Learning Circle: New Faculty Guidance for Best Practices in Research Mentoring

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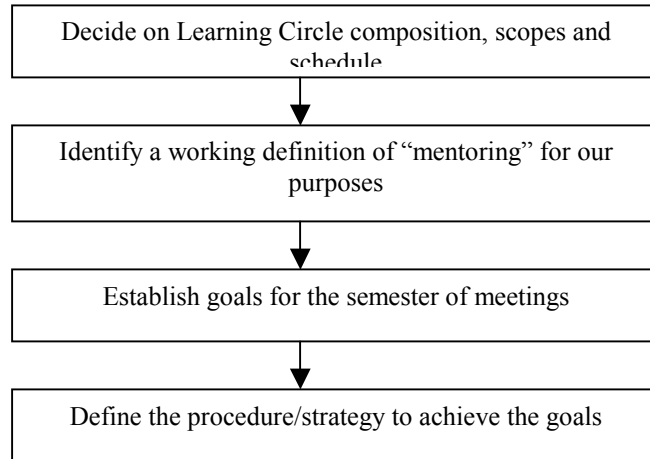**Halifax, Nova Scotia Canada**

Introduction

Student-conducted research is an active learning experience practiced in capstone projects, in-class research assignments, or laboratory based undergraduate and graduate research. Society depends on the innovations that stem from research at all levels. The transition from an undergraduate environment to a research environment is often difficult: new skills are needed, students are expected to make decisions independently, and learning is informal. Graduate work (and research in general) is recognized to be a stressful time for students (Brennan, 1999). This is especially true for women and minority graduate students who find themselves more isolated and less able to take advantage of informal learning networks than others (Berg and Ferber, 1983). The problem is confounded by the fact that faculty research advisors are not taught management and mentoring skills that are required to properly supervise students. This situation is especially difficult for new faculty who are inexperienced in mentoring student research, but depend strongly on student research productivity. To address these issues, a small group of faculty, students and research staff convened a "Learning Circle" over the course of one semester. The ultimate goal of this group was to put together a common set of resources that can be utilized when training and mentoring students who do research, to encourage new faculty to develop strategies for more effectively mentoring these students, and to provide mentoring for junior faculty who are supervising research. The group process and recommended strategies will be discussed

A "Learning Circle" brought together various members of the university community over the course of one semester to discuss mentoring students in a research environment. The panel consisted of 8 members: three junior faculty members, one senior faculty member, one research staff member, one undergraduate student, and one graduate student. At the first meeting the focus of the group was discussed, definitions of mentoring were established, topics for discussion were identified and a timetable for meetings was established. The plan developed at the first meeting is outlined in Figure 1.

The Learning Circle Process

Figure 1: Learning Circle Self-Definition

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│   Decide on Learning Circle composition, scopes   │
│   and schedule                                    │
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│   Identify a working definition of "mentoring"    │
│   for our purposes                                │
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│      Establish goals for the semester of meetings  │
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│    Define the procedure/strategy to achieve the    │
│    goals                                          │
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Learning Circle composition and scheduling

The Learning Circle decided to hold meetings once every two weeks for one and a half hours, late in the day to accommodate individual schedules. The idea of adding more participants was discussed. We agreed that it would be useful to have more students in the Circle, but considering their schedules and the limited benefits to them, it was decided that we would bring in guests as necessary. Some possibilities are: students who can speak on their experiences, researchers who are acknowledged to be successful mentors, individuals with specific expertise (ex. library/literature search, computing, and statistics).

Defining "mentoring"

Many definitions of mentoring exist. After research and discussion, the following definition was chosen:

"Mentors are advisors, people with career experience willing to share their knowledge; supporters, people who give emotional and moral encouragement; tutors, people who give specific feedback on one's performance; masters, in the sense of employers to whom one is apprenticed; sponsors, sources of information about and aid in obtaining opportunities; models, of identity, of the kind of person one should be to be an academic." (Zelditch, 1990).

Additionally, although the Circle defined a distinction between mentoring and supervising or advising a student in research, we did choose to include elements of advising in our discussion. It was the opinion of the Circle that including mentoring in your advising or supervising style would contribute to the student's success in research. Additional benefits of mentoring the research students include:

- Increase the likelihood of a positive and productive research experience for the student.

- Improve student retention at the undergraduate level.
- Encourage undergraduate students to continue to graduate studies.
- Encourage graduate students to pursue doctoral work.
- Enhance student productivity and morale.
- Retain women and minorities in graduate school.

Learning Circle Goals

The group narrowed down a reasonable list of goals for the semester-long meetings. The primary objective of the group was for the participants to exchange ideas and experiences on mentoring methods with colleagues in similar situations. A second goal was to learn about the current "best practices" in mentoring. The Learning Circle also had the objective of identify and developing training models for developing research skills in our mentees. Finally, a less vital but still desirable aim of the group was to disseminate the information in a brief handout to guide other faculty in mentoring students doing research.

Strategy: Achieving the Learning Circle goals

It was decided that the majority of the goals of the Learning Circle would be met by having discussion-style meetings, with a different Learning Circle member designated as the moderator for each session. The responsibility of the moderator would be to research the topic before the meeting, provide any resource materials, and facilitate the discussion. Additionally, the Learning Circle decided the meetings should be supplemented by holding a one-time panel discussion, where we could get input from experienced faculty and other students without causing a time burden on them. Finally, the group decided to identify and distribute available resources for Learning Circle members on their own time.

The list of potential discussion topics generated was very large, and the group narrowed down the focus. Topics for discussion that were chosen at the first meeting are summarized in Table 1.

Table 1: Topics discussed in Research Mentoring Learning Circle	
Diversity	• Dealing with minority students • Being a minority faculty member
Communications	• Forms of communication • Finding the right form for your mentoring relationship
Behaviors	• What is appropriate for the mentor/mentee? • Correcting bad habits
Panel discussion	• Question/answer period with experienced supervisors and students who have had mentors
Training students	• Different models for disseminating research skills (both specific skills and general skills)
Assessment	• Establishing expectations • How to evaluate your mentoring

<u>Topic 1. Diversity</u>

Diversity issues of particular interest to Learning Circle members consisted of student disability, age differences, international students, and minority faculty mentoring minority students. Major points of discussion and recommended strategies are outlined below.

Disability: Advisors/supervisors need to help mentees to cope, but as their supervisor we also need them to be productive. Many student researchers are supported on grants that are of limited duration and require reporting of results within a certain timeframe. Key issues identified were: How do you identify student disabilities? How do you go about getting help for the student? How far do you go with this?

Experience has helped some individuals in the group spot problems early on, but much time was lost in the stages of gaining this "experience". The key for many has been to recognize a pattern in observed behaviors and then act on it. Some of this experience may be gained by utilizing resources available. The strategies identified were to utilize the experience of other members of the student's department or supervisory committee, or a more experienced faculty member/chair, to make contact with Services for Students with Disabilities (Student Academic Services) or with Counseling offices on campus.

Age: Another issue that ties in with this theme is age. Younger professors may be sought out more by students. New professors may find themselves with graduate students who are older than they are, making the supervising relationship tenuous. Encourage student researchers to seek out other mentees and to include a balance of other faculty members, research staff and other students as part of the research student's "team" of resources personnel they can contact.

International students: The issues discussed centered on a perceived or real bias against international students. Often international students are seen as high risk compared to American students because of language issues, cultural transitions requiring more time to adjust, the possibility of international students using the F1 visa to get into the country and taking a job immediately, and the unknown quality/suspicion of grade inflation. This can result in a breakdown in mentoring and advising the student. There are a lot of benefits in supervising/mentoring international students, so new faculty are encouraged to involve them but also to carefully select students and help them make the transition. Faculty members should talk to the International Student's Office, and the English as a Second Language Program Office to get information on how to interpret exam scores and transcripts from specific countries, and introduce students to international groups on campus for cultural support.

Minority faculty mentoring minority students: Many young faculty are the "first" or "only" of their kind in their department. This can create additional expectations within the department for mentoring that the other faculty and minority students expect them to undertake. This can be extraordinarily time consuming (for example, only one female professor on the faculty of a division where 30% of the students are female). Another time demand which may be placed on a minority faculty member is being asked to serve on an excessive number of committees. Additionally stress is added when that individual is expected to be the sole voice of the minority.

There is a lost opportunity for other faculty to become "minority- sensitive" when the minority faculty members are expected to be responsible and knowledgeable on all issues pertaining to their minority group. The minority member may become marginalized and isolated. Encourage other faculty to continue mentoring minority students as well, for the benefit of both the student and faculty in experiencing diverse relationships. Encourage students to seek other faculty. For example, one might say "I don't have time to write the letter, but maybe you should try Prof. Smith". Learn ways to become efficient in your one-on-one mentoring time with students in your department and make sure to develop mentoring relationships with student in your dept who are not minority students.

Topic 2 : Communication

Communication styles can be used to create a certain atmosphere in your lab or research setting. It may take some trial and error to find the best form of communicating with various students. All students should learn to communicate their research in written and oral formats.

Individual and Group Meetings: Individual and/or group meetings are a recommended form of advising student researchers, and also provide a good chance to find out if there are problems with the relationship or if the student is having difficulty. Try different forms of communication when there is a breakdown in your verbal communications (ex. email or written report). If there is a language problem and you are not sure if the student understood what you said, have the student take notes from the meeting and submit them to you later to make sure they understood.

The Learning Circle discussed the use of "qualifying" statements vs. "absolute" statements (see gender discussion below). While this may or may not be a gender issue, we all recognized the need for qualifying statements in research in all fields. It was recognized that this can lead to the listener (whether this is the student or advisor) losing confidence in the speaker's knowledge, and to the student being frustrated by not being provided with absolute statements.

Gender and cultural differences: Women are more likely to qualify their responses and results, much less likely to speak up in meetings or answer questions, more cautious with results. It was noted by some that women who go into engineering generally do not exhibit these communication patterns, but that is exactly why it should be pointed out. This trend increases the potential to discriminate against the more "female" communication patterns. Additionally, in some cultures students are not accustomed to asking questions. Some cultures have the opposite approach, with a tendency to be combative in research meetings and presentations, and absolute/definite in the presentation of results.

Presentation and written communications: Provide opportunities for undergrad and grad students to present their work both orally and in a written report. Insist on practice of oral presentations, and provide many opportunities to do so. Also, provide anonymous feedback forms to the audience for critiquing presentations. In both written and oral communications, review the student's work periodically and provide pointers and corrections. Be aware that sometimes you can provide too much feedback. Choose 2-3 major comments on each revision. Additionally, suppress your desire for major rewriting of a student's thesis. Instead, make the changes in papers from the thesis that you will be submitting for publication.

Topic 3: Mentor/Mentee Interactions

The discussion on interactions and behaviors was conducted in a case-study format. The facilitator presented certain scenarios for the group to discuss. Discussion centered on identifying the possible problems and strategies or solutions to the interaction problem. Topic areas discussed are shown in Table 2, and an example of a case scenario is shown in Table 3.

Table 2: Possible interaction problems
Ensuring you work fairly with all students Getting involved in student's personal lives How involved should you be in your student's research? Giving honest evaluation and feedback Advisor-student conflict Frustration due to time constraints Avoid/deal with feelings of manipulation Sexual advance/impropriety

Table 3: Example case study	
Behaviors Issue	Case study
Ensuring that as a mentor/advisor you work fairly with all your students	You supervise 2 undergraduate student research projects, for which the students are getting grades. You know one of your students, Mary, from church and through frequent non-academic contact you have become friendly. This has extended to her research project, as Mary feels comfortable approaching you to discuss her problems with her research, her ideas on the field, articles that she has read, etc. In your discussions it is clear that she has an interest in the area but needs a great deal of help with her research. With much guidance, her research report looks very good and you know that she has made great progress. Another student, John, is very shy and never comes to see you. Have you treated the students fairly? When the reports are handed in, how do you maintain your objectivity?

The case study discussion started with first identifying the problem at hand, and then led to strategies for dealing with the problem or altering the behavior.

Topic 4: Research Skills Training

Upon starting a research group and advising students in research, individual faculty members will often need to give much one on one instruction in both the specific research skills required for their work, and the general philosophies of research. Preparing a standard "training program" for your research lab will help the advisor to mentor the student in research more efficiently. The individual members of the Learning Circle discussed the skills required from their student researchers, and each member of the group was encouraged to make up an individual training program for their lab, by using the "Possible topics" shown in Table 3, and filling in the specific information as it pertains to their research lab.

Table 4: Possible topics for Research Training	
Literature review	Know the library and how to find information Identify key databases to search for information Decide on key journals relevant to research project Idenify journals to read and how to evaluate a paper
Defining the research project (questions for the student to think about**)**	What are the key achievements in this field? What techniques are commonly used? What are the major problems in this field What problem are you trying to solve? What is your hypothesis?
Goal setting	Break the project into smaller sections Establish major milestones Put together a timeline Continually re-evaluate goals and objectives
Experiments	Identify the independent and dependent variables Plan and design experiments Identify and learn or develop the techniques that are required Learn how to keep a notebook and record data Develop ways of organizing data Lab safety and management of waste
Techniques	Identify important experimental techniques that may be used Set protocols on how to use those techniques
Analysis	Determine how to analyze the results Identify and learn how to apply the appropriate statistical methods Evaluate the reproducibility of experiments Evaluate and interpret results
Computer skills	Excel spreadsheets, graphing, Word, Powerpoint ProCite, Mathcad Programming languages Statistics programs
Time management	Locate and order the necessary supplies and equipment Keep a database of journal articles Develop a working filing system Schedule experiments and research
Presenting your work	Oral presentations for group meetings, journal clubs, and conferences Develop a "cocktail party" summary of your project Design and effective poster presentation Learn effective writing for journal papers and thesis

Topic 5: Evaluating your mentoring

Evaluation of mentoring and advising was seen as a very difficult but extremely important aspect of the Learning Circle exercise. Rather than evaluating our own mentoring at that time, we discussed ways to assess and improve the advising and mentoring we were doing with our own students. One tool that we found very useful was to have an expectations agreement with the student from the start of the advising/mentoring relationship. This can take many forms, and be as simple as having a discussion on the roles and responsibilities of the mentor and mentee in the relationship. Writing this down, you can come back to it throughout the course of the student's research and assess the validity of assigning such responsibilities, and discuss the whether they are being adequately fulfilled. The concept of an "evaluation" form, similar to course evaluation forms, was not seen to be a viable method of evaluating mentoring as student anonymity would be compromised.

Discussion and Conclusions

The members of the Learning Circle found the format to be extremely useful from the standpoint of thinking about their mentoring/advising style, and exchanging information about specific problems they were dealing with at the time. While the group members became aware of available resources and strategies to use in their own mentoring, the goal of disseminating the information to other faculty was not accomplished in the time frame of one semester.

Some difficulties were encountered. Finding experienced faculty mentors who were interested in participating was a challenge. Keeping to the time limit on each meeting was difficult as well, as it seemed there was much to discuss. It was difficult to get specific work done, such as a guideline or recommendations sheet as we intended, partly due to the lack of time available and also due to the widely varying nature of the disciplines represented. However, the process and discussions were found to be useful by all, and did encourage many people involved to identify their own individual practices for mentoring and supervising research conducted by both graduate and undergraduate students. Future work on this topic will be to take the information and strategies developed in this Learning Circle to develop a short workshop or program for new faculty members to develop their own mentoring styles, research skills workshop, and expectations agreements.

References

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Biographical Information

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