop self-motivation within the university context. Emerging themes reflect the tension between wanting the predictability of the secondary school structure but also appreciating the "freedom" of pursuing their own learning objectives available in the Inquiry course.

> "But a lot of our courses don't offer that freedom. It's like due that day, (and) if it's not in that day then a lot of professors don't let you do it the next day. Like our stats course, if it's not in that day, than you've lost it."

> "Like they said, going to be like not lecturing, no teacher actually going to tell you what to do, it's like… your own based learning, you going to do what you want to do so, I've never actually had that experience at all."

Many students' recommendations for future Science Inquiry courses revolved around having more lectures, due dates and more extensive assignments that would make the course more "organized". This type of tension is typical of struggles that health science students describe in learning to adjust to problem-based learning where they are often frustrated that professors are not giving specific directions on how to complete their work and that there is no one "right" answer (Solomon and Finch, 1998).

Despite their recommendations for more traditional course expectations in future Inquiry courses, students felt overwhelmed by the Natural Sciences program's first term work load (i.e., Biology, Chemistry, Calculus, Physics and Psychology), and the effects of large class sizes and lecture formats.

> "I think I rediscovered working with other people cause for like the entire first semester, basically all you did was work with your textbook and the notes and that's it. So I sort of I found that not writing about stuff and not talking to other people and working with them over just a semester can really make a difference (laughs). Like, I completely forgot."

"I'm seriously feeling just like a 'mark'. Like if (students) don't get the highest mark, they're like sick, totally. There's no learning experience, you just study to get 'the mark', that's it. It's your only incentive sometimes. But that's not the right thing obviously, to get marks…"

"…Cause they expect you to be so passionate about a subject, so that at the end of four years you decide, ok, I want to go into medicine, or teach children. But if you never have an opportunity to interact with anyone like that, I mean never have that experience (to learn), then all you think about is marks, marks, marks, you don't even get a chance to think, do you love this , or not? Its just memorizing."

The effects of the pressures of a traditional learning environment, combined with many students wanting to get high marks to apply to professional schools inhibited many students from developing friendships with other students who share similar academic interests, increased feelings of competition and loneliness, and decreased the relevance of a university learning experience by focusing on the 'static' materials of text books and notes.

"…and in the first semester, didn't you find that everyone just wanted to compete with each other so much like…if you wanted help, people wondered if you wanted the answers or you wanted help. And you're thinking, I just want help, chill out (laughs). But no one wants to chill out, so I just totally forgot about asking people. If I didn't know someone, I wasn't ready to like ask for help. So this course taught me like that again, like if you need help, its' not a problem, like no one's going to kill you, hopefully."

"Probably that's a reservation that's with us now as a result of first semester. Where you didn't really want to like, know people that you didn't know and everyone minded their own business. You're a little bit less up to meeting people. Whereas in high school, everyone always knew everyone, that type of thing, no one was afraid to talk to anyone else."

The experience of small group cooperative learning, using LearnLink as a means to communicate with their class mates outside of class time and to have discussions with a professor, seemed to make university life more accessible to the students, although it did not completely remove their fears of engagement with others. Also, having an opportunity to focus on learning about how research is conducted, as opposed to rote memorization from the text book, seemed to encourage the students in developing support relationships that fostered academic curiosity and growth.

Because of their experiences in Inquiry, students moved from being less competitive for marks between students and developed an internalized notion of themselves as university students.

"Yeah, I don't see the end result of this course as a mark being on my transcript"

Focus Group Student One: "About the grading, I was not so worried as I was confused. I mean I'm not so worried about the kind of mark I will have but I think that, that it's good in a way, because it more reflects the way things will be when we get out of here. Because once we're out there and we're doing some research and whatever, there won't be anyone telling us what to do for this many percent, so…

Focus Group Student Two: yeah
Focus Group Student One (con't): so in a way, it teaches a lot of …
Focus Group Student Two: discipline
Focus Group Student One (con't): yeah, discipline, and also, for someone to know what
they are supposed to do to get the result they want…
Interviewer: so you have to be self-monitoring in terms of how successful you're being
Focus Group Student One: but I think it's all your own responsibility"

Although students expressed some anxiety about how the final Inquiry mark was going to be assigned at the start of the term, students did not mention marks at all during class time by the end of the semester: it appeared that the students were more focused on completing their small group project for their meeting with the instructor than they were on "getting a mark". Defining their sense of self-worth and self-discipline during the first year of university studies is developmentally appropriate for persons in their late teens and early twenties. These students have often moved away from home in the last six months and are establishing identities outside their families of origin. In developing their identities as university students, Inquiry offers them an opportunity to learn about what is appropriate research in a less competitive environment with professors acting as real world role models.

Theme Five: Students Feel That They Learned How to Learn in Inquiry

Students defined their knowledge gains from Inquiry as developing university level skills in focusing research questions, finding and critically evaluating research, increasing their motivation and discipline, as well as being persuasive in presenting knowledge.

"Well, the good thing about it was you could learn how to work individually as well as in a group. I mean that's what I find. You're basically like pacing yourself, telling yourself what you actually have to do and stuff and have the will power to do it (laughs) dedication or whatever".

"But still, I thought global warming was a good topic although not a very interesting one. It forces you to make your topic, to make your topic interesting to you. And that's important because often research (isn't) fun and interesting, so you have to make it work for you."

"Cause global warming is such a broad topic right? So (dividing the topic up between members of the small groups) allowed you to basically pinpoint and narrow down . . . and learn a lot more."

"Cause that's a real test of knowledge, right? If you can…it's easy to research but if you can explain, sit down and talk to someone about all the knowledge that you've obtained then that says something, you can really reinforce what you've learned."

Discussion and Conclusion

The data analyzed in this report illustrated that the students were struggling to develop an identity within that university environment. This struggle was in keeping with the developmental milestones of young adults. They were anxious for role models who could show them how to be successful in using research skills and in developing cooperative relationships with their peers. Large class sizes, with few opportunities for discussions with professors or peers, appeared to alienate students and focused their attentions on getting high marks instead of

learning. Courses like Science Inquiry may provide a model to help students bridge the gap from moving from high school to university successfully.

Research Outcomes that Affected Program Implementation: From the research data collected and the instructors' observations, there were three major findings.

- Firstly, it was apparent that Inquiry sensitized students to the diverse learning experiences available in a university compared to their high school environments. However, being aware of the breadth and depth of university level research was not sufficient for students to feel confident in approaching these tasks. They were more likely to approach new learning experiences and persist in skills mastery when bolstered by an academic social support system. Steps were taken to ensure that subsequent Inquiry course provided this social support system through increased instructor-student contact (e.g., individual student-teacher interviews), the introduction of peer tutor-student interactions, and continued student-student small group interactions.

- Secondly, the decision was made to extend the course to 36 hours of class time over two semesters (i.e., one hour per week first term, two hours per week second term) instead of the traditional one semester course. The instructors found that students would be more open to and would derive greater benefit from learning Inquiry skills in September when they were just beginning at university: students starting Inquiry courses in January were resistant to learning about the library, for example, since they had already "been to the library" although almost all students did not know that journals existed and could not name more than one electronic abstract database.

- Third, the instructors also realized that students should participate in more than one group problem and have at least one opportunity to choose a problem based on their interests. With at least two attempts, both the instructor and students could learn from any difficulties in the first group and then make a second attempt with their newly learned insights.

In the second year of the course, the instructors worked as a teaching team by developing and using the same course elements and exercises in all sections. They agreed that the instructors, acting as facilitators, would benefit from ongoing discussion and collaboration with other first year Science Inquiry instructors to improve the quality of the course. The instructors from various disciplines [i.e., mathematics, biology, psychology, and health sciences] and a representative from the Centre for Leadership and Learning (CLL) met weekly to share their classroom experiences of what worked, problem-solve any difficulties, discuss how their ideas about teaching and learning were changing, and share any tools they found effective. The advantage of this collaboration was that the instructors were pilot testing and refining a series of teaching tools and sessions they found effective in helping students work through their skill set (e.g., how to get students into the library, group work skills, how to encourage peer tutor – student interactions, critical thinking skills, how to assess the validity and reliability of a website, the LearnLink tutorial, how to make presentations, etc.)

However, to encourage more faculty to teach Inquiry, they decided to have a three-year rotation of instructors. This rotation ensured that experienced instructors supported new inquiry instructors with third year instructors taking a leadership role. The team realized that having a tightly structured course, based on their developed tools and sessions, would impede new instructors' full participation in the teaching team. New instructors brought their own expertise and previous teaching and learning strategies which added additional depth to the collaboration. The decision to have a three-year instructor rotation meant that the Inquiry teaching model

needed flexible boundaries. This flexibility meant that experienced instructors give new instructors room to be self-directed in their teaching while new instructors were amenable to the support available from the other instructors, peer tutors, CLL and research initiatives. Science Inquiry team meetings evolved into developing and sharing a 'tool kit' of flexible tactics that instructors could use to help the students explore the skill set in response to the students' needs. The teaching teams in the third offering of Inquiry became this type of partnership between the instructors, a Centre for Leadership and Learning representative, research support and their respective peer tutors. These teaching team meetings have continued in subsequent inquiry courses to the mutual benefit of all.

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