

## **AC 2009-914: IMPROVING STEM DOCTORAL STUDENTS' RELATIONSHIPS WITH THEIR ADVISORS: WEB-BASED TRAINING IN INTERPERSONAL PROBLEM SOLVING**

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## **Improving STEM Doctoral Students' Relationships with their Advisors: Web-Based Training in Interpersonal Problem-Solving Skills**

All graduate students, regardless of discipline, gender, or ethnicity, encounter an array of social, economic and academic factors that influence their decision to persist in graduate programs. In STEM fields where women are already underrepresented, any factor that may interfere with their degree completion warrants attention. The retention of women doctoral students in science, technology, engineering and math (STEM) programs continues to be a problem. Recent outcome data from the Council of Graduate Schools confirms that rates of attrition are significantly higher for women than men across all doctoral programs and gender is the strongest predictor of graduate school completion<sup>1</sup>. In the physical sciences and engineering, attrition is most common within the first three years<sup>2,3</sup>. While women represent 22% of the doctoral students in engineering, they receive only 17% of the doctorates; the dropout rate for women is roughly twice that of male PhD students in the same fields<sup>4,5</sup>. Additionally, even women who persist through their doctoral program remain unlikely to actually embark on a career in science or engineering; 36.5% of women with degrees in science, compared to 27.4% of men, never begin science careers<sup>5</sup>.

*The purpose of CareerWISE*, an NSF-funded research program, is to improve the retention of female STEM doctoral students (and, indirectly, the likelihood of their entry into STEM-related careers) through the development and evaluation of online personal resilience training. In early *CareerWISE* studies, four types of concerns were identified as particularly discouraging to doctoral student women in STEM fields: lack of timely success or progress with dissertation research, difficulty balancing the demands of academic work with a personal life, coping with a professional climate that can be unfriendly toward women, and managing a difficult relationship with the primary dissertation advisor<sup>6,7,8,9</sup>. This paper examines a small portion of the *CareerWISE* research program and presents preliminary results related to user impressions of the web-based training materials that have been specifically designed to assist graduate students in successfully navigating the advisor-advisee relationship. Specifically, we examine user perception of material relevance, and user confidence and intentionality with regard to implementing the coping strategies provided on the *CareerWISE* website.

### **Significance of the Advisor – Advisee Relationship**

A graduate student's advisor is an important and powerful person during the student's journey through graduate school. The advisor is not only the head of the dissertation committee, but is also a guide to the academic program, the dissertation process, research, professional opportunities, and the discipline at large<sup>10</sup>. The type of relationship that a student develops with her advisor can affect greatly her productivity and progress in her program<sup>11</sup>, especially as she transitions into the dissertation stage<sup>12</sup>.

A positive relationship with the advisor is a strong predictor of productivity and completion of the doctoral degree. Students who have a greater degree of interaction with their advisors are more likely to graduate than those whose interaction with their advisor is minimal<sup>10</sup>. As well, women who withdrew from their doctoral program reported being less satisfied with the doctoral experience than men who withdrew, and the majority of women reported that problems with

their advisor-advisee relationship were directly related to their decision to withdraw from their doctoral program<sup>13</sup>. Lovitts' survey<sup>10</sup> found that students who completed their PhD program (completers) were twice as likely as non-completers to be "very satisfied" with their advisors, while non-completers were more likely to be "not too satisfied" or "not satisfied at all" with their advisors.

The critical factors related to advisor satisfaction can be broadly categorized into six areas: intellectual/professional development, interest in advisee, professionalism, personality of the advisor, advising style, and accessibility<sup>10</sup>. Lovitts<sup>10</sup> suggests the most predictive factor of advisee satisfaction with a graduate advisor is the advisor's involvement in the intellectual and professional development of the student. In this survey<sup>10</sup>, students described these advisors as challenging them to think harder and more imaginatively; satisfying advisors were also described as attentive, willing to listen, and enthusiastic about their student's work. Additionally, students were satisfied with advisors who gave them freedom and independence to explore research ideas, but also provided feedback and direction when needed.

However, in reality, it can be quite difficult to find an advisor who possesses all of these characteristics in addition to sharing research interests with the student. As a result, students may need to seek alternate sources of support. One such resource is a mentor. According to the *How to Get the Mentoring that You Want Guide* from the University of Michigan, a mentor is a faculty member with career experience who shares his/her knowledge with mentees and provides moral and emotional support as well as feedback on performance. Mentoring has been shown to increase graduate student productivity, generate higher degrees of satisfaction with degree programs, and stimulate more involvement in the department activities<sup>14</sup>. Mentors in science and engineering fields assist the student with professional socialization and navigating the culture of the discipline. These roles often extend beyond graduation and through the student's professional career<sup>15</sup>.

### **The *CareerWISE* Approach to Problem Solving**

*CareerWISE* provides web-based training in interpersonal problem-solving skills to assist STEM women in getting the most out of their relationships with advisors and mentors. Engineers and scientists often identify themselves as problem solvers<sup>16, 17</sup> and STEM students are usually exposed to problem solving techniques such as the scientific method, root cause analysis, and the engineering design process during their undergraduate curriculum. Jensen<sup>18</sup> and Ulrich and Eppinger<sup>19</sup> give examples of typical undergraduate engineering textbooks which include sections devoted to teaching the application of various types of technical problem solving. Debate continues with regard to the effectiveness with which *typical* graduates of undergraduate STEM programs can apply technical problem solving skills<sup>20</sup>; it is reasonable to assume, however, that students who were successful enough in their undergraduate education to continue on to PhD programs have had ample practice and success in the application of problem solving to technical problems. The *CareerWISE* online training tool builds on the technical problem solving skills with which they are already familiar and provides instruction in applying them to the interpersonal problems they may be having with their advisor.

The *CareerWISE* problem solving model has four key steps that are analogous to those in a typical technical problem process: assessing the problem, specifying the outcome you want, weighing strategies and making a plan, and taking action and reviewing results. This model allows users to apply a familiar, systematic approach to identifying and addressing hurdles throughout their graduate school experience<sup>21</sup>.

Applying the concepts of technical problem solving to personal and interpersonal problems is not a trivial task. To do so, students require assistance and training in a new set of skills. For example, root-cause analysis is a common engineering-problem solving approach in which the root causes of a specific technical problem are identified so that they can be addressed to prevent recurrence of the problem. Generally, root-cause analysis is applied after a problem has been identified, but skilled practitioners of root-cause analysis can also use the tool to identify root-causes of anticipated problems. If a female STEM doctoral student wished to apply root-cause analysis to a difficult personal or interpersonal problem, such as “why can’t I seem to get timely feedback from my advisor?,” she would first need to identify the fundamental causes for the problem. However, it is unlikely that she knows how to identify what those root-causes might be without the assistance of experts in the area of interpersonal problems. *CareerWISE* provides such expertise by embedding psychological education and skill training modules within each of the problem-solving steps. Specific training modalities include tutorials to strengthen personal and interpersonal skills, written case studies that demonstrate effective solutions to commonly faced problems, and videotaped interviews of successful women engineers and scientists. The case studies and videotaped interviews serve as examples, demonstrating the need for the accompanying skill-building tutorials in a context familiar to the women STEM PhD students. *CareerWISE* not only provides the actual training to the target audience, but also highlights why this training is particularly important.

## **Purpose of the Study**

The research reported here focuses on the impact of the web-based training materials that pertain to Steps 1 and 2 of the *CareerWISE* problem solving model (assess the problem and specify the desired outcome) and addressing difficulties related to advising. The materials selected for evaluation in this study were designed to help users determine the most important advisor characteristics for their individual success in graduate school. The content emphasizes the need to prioritize these advisor attributes and sometimes to rely on alternate sources of support.

The purpose of this study was to examine participant perceptions of: a) the relevance or applicability of the advisor-related materials to the situations they face in graduate school, b) the relative level of confidence in employing the targeted skills, and c) the usefulness of the training materials in helping them generate alternatives to the coping methods they’ve previously employed. The data derived from this study are intended to provide further direction in the construction of and progression toward the final version of our internet-based resiliency training intervention for women in the STEM fields.

The present study involved a remote user web-based evaluation of the *CareerWISE* website. This paper presents the methods and results, and concludes with a discussion and plans for future work.

## Methods

This section describes methods used for participant recruitment, the material evaluated during the study, and the data collection instruments used to collect participant feedback.

### *Participants*

Participants were recruited from the target population (women in STEM Ph.D. programs) using a “snowball”<sup>22</sup> methodology. This recruitment strategy involves developing connections with members of a target population and recruiting them to participate in a particular research study. Initial participants are then encouraged to recruit as participants other people they know in the target population, and then this second, “snowball”, group of participants is asked to do the same after participating in the study themselves. Additional participants have been recruited across multiple research trials of the *CareerWISE* web-based resource by contacting staff, graduate advisors and faculty members in STEM departments, and requesting their cooperation in recruiting STEM women for participation in the study. This two-pronged recruitment strategy has led to a significant increase in sample size over previous strategies that relied primarily on recruitment via e-mail.

The participants in the present study ( $N = 15$ ) were female STEM PhD students at a large southwestern university. The sample was 66.7% Caucasian, 20.0% Hispanic, 6.7% Asian/Asian American, and 6.7% Black/African American women (age range: 24 – 31,  $M = 27.1$ ,  $SD = 2.22$ ). The majority of the sample (86.7%) had U.S. citizenship. Participants represented a variety of STEM disciplines: Chemistry ( $N = 4$ ); Industrial Engineering ( $N = 3$ ); Mathematics and Statistics ( $N = 2$ ); Bioengineering ( $N = 1$ ); Geography ( $N = 1$ ); Geophysics ( $N = 1$ ); Geological Sciences ( $N = 1$ ); Materials Science and Engineering ( $N = 1$ ), Not Reported ( $N=1$ ). A majority of participants (73.3%) reported having earned a Masters degree, and had spent an average of 2.8 years ( $SD = 1.2$ ) in their current doctoral program prior to evaluation.

Using the two-pronged recruitment strategy described above, twenty-five women responded to the initial invitation to participate in the current study, which was described as a 3-4 hour review of a web-based resource for women in STEM Ph.D. programs. The study proceeded in two steps. First, the women were sent an introductory email, which contained a consent form and provided them with a link to a Pre-Evaluation measure. Participants were instructed that completion of the Pre-Evaluation measure constituted their consent to participate in the study. Second, those participants who completed the Pre-Evaluation measure were sent a second e-mail with a link to the *CareerWISE* website, along with instructions explaining how to review the website and complete the two website evaluation measures. These participants were also assigned to one of five treatment groups. Each treatment group was given access to roughly 1/3 of the *CareerWISE* website, with all five treatment groups receiving access to the advisor related materials that are discussed in this study. To ensure that each treatment group only viewed the intended areas of the website, the appropriate web links were removed for each group. The initial participant pool for the current study was 25 women; of these, 22 participants completed the Pre-Evaluation measure, and 15 participants completed the 3-4 hour review of the website and completed the multi-measure evaluation of the advisor-related skills training section of the website. Participants who completed both steps of the evaluation (Pre-Evaluation measure and

multi-measure website evaluation) received a small cash honorarium. Descriptions of the evaluation materials and measures used in this study follow.

### *Materials*

The present study asked participants to evaluate three Informational Briefs (IBs) related to advisor and mentor relationships. The IBs serve as reference pages and guide the user toward identifying what she wants in an advisor, how she can get the most out of her relationship with her advisor, and when to rely on external sources of support in the form of mentorship.

A description of each of the Informational Briefs follows.

1. *What Do You Want in an Advisor?* This IB is intended to provide STEM women with information about the formal and informal roles and responsibilities of advisors. The five-page brief explains the role of an advisor in a PhD program and contains a self-test designed to assist doctoral students in identifying what their current advisor provides by way of support and contrasting that with what they themselves identify their personal needs to be.
2. *How to Help Your Advisor Help you?* This IB assists women in taking the initiative to build a stronger and more effective relationship with their advisor. The IB is two pages in length and gives tips to participants about the “do’s” (e.g., take ownership of your intellectual development, and give feedback to your advisor about what is helpful to you) and the “don’ts” (e.g., wait for your advisor to initiate contact with you) of working with one’s advisor.
3. *What Do You Want in a Mentor?* This informational brief is intended to help STEM woman learn how a mentor can provide additional support in their personal, academic, and professional development. The two-page brief explains the definition and purpose of a mentor and also asks women to reflect upon what they are looking for in a mentor. Suggestions are included about how to get the most from a mentor and how to find a mentor (e.g., contacting professionals who have received awards in the past for their mentoring contributions, and contacting alumni).

### *Measures*

Prior to viewing the *CareerWISE* materials, participants completed a *Pre-Evaluation Assessment*. This 18-item measure was used to describe participant characteristics that have been suggested to predict satisfaction and persistence at the doctoral level; these include coping self-efficacy<sup>26</sup> and academic and social integration<sup>25</sup>. While some of the items in this instrument were created for this study, the majority of the items in the Pre-Evaluation Assessment were taken from previously existing scales that have been used to measure the variables of interest with undergraduate samples<sup>23, 24</sup>. We use the self-report measures to profile each individual woman who uses our web-based training program. Participants were asked to rate the extent to which a series of statements are true of the way they perceive their PhD program experience the majority of the time, and were rated along a five-point Likert-type scale ranging from 5=very true of me to 1=not at all true of me (sample item: “If earning a Ph.D. turns out to be harder than expected, I will drop out of school or drop down to a Masters degree.”). Higher item scores indicate a higher degree of agreement with a particular statement, while lower scores indicate lower/no agreement. Three items were reverse coded (sample item: “Few of the faculty members I have had contact

with are willing to spend time outside of class to discuss issues of interest and importance to students”).

After reviewing the *CareerWISE* website, participants completed a multi-measure evaluation of the advisor-related skills training portion of the website. The quantitative items used in this study are rated along a 5-point Likert scale (1= not at all likely, 5=very likely).A description of the specific measures follows.

*Skills Training Measure.* The Skills Training Measure (see Appendix A) is a 10-item scale containing three qualitative and seven quantitative items designed to assess participants’ reactions to website content (e.g., value of content, relevance, takeaway messages). Participants were asked to rate along a six-point Likert-type scale (1= strongly disagree, 6= strongly agree) the extent to which they agreed with a series of statements about the information they just reviewed. Higher scores indicate a higher degree of agreement with the statement provided, while lower scores indicated a lower/no degree of agreement. The measure consisted of both quantitative (sample item: “This section of material contained practical information that could be applied to problems I experience as a woman in a STEM PhD program) and qualitative items (sample item: “After viewing this section of the website, what, if anything, will you do differently in your own graduate experience?”). The measure was given to participants after review of each of the three advisor-related sections of the *CareerWISE* website.

*User Impression Measure.* The User Impression Measure (see Appendix B) is a 17-item measure containing 13 qualitative and 4 quantitative questions designed to assess user impressions of the *CareerWISE* website overall.(sample quantitative item: “How likely are you to visit this website again at a later date?”; sample qualitative item: “What is your initial overall reaction of the website?”). The analysis and results from this measure will not be discussed in this paper

## Results

Results were obtained separately using the pre-evaluation and the website review portions of the evaluation. A summary and discussion of the results obtained during each of the two steps of the evaluation follows.

### *Pre-Evaluation Assessment Results*

Based on the results from the Pre-Evaluation Assessment, a number of characteristics can be derived regarding the present sample. Overall, participants (N=22) reported a moderately high level of satisfaction with their PhD program, with an average satisfaction level of 77.8% on a 100-point scale ( $SD = 18.99$ ). Comparatively, participants reported a very high level of confidence in completing their PhD program, reporting an average confidence level of 95.2% on a 100-point scale ( $SD = 5.89$ ). Of note is the fact that figures may be a reflection of our sample, as opposed to an accurate description of the entire target population. The sample consisted of well-supported, well-connected women at a large university, who may differ in their experiences and outlook from other female STEM PhD students. The relatively high levels of satisfaction and confidence warrant replication with additional samples.



Participants were also asked in the *Pre-Evaluation Assessment* to respond to five items concerning their interactions with faculty. With regard to faculty support, 47.8% of participants endorsed the statement, “Few of the faculty members I have had contact with are generally interested in students,” and 34.8% of participants agreed that “Few of the faculty members I have had contact with are willing to spend time outside of class to discuss issues of interest and importance to students.” At the same time, a majority of participants reported that they believe that non-classroom interactions with faculty have a positive influence on personal growth (69.5%), intellectual growth (82.6%), and career goals and aspirations (82.6%).

### *Web-Based Evaluation Results*

Three sets of questions were asked of participants. Broadly stated, the quantitative measures pertained to the relevance and applicability of the materials. The data derived from these measures were analyzed using descriptive statistics and t-test analyses. The qualitative questions addressed learning and intentions to respond differently to experiences with an advisor.

The first set of research questions in the web-based portion of the evaluation examined participant perception of the applicability of the advisor-related training materials. The research questions themselves, along with the means and standard deviations for their responses are presented in Table 1. In this table, *M* represents the mean response across all participants, and *SD* represents the standard deviation across all participants. Additionally, higher scores indicate stronger levels of agreement with each item. As shown in Table 1, all three skill training exercises (“What do you want in an advisor?”, “How to help your advisor help you”, and “Mentorship”) were rated highly by participants (*N*=15) with respect to level of personal relevance, perception of helpfulness of material in considering solutions to problems, as well as perception of increased ability to deal with future challenges in graduate school. However, *t* test analyses indicated significant differences between participants’ perception of the level of practical information contained in the “How to Help Your Advisor Help You” IB and the “What do You Want in an Advisor” Infobrief. Participants found the latter IB to contain significantly more practical information than the former,  $t(1,28) = 7.65$ ,  $p < .01$ , where 1 represents the number of treatment groups in the study and 28 represents the degrees of freedom of the sample size.

The second set of research questions in the web-based evaluation was designed to ascertain participant confidence in and intent to apply to her own graduate experience the skills learned in each topic area. The means and standard deviations for the second set of research questions, along with the research questions themselves are presented in Table 2. As with Table 1, *M* represents the mean response across all participants, and *SD* represents the standard deviation across all participants in Table 2; higher scores also again indicate stronger levels of agreement with each item.

The results in Table 2 show that all three skills training exercises (“What do you want in an advisor?”, “How to help your advisor help you”, and “Mentorship”) were rated highly with respect to the first two items measured in Table 2 (confidence in applying the skills they learned and intention to use the skills they learned in considering solutions to future problems they may face in graduate school). Overall, *t* test analyses indicated no significant differences between the responses of participants for each training skill exercise with regard to the items in Table 2.

**Table 1: Relevance of Skill Training Material.** M = mean, SD = standard deviation, and higher scores indicate stronger levels of agreement with each item, where 1 = Strongly Disagree and 6 = Strongly Agree.

	<u>What do you Want in an Advisor?</u>		<u>How to Help Your Advisor Help You</u>		<u>Mentoring</u>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
This section of material contained practical information that could be applied to problems I experience as a woman in a STEM PhD program.	5.60*	0.63*	5.20*	0.94*	5.53	0.83
This section of material helped me consider solutions to the problems I experience in my STEM PhD program.	5.00	0.93	5.27	0.8	5.13	0.99
After working through this section of material I am better able to deal with the problems that might arise for me as I work through my STEM PhD program.	4.93	0.92	5.20	0.86	5.33	0.90

Note: \*= significance at the  $p < .05$  level.

**Table 2: Applicability of Skill Training Material.** M = mean, SD = standard deviation, and higher scores indicate stronger levels of agreement with each item, where 1 = Strongly Disagree and 6 = Strongly Agree.

	<u>What do You Want in an Advisor?</u>		<u>How to Help Your Advisor Help You</u>		<u>Mentoring</u>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
After working through this section of material I feel confident that I can successfully apply the information I've learned to my own problems.	4.86	0.92	5.20	0.86	5.00	1.00
After working through this section of material I intend to use the information I've learned by applying it to my own problems.	4.80	0.86	5.33	0.72	5.13	1.25
After working through this section of material I feel more anxious about the problems I face in graduate school.	2.00	1.41	2.33	1.54	1.73	1.10

The third and final set of research questions examined, after viewing each of the three advisor-related Information Briefs, participant self-report of what they would do differently in their graduate experience. Then, after viewing all three IBs, participants were asked what they would do differently the next time they faced one of three common advisor-related challenges. Responses of the participants (N=12) were analyzed using grounded theory<sup>27</sup>, an approach where researchers do not compare results to preconceived conceptual categories of results. In this type of qualitative analysis, conceptual themes emerge from the data rather than being superimposed onto the data, and meaningful clusters are identified. Two auditors independently examined the

raw data and came to the consensus on the interpretation of the data. Results are presented below, first by specific Informational Brief, and then by specific advisor problem.

- *What do You Want in an Advisor.* After reading this IB, some participants (N = 4) reported that they would not change anything about their advisor relationship, stating that they were satisfied with their advisor. Other participants (N=3) stated that, in addition to their advisor, they would try to find a mentor to foster their personal and career growth. A few participants (N = 2) reported that they would evaluate what they want in an advisor; one participant stated, “I will do a conscious evaluation of what I want from my advisor, what is missing, and ways (in) which I can...improve our relationship in terms of needs and expectations.” Others noted they would get an advisor more involved by increasing communication (N=2), tell other graduate students about the information provided in this IB (N=1), and become more aware of advisor responsibilities (N=1).
- *How to Help Your Advisor Help You.* After reading this IB, a majority of participants (N = 7) reported that they would improve their communication with their advisor by initiating, or increasing the frequency or accuracy of the communication occurring. One participant explained that she has “known from day one of grad school about communicating expectations and roles” but it has not worked. However, she then explained that, after reading this IB, she intends to utilize a resource on the *CareerWISE* website (this resource is not included in the current study) to obtain further assistance with this challenge. Other participants (N=3) reported that they would become “more active” or “proactive” in their relationship with their advisor. One participant shared that she would “be more aware”, and another participant stated, “I will remember that my advisor is human. Sometimes I forget because it seems like he can do just about anything.”
- *Mentorship.* The majority of participants (N=8) responded to this IB by reporting that they would either look for a mentor in addition to their advisor (N=6) or increase the number of mentors that they already had (N=2). One participant reported, “I think I will look for mentors more proactively. This is a great idea, simply something that I have not been motivated to do because I tend to be independent and I worry about taking too much time from an already busy person.” Other participants (N = 2) stated that they would utilize resources such as professional organizations or contacts from their alma mater to generate mentors. One participant shared that she would find “a mentor closer to my field”, and another participant stated that she would make a conscious effort to increase the amount of contact she has with her mentor. In sum, all participants but one reported that after reading the Mentorship IB that they would either seek a mentor or solidify current relationships with their mentor(s).

After reviewing all three Informational Briefs, participants were asked to report what they would do when they next had each of these experiences.

- *Difficulty getting one-on-one time with your advisor.* Participants provided a variety of proactive strategies for how they would deal with this problem. Half of the sample (N=6) stated that they would seek out a mentor or other resources if their advisor was unavailable or unwilling to meet with them. Other participants (N=3) reported that they would “be

persistent” or “keep trying” to connect with their advisor, and others (N=3) suggested alternative ways they could connect with their advisor (e.g., “See if we can communicate by e-mail or phone until he’s free for a meeting.”). One quarter of participants (N=3) reported that they would communicate the importance and/or their need for the one-on-one time with their advisor, and one participant shared that she would not do anything differently.

- *Receive inadequate or vague feedback and direction from your advisor.* There was very little variety in participant responses to how to handle this situation. The majority of participants (N=11) reported that they would ask directly for “additional clarification” or “more specific feedback” from their advisor, and many participants (N=6) stated that if this strategy didn’t produce more specific feedback, they would seek out a mentor or another resource (e.g., “another member of my committee”). Two participants combined these strategies; as one explained, “Be straight and honest with him that I need more feedback. If that doesn’t work, then I will probably talk to one of the senior scientists in the lab.”
- *When you have different expectations than your advisor about your relationship.* Participants provided a variety of interpersonal and intrapersonal strategies for how to deal with this problem. Virtually all participants (N=11) reported that they would speak with their advisor about this issue. However, while some participants merely stated that they would talk with their advisor about it (N=4), others were more specific (N=7), reporting that they would discuss with their advisor the roles and expectations of the advising relationship. One participant added that she would use this as an opportunity to communicate her professional goals to her advisor. The only other interpersonal strategy participants reported for this problem was to seek out a mentor or another resource (N=3). Two participants reported that they would address this problem intrapersonally, reflecting on their own expectations of their advisor and evaluating whether these expectations are realistic.

## Conclusions and Next Steps

Results of this study related to the relevance of the *CareerWISE* website materials indicate that all three IBs are relevant to participants’ graduate school experiences. Additional analyses indicated that participants found the “What do You Want in an Advisor” IB to contain significantly more practical information than the “How to Help Your Advisor Help You” IB. With regard to our second research question, participants reported a high level of confidence in employing the targeted skills to their own situations. While there were no significant differences between IBs with regard to participant confidence levels, the “What do You Want in an Advisor” IB generated the highest average score, followed by the “Mentorship” IB. The “How to Help Your Advisor Help You” IB generating the lowest average score. Results addressing our final research question, the usefulness of the training materials in helping women generate alternative coping methods, produced two major themes. First, women reported intent to implement a variety of the coping strategies presented in the training materials. Additionally, the most frequently reported coping strategies included increased communication with an advisor and the acquisition of a mentor.

The results from the Pre-Evaluation indicate between a third and a half of the participants in the study don’t believe that the faculty makes time for them. However, the participants also

recognize that faculty attention outside the classroom is important, which suggests that the students are being underserved by their faculty and provides preliminary evidence that the materials on how to communicate with your advisor are needed and would be of value.

The results presented in this paper provide support for the usefulness of the *CareerWISE* advising and mentoring Informational Briefs for learning how to better manage their relationship with advisors and mentors. However, the results from this study are preliminary and are constrained by the small sample size. We anticipate that further research with our growing pool of participants will strengthen the validity of the results of the present study and extend our understanding of whether advisees can actually improve their relationships with advisors, and in turn, improve their chances of completing their degrees. This focused study is a part of our continuing research effort to ascertain the value and applicability of the *CareerWISE* resource for women in STEM PhD programs.

Next steps for the *CareerWISE* research program include expanding evaluation studies to more learning outcomes and persistence indicators, and to other areas of concern beyond advising and mentoring. Comparative studies are also underway to assess the effectiveness of the online delivery medium for this population and skill set. The *CareerWISE* website is scheduled for public release in 2009.

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