

**AC 2010-800: EFFECTIVE FACULTY MENTORING FOR DIVERSITY: AN
ASSESSMENT OF MENTORING PARADIGMS**

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Effective Faculty Mentoring: A Preliminary Assessment of Mentoring Paradigms

Abstract

One of the difficulties facing smaller institutions is the limited number of faculty from which mentoring partnerships can be formed. This is problematic when changing institutional priorities can cause a generational difference in the faculty expectations of junior and senior faculty with respect to research production; this change in institutional priority is occurring at many predominantly undergraduate institutions (Kramer 2005). It becomes even more problematic when the issue of diversity is brought into play. Numerous paradigms for faculty mentoring exist; the question becomes, which mentoring models or combination of models are most effective in institutions with small numbers and changing expectations for faculty performance? In particular, what models prove effective for underrepresented faculty?

A plethora of articles exist on mentoring and its importance in faculty development (Smith et al 2000). Faculty mentoring is predominantly based on a male model which fosters a challenging, competitive environment and stresses independence (Seymour and Hewitt 1997). However, women prefer inclusive, cooperative environments that provide a sense of belonging (Gilligan 1982). Chesler and Chesler (2002) discuss innovative mentoring strategies related to gender, including the “distributed mentorship.” This approach breaks the traditional one-on-one, senior faculty as mentor model and includes alternative methods such as peer mentoring and electronic methods for distance mentoring. This model may be particularly well suited to an institution lacking critical mass of women faculty and/or geographically isolated from other institutions. While gender may be one criterion in choosing a mentor, it cannot be the only criterion, nor does it guarantee a successful mentoring relationship (Chessler and Chessler 2002, Smith et al 2000). At institutions where there are less than ten women faculty members in the science or engineering programs, gender-specific mentoring or networking programs are not likely to be to be practical. This is generally due to the lower number of senior female faculty when compared to junior faculty in science, technology, engineering and math (STEM) fields (NSF 2007) as well as the fact that women faculty allocate a higher percentage of their time to teaching and service than their male counterparts (Bellas and Toutkoushian 1999).

This paper will discuss the preliminary findings of a meta-analysis of a number of faculty mentoring programs at both large, research intensive institutions and predominantly undergraduate institutions to consider the question, “What are the strengths and weaknesses of different faculty mentoring paradigms, particularly with respect to diversity?”

Problem and Background

Faculty and student mentoring relationships have been analyzed and implemented at institutions of all sizes and locations. Less attention had been given to the importance of faculty mentoring which has only gained research attention within the last few decades ¹⁹.

The South Dakota School of Mines and Technology (SDSM&T) is a specialized engineering and science institution located in the Midwestern United States. SDSM&T is a primarily undergraduate institution that is geographically isolated with a student population of approximately 2100 students. Within the last few years, SDSM&T has been experiencing a slow increase in the student population and a more significant increase in research expectations while maintaining a reputation for excellence in undergraduate education. Currently, no formal mentoring program exists at the institution or at any of the state regential institutions for either new or existing faculty members. The small number of faculty members (approx. 150) at the South Dakota School of Mines and Technology results in fewer individuals to do the necessary work of teaching, advising, and service, particularly as research expectations rise and a low number of faculty from which to create mentoring relationships.

In general, new professors take four to five years to rise to full research and educational expectations set by the employing institution⁴. Within this time, new faculty members use a trial and error method to learn how to balance education, research, and family life. Some new faculty members fail to reach tenure or fail to efficiently conduct research and teach within the classroom setting⁴. For this purpose, mentoring may be used as a tool to overcome such obstacles and quickly transition new faculty into becoming efficient assets to the institution⁴. However, it is still often a struggle to create programs that assist these faculty members in the beginning stages of their academic careers, particularly in smaller institutions that may be geographically isolated, possess a small engineering faculty population, and/or have limited financial resources.

A survey was conducted by the research team to determine the major concerns of faculty members at their respective institutions to determine major factors that a new faculty development program may need to address. This survey targeted STEM (Science, Technology, Engineering, and Math) faculty and included questions about mentoring, career satisfaction, and career relationships. The participants ranked their responses as strongly disagree, tend to disagree, tend to agree, and strongly agree. The data contained within this survey will be analyzed in more detail as the research process progresses.

From results compiled from the Indicator Survey performed by the research team, it was determined that many faculty members chose location as one of the primary factors when choosing employment at any given institution in the state. For the purpose of this study and in conjunction with the Indicator Survey, geographically isolated institutions are institutions that are considered to be sheltered from major centers of population (e.g. Rapid City, South Dakota) (Indicator Survey). Geographically isolated institutions often find it difficult to attract diverse faculty; this may be attributed to a number of factors including homogenous demographics and lack of support systems for underrepresented faculty (Indicator Survey). The isolated institution must rely on its own faculty, staff, and administration to encourage communications with colleagues at institutions across the county. Even though geographically isolated institutions do have a disadvantage in terms of location, programs may be established that accommodate the recruitment and retention of faculty, including those from underrepresented groups.

The main objective of ongoing research reported herein is to perform a meta-analysis of mentoring programs and paradigms at diverse institutions to determine the most effective paradigm to implement at a predominantly undergraduate, geographically isolated, and

specialized institution. Mentoring paradigms at institutions varying in size, focus, geographic location and demographic make-up throughout the United States will be analyzed to assist in determining the most effective modes of mentoring for different desired outcomes.

In this study, a successful mentoring paradigm to be reviewed within the meta-analysis will be defined as helping to achieve the following institutional outcomes:

- Recruit and retain top faculty
- Inform new faculty of university policies and regulations
- Engage and open communication between new faculty and existing faculty
- Provide a smooth transition for entering faculty
- Assist new faculty in future career decisions
- Promote diversity in faculty populations

The desired outcome of the research is that the most effective mentoring paradigm or paradigms can be incorporated into a formal faculty mentoring program at SDSM&T, and that recommendations concerning the efficacy of specific paradigms can assist in development of appropriate paradigms for similar institutions.

Definition of Mentoring

In a sociological sense, the term “mentor” does not have a specific definition. A mentor may serve as a career advisor who assists an individual in making positive career choices¹³. In other instances, a mentor may be a person that emotionally assists the individual with personal and career decisions^{2,19}. Each mentoring relationship will vary based on characteristics of the individuals involved in the mentoring relationship². Depending on the type of relationship desired, a mentor may be a colleague but not necessarily a friend to the mentee and vice-versa². Some mentoring programs follow a group construct where a group of multiple mentors and mentees may hold discussions and assist one another in that sense. Specific mentoring paradigms are described in the next section.

“Formal mentoring” is the term used to define a planned mentoring process². Individuals are generally placed together in various mentoring groups and attend scheduled meetings². Meeting times and other scheduled events are logged, and financial costs can be documented to help the institution assess whether or not the program experiences continuing success. Informal mentoring relationships are generally developed through means other than a formal pairing structure². Meetings and other scheduled events may occur within this relationship, but no criteria are set for the number of times the mentor and mentee are required to contact one another². The following mentoring paradigms discussed include both formal and informal mentoring styles.

Mentoring Paradigms

Various mentoring paradigms exist that encompass all types of personalities and relationship preferences of the participants. Each individual involved in mentoring programs desires different outcomes and benefits from the mentoring relationship. Not only do gender and age affect which

type of mentoring relationship any individual faculty member may desire, but department and faculty rank of the individual also play a key role. The following mentoring paradigms are discussed to give the reader more background information on the types of mentoring relationships analyzed within this study.

One-on-One Mentoring is a type of mentoring in which two individuals participate within the relationship. This traditional type of mentoring relationship is the most well-known and widely practiced throughout academia. Weekly, monthly, and even yearly meetings may be scheduled between the mentor and the mentee to discuss various topics such as strategic career advancements. This type of relationship may be very beneficial to its participants if the participants are comfortable with one-on-one interaction with one another. These individuals may form a tight bond with one another, and a friendship may develop from the situation. This one-on-one relationship may also hinder the mentoring process. At some institutions mentors and mentees are paired together without input from either party. Differences in personal characteristics (e.g. personality traits or value systems) may pose problems for the relationship. Mentees that do not feel comfortable with his or her mentor often seek assistance from another individual outside of the relationship. One-on-One Mentoring relies heavily on the personalities of the participants.

Circular Mentoring is a mentoring relationship in which two one-on-one mentoring pairs come together to form a larger mentoring group and has been used as a primary mentoring model by California State Polytechnic University (whose mentoring program is discussed in a later section)¹². This type of mentoring is beneficial for the fact its participants may choose to either seek the assistance of from one person to three people. This may be beneficial when participants would like more than one perspective on any given problem that may arise. If any issue arises that the individual is uncomfortable discussing with the group, a one-on-one relationship may be implemented. Mentoring pairs are generally formed and then placed with another mentoring pair. Thus for meeting times, scheduling generally becomes more of a conflict for the group as a whole. If mentoring circles fail, the outcome is a relationship that is reverted back to a one-on-one relationship.

Triangle Mentoring (aka triadic mentoring) involves three people within the mentoring relationship and is similar to the circular relationship. In this paradigm, one mentor is grouped with two mentees. Similar to circular mentoring, triadic mentoring allows the mentees to obtain different experiences and perspectives of the participants allowing each individual within the relationship to gain a broader sense and different views on any given subject. The downfall to triangular mentoring is also similar to circular mentoring. Scheduling conflicts may pose a problem for meeting times. Triangular mentoring does not have the flexibility that circular mentoring maintains. The triangular mentoring group is generally not broken down into two smaller one-on-one mentoring groups. This approach may be beneficial for instances where a small number of faculty mentors exists with respect to mentees, such as at institutions that are actively recruiting underrepresented faculty and trying to maintain mentor/mentee groupings that are specific to the demographic group.

A panel discussion was held during the 2009 ASEE conference. Session no. 3292-WEPAN/WEID Joint Panel: Life after Tenure—Leadership Roles in Academia. During this

discussion, the panel talked about a form of mentoring known as silent mentoring. *Silent Mentoring* occurs without the knowledge of the mentor. A mentee may personally assign an individual the mentoring role, keeping track of major decisions the silent mentor makes. The mentee follows the mentor by example and seeks advice without forming a formal mentoring relationship. The major advantage that this type of relationship provides is that the mentee chooses the mentor. Personality discrepancies are not an issue in this type of relationship. The major disadvantage that this relationship poses is that a formal mentoring structure cannot be utilized. Scheduled meetings and other activities that may bring mentors and mentees together do not occur.

A sample of specific mentoring programs is described below. These mentoring programs contain characteristics that suggest they have resulted in successful outcomes. As with most studies involving personal or group relationships, mentoring programs are abstract, and the social trends of various groups and institutions must be taken into consideration when determining the success of the mentoring relationship. Success of mentoring programs is typically established based on the self-reported feedback of the participants. If both mentors and mentees feel that the relationship was successful, the program receives continued funding, and is supported by the institution the mentoring structure is successful.

California State Polytechnic University, Pomona (Cal Poly Pomona) is a specialized, primarily undergraduate institution. The mentoring structure utilized was a Mentoring Circle Program that was developed at the institution. This structure involved participants from various departments and colleges in the form of the circular mentoring paradigm as described in the previous section. The main advantage to a mentoring circle is that senior faculty members are provided with the opportunity to mentor each other as well as beginning faculty members. A minimum schedule time of one meeting per quarter was established as part of the structure. Reward and recognition programs were established to encourage time commitment to the program. A training portion to the mentoring program was also established to ensure that each mentor efficiently benefitted the mentees.¹³ This program has advantages (e.g. senior faculty members mentoring each other as well as new faculty members) and it promotes inter-departmental communication. The results of this mentoring program have not yet been evaluated, but the program demonstrates characteristics indicative of a successful mentoring program.

Although the overarching study is focused on mentoring within academia, a model was created at the IBM Corporation to improve diversity among its employees and its consumers. IBM divided itself into six major groups, also known as “task forces”. Approximately 20 staff members were included within each task force. Executives from the company were charged with developing task forces that included groups such as women and blacks (African-Americans and people of African descent). Each group determined improvements that could be made within the company to better involve all employees of the company. As task forces met, each presented goals that were created for the group itself and for IBM as whole. Downfalls within the company structure and within other groups were also identified to ensure that communication was open between groups. After the “constructive disruption” stage was surpassed, the task forces came together to create an environment that included people of all backgrounds and ensuring continued diversity within the company.²² Such a corporate paradigm can enhance mentoring

programs within academic institutions by involving a diverse group of individuals and keeping the line of communication open among them.

The research method used for this analysis is described below and is used to analyze the social aspects of faculty members at any institution. From this type of research, errors and successes may be analyzed to determine the general mentoring program that will best suit SDSM&T and other schools with similar characteristics.

Research Method

The purpose for conducting a meta-analysis on faculty mentoring programs throughout various institutions is to create an efficient mentoring program that may be implemented within the SDSM&T and other institutions that contain similar characteristics. Because the institution has a small faculty population and a very small number of underrepresented faculty, it would not be possible to design a study considering multiple mentoring paradigms on campus; small n-values would lead to statistical irrelevance. Consequently, a meta-analysis of reported mentoring programs is in progress. Meta-Analysis is the “systematic procedure for synthesizing and summarizing the results from previous studies”²⁰. Unlike a literature review, meta-analysis involves the researcher to define a problem, search for relevant research studies, determine the accountability and credibility of the studies, and present overall findings to form a conclusion or solution to the defined problem.

Generally, meta-analysis is utilized as a research tool when conducted research cannot be easily tested within a laboratory or other staged environment. Studies that have previously been conducted in the past, such as certain behavioral studies, require that the subjects do not know they are participating in the study. Knowledge of participation may hinder the ability for the test subjects to be unbiased during the research process. The first step in conducting a meta-analysis is to define the research problem. For this study, the subject in question is one that involves human interaction with one another through faculty mentoring relationships. For the meta-analysis process, the research question may be summed up as, “What mentoring types or combinations thereof are most successful for STEM faculty in small institutions?”

Once the research question is defined, relevant research studies are analyzed carefully to determine the relevancy and validity to the subject. The researcher must develop a criterion for each study that defines the process for which each study is to be analyzed. For this meta-analysis, the researcher analyzed the studies in question with the following guidelines:¹

- On what type of mentoring relationship is the study focused?
- Where was the study conducted?
- Are there any mistakes or biased assumptions included within the study?

Analyzed studies proven to be relevant to the meta-analysis are then categorized and carefully dissected to determine the conclusion of each individual study. Notes are carefully logged and every minute detail of the study is analyzed to determine how the results from the study in question validates or disproves the hypothesis for which the meta-analysis is being conducted.

Current Findings

From the current and continuing meta-analysis being conducted for this study, the table on the next page lists various institutions and their mentoring types thus far. Various institutions generally have one mentoring program that combines mentoring paradigms. For the table below, the primary mentoring paradigm used within the program is listed.

As shown on by the tables and figures on the next page, the majority (87%) of mentoring programs currently used at institutions of higher education use formal mentoring programs. These mentoring programs were broken down into four major categories: dyadic mentoring, triadic mentoring, circular mentoring, and group mentoring. Dyadic mentoring used within a formal setting was the most common paradigm developed within the fifteen institutions that were included within the initial analysis. Breakdowns of program by paradigm and type of program may be found in the graphs on the next page.

<i>Institution</i>	<i>Program Type</i>	<i>Mentoring Paradigm</i>
Kansas State University ⁸	Formal	Group
Marquette University ⁹	Formal	Dyadic
Purdue University ²⁵	Formal	Dyadic
California State Polytechnic University, Pomona ¹²	Formal	Circular
Texas A&M University ¹⁷	Formal	Dyadic
University of Iowa ¹⁰	Informal	Group
University of Massachusetts, Amhurst ²¹	Formal	Group
University of Delaware ²⁶	Formal	Group
Rice University ¹⁸	Formal	Triadic
University of Wisconsin ²⁷	Formal	Dyadic
University of California, San Diego ¹¹	Formal	Dyadic
University of Missouri, Columbia ¹⁵	Formal	Dyadic
University of Montana ²³	Formal	Dyadic
University of North Carolina ¹⁴	Informal	Dyadic
University of Rhode Island ¹	Formal	Group

Table 1: Mentoring Paradigms at Various Universities

Formal mentoring programs were deciphered from informal programs by the method in which the mentoring relationships were formed. Informal mentoring groups were not formed by a structured model and many participants were voluntary.

In addition to the specific mentoring programs, many institutions have also created various workshops and training sessions to better prepare mentoring participants for future mentoring relationships and activities. The University of Missouri-Columbia has developed a mentoring program with much flexibility for both the mentors and mentees. A formal mentoring structure has been created where mentoring pairs are developed but are also enhanced with group mentoring that may be completed both formally and informally²¹. This allows mentors and

mentees to communicate with more individuals and receive more exposure to new ideas and suggestions.

Mentoring Paradigms

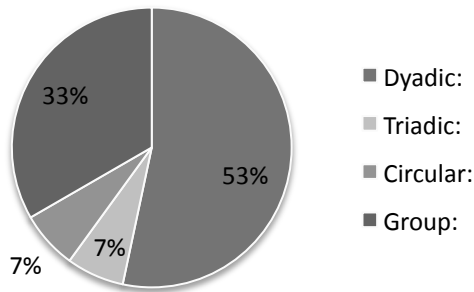


Figure 1

Program Type

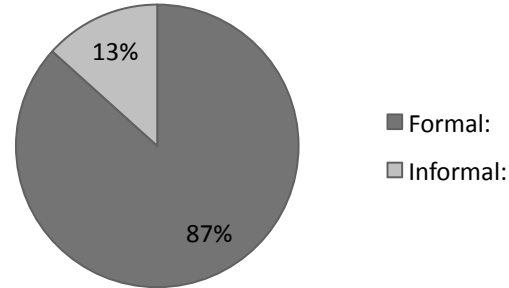


Figure 2

Formal Mentoring Paradigms

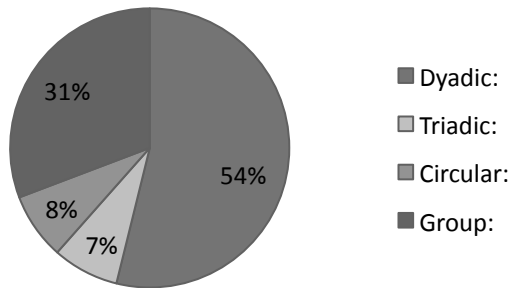


Figure 3

Informal Mentoring Paradigms

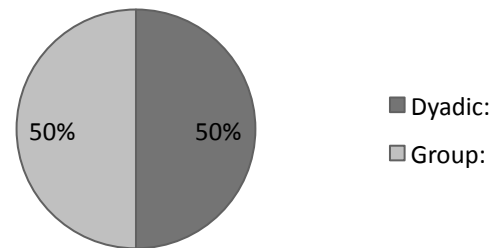


Figure 4

In Figures 3 and 4 (above), the breakdown between the formal and the informal mentoring types are shown. As demonstrated in Figure 3, the majority of the formal mentoring groups formed are dyadic. This may be due to the fact that dyadic mentoring has been present since Grecian times and is known as the traditional type of mentoring²⁵.

It appears that many of the institutional mentoring programs that have utilized the dyadic mentoring scheme are in the process of implementing group mentoring programs, whether formal or informal. Dyadic mentoring is slowly becoming a mentoring style of the past as universities realize the diverse faculty populations on their campuses; every type of faculty member is trying to benefit from these various mentoring programs. As more diverse faculty members enter the campus, views on problem solving and other campus issues also increase. Faculty members at universities already know that “two heads are better than one”. Currently faculty members at universities across the country are slowly testing the hypothesis that any given mentee may need more than just one other “head”.

Future Work

Currently, mentoring programs, specifically those targeted at underrepresented STEM faculty are under assessment and will continue to be assessed to determine which programs can be categorized as successful and the degree of efficacy for underrepresented groups. A checklist is currently being constructed to specifically define and determine the types of mentoring programs deemed to be successful. From this checklist, each mentoring program will be dissected to ensure the validity of the program. It is currently unknown exactly how many participants are included within each mentoring program. As future mentoring programs are studied, the most effective and beneficial mentoring paradigms for different faculty development needs will be determined.

Telephone interviews will be conducted during the research process to determine the influence that mentoring relationships have had on faculty members. The interviews will also determine the type of mentoring structure with which faculty have had positive experiences or have been personally concluded as successful.

ⁱ Note that these questions are only a sample of the guidelines used within the meta-analysis. Study guidelines will be further discussed in later chapters. Each guideline question is essential to validating the study. If one study is included within the meta-analysis that is proven to be invalid or faulty, the validity of the entire meta-analysis may be questioned.

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