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Development of a Questionnaire to Identify Barriers and Facilitators to Academic Careers for Women in STEM

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DEVELOPMENT OF A QUESTIONNAIRE TO IDENTIFY BARRIERS AND FACILITATORS TO ACADEMIC CAREERS FOR WOMEN IN STEM

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DEVELOPMENT OF A QUESTIONNAIRE TO IDENTIFY BARRIERS AND FACILITATORS TO ACADEMIC CAREERS FOR WOMEN IN STEM

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This thesis is dedicated to Elisabeth, my fiancée and best friend, who has been a continuous source of motivation, and whose encouragement and unending support has inspired me to be the best student and person I can be.

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The purpose of this research was to develop a questionnaire to be used to identify barriers and facilitators to women faculty in science, technology, engineering, and mathematics (STEM) academics. The phenomenon known as the leaky pipeline, a theoretical model describing why women are underrepresented in STEM disciplines, was examined. Women have long been underrepresented in STEM professions despite an increase in the number of women earning STEM degrees, suggesting women are faced with barriers that prevent them from achieving equal representation with men. The literature has identified several potential barriers, both historical and new, such as biological inequalities, family responsibilities, commitment differences, competitive differences, gender stereotypes and implicit biases, work environments, and job preference. Major facilitators included mentors and specific policy/program implementation. Barriers and facilitators to faculty members at Western Kentucky University will be identified objectively through the use of this questionnaire in a future study.

Introduction

The fields of science, technology, engineering, and mathematics (STEM) are very important to many different aspects of everyday life. Many of the products of organizations in the STEM discipline are used by a large number of individuals daily, and they generally improve the quality of life for those who use them. The concepts taught by STEM classes, such as basic math (i.e., addition, subtraction, etc.), are foundational to basic understanding and critical thinking. Thus, it is very important for qualified individuals to enter STEM professions. One way to do this is by focusing on increasing the number of college graduates with STEM degrees.

Increasing the number of STEM graduates is very important to the STEM disciplines and the United States as a whole. According to a report from the President's Council of Advisors on Science and Technology, it is projected that over the next decade there will be a need in the U.S. for approximately one million more STEM professionals than the country is currently producing (Olson & Riordan, 2012). The report stresses how critical it is to implement strategies that encourage degree retention of post-secondary students with STEM majors. A similar report found that there are currently up to 600,000 STEM job openings and unfilled positions (Battelle Technology Partnership Practice, 2014). Based on these two reports, it is apparent that both the current and future job markets require more qualified STEM professionals. This should be encouraging to young adults who are considering a career in STEM fields. One demographic that could increase the number of qualified STEM professionals is women. Unfortunately, despite now being on par with men in terms of mathematical ability and admittance to STEM

doctoral programs (National Academy of Sciences, 2007), women are still very much underrepresented in STEM disciplines.

The *pipeline* model has been proposed to explain women's limited presence in STEM disciplines (Xu, 2008). This model gives two possibilities that explain the underrepresentation of women in STEM: a) the flow of female students entering STEM education/careers and b) the leakage, or attrition, of women who have already entered STEM education/careers. According to this model, the underrepresentation of women can be corrected by increasing the number of women who enter STEM, which can be done by encouraging them and building their interest in STEM topics from grade school to graduate school (Xu, 2008). It is believed that an increased female labor pool, which results from the increased flow, will eventually result in expanded representation. However, as will be discussed later in this review, women are still very much underrepresented in STEM professions despite a greatly increasing amount of women completing STEM degrees (Bilimoria, Joy, & Liang, 2008). According to the pipeline model, this persistent underrepresentation suggests that there is a leakage problem. Leakage suggests there is gender disparity when hiring women into STEM professions and/or women leave the discipline in the middle of their careers. Because of this, the pipeline model is often referred to as the leaky pipeline. The model proposes that, in addition to increasing flow, leakage in the pipeline must be prevented at all stages of a woman's path through STEM disciplines (Xu, 2008).

Transition through the Stages of a STEM Education

There are various stages along the pipeline where women are supposedly leaked. The pipeline carries students from high school through college and on to jobs in STEM.

The major leakage points occur when students who are interested in STEM select other areas to study when applying to college, college students in pursuit of STEM degrees change their major prior to graduation, and STEM graduates select another field as a career (Blickenstaff, 2005). Because of leakage at these critical points in a student's education, efforts must be taken to increase retention of all students, especially women STEM students. One way of doing this is by ensuring a positive academic environment be maintained. Research has linked academic environments to student learning and retention, such that positive perceptions of the environment can increase student success (Ramsey, Betz, & Sekaquaptewa, 2013). Creating better academic environments is just one approach to attracting women to STEM. However, it is becoming apparent that this approach and other existing efforts are not working (Blickenstaff, 2005); this suggests that there is something more that is keeping women out of STEM disciplines. Some proposed explanations to this phenomenon are described later in this review.

Whereas leakage through women's STEM education is a major problem, it does not stop once women graduate and secure a job. Women in the workplace continue to face hardships and underrepresentation in STEM careers. To better understand why women are either unable to secure a job in STEM fields or leave the field altogether, it is necessary to examine potential barriers they may face.

Barriers to Women in STEM

Historically, women have been underrepresented in STEM disciplines; however, as of late, the gap has been closing. Bilimoria et al. (2008) found the number of women earning doctorates in science and engineering has increased by more than seven times between 1973 and 2003. The increased representation also was noted by Ceci, Ginterh,

Kahn, and Williams (2014); however, they noted that this difference is not seen as readily in more math-intensive fields such as engineering, mathematics/computer science, and the physical sciences. Furthermore, the representation of women faculty in science and engineering positions at universities continues to remain low (Bilimoria et al., 2008). This finding suggests that although women are increasing their representation in STEM disciplines, there are still barriers keeping them from equal representation with men. Additionally, given the increase in women receiving doctorates in STEM fields, earned education degrees can no longer be considered a barrier to women.

Previously, it was believed that the underrepresentation of women in STEM could be attributed to various reasons such as biological gender differences, women not being as good at math as men, women being held back by family responsibilities, women being less committed to their career than men, women being less competitive than men, and not as many women being qualified to enter STEM positions (Ceci et al., 2014; National Academy of Sciences, 2007; Xu, 2008). However, it has been discovered that many of these historical beliefs are not empirically supported (Ceci et al., 2014; National Academy of Sciences, 2007; Valian, 2014; Xu, 2008, 2015). The major historical reasons, as well as the evidence that disputes them, are discussed in further detail below.

Biological gender differences. It has long been believed that biological gender differences in mathematical ability exist (Benbow & Stanley, 1983; Finegan, Niccols, & Sitarenios, 1992; Hines et al., 2003). However, research findings on this topic have been inconclusive. For example, pre-natal hormones have been predicted to cause gender differences in spatial ability, but evidence suggests that gender differences in spatial ability are due to many factors and there is no linear relationship between these abilities

and pre-natal hormones (Ceci et al., 2014). Ceci and colleagues (2014) also stated that math is comprised of a variety of different cognitive skills and the importance of each of these differs depending on the various fields of mathematics. Thus, while spatial ability may be critical for geometry, for example, it is far less important for algebra. This line of thinking cautions against the assumption that early gender differences in spatial ability are directly responsible for later underrepresentation of women in STEM careers. Further, it has recently been suggested that the core cognitive basics of mathematical thinking have little to do with biological gender differences (Spelke, 2005; Xu, 2008).

Although biological differences in mathematical ability have been ruled out as a potential barrier to women in STEM, Schmidt (2014) proposed that pre-natal testosterone causes men to be more interested in factors related to STEM fields. Specifically, men show more interest than women do in inanimate objects, or "things," which typically tends to be more associated with science and math. The author proposed that this is an explanation for women's underrepresentation in STEM. However, Valian (2014) discussed how theories like Schmidt's dichotomize human interests into things versus people, and that this categorization is inaccurate and misleading. In fact, interests are sensitive to subtle environmental cues, suggesting that the interests of both men and women are malleable. This is in conflict with the notion that pre-natal testosterone predetermines men's interest in STEM topics. Valian stated that women's interest in math and science can increase if they are presented with an environment promoting feelings of belonging and an expectation of success. Unfortunately, women are often given cues that lead to disinterest in these topics because they are in male-oriented environments, thus creating barriers for women to hurdle.

Gender mathematical inequalities. Another historical barrier is the notion that women simply are not as good as men in mathematical subjects. Part of the belief is the biological differences previously mentioned, but there are social aspects that contribute to this notion as well. Whereas a gap in the mathematical ability of adolescents has been noted in the past, that gap is now closing (Ceci et al., 2014). At both the high school and college levels, men and women are showing similar rates of mastering the more demanding materials in math and science (National Academy of Sciences, 2007; Xu, 2008). This trend continues for further education pursued after college. As already mentioned, the number of doctorates awarded to women in STEM has greatly increased over recent years (Bilimoria et al., 2008), and there is now very little difference between men and women in the likelihood of pursuing a PhD and tenure-track professorships (Ceci et al., 2014).

Family responsibilities. Because women bear children and are typically designated as primary care-givers, it has long been hypothesized that family responsibilities hold women back in their careers. This hypothesis has led to the belief that family responsibility is a possible explanation for women's underrepresentation in STEM (National Academy of Sciences, 2007). Again, this historical belief has been disputed by more recent research. In a longitudinal examination on the underrepresentation of women in STEM from the perspective of a gender-based earning gap, Xu (2015) reported that women's distractions from childrearing and other family obligations are not causes of the pay gap. This was evidenced by the pay gap that still exists between childless, unmarried women and men. Women in STEM disciplines also continue to persist in their pursuit of academic careers despite work-family conflicts that

often occur (National Academy of Sciences, 2007), suggesting that family responsibilities can cause a strain on women, but does not deter them from their careers as scientists and engineers. Not only has empirical evidence disputed that family responsibility interferes with work responsibility, evidence is beginning to show that married faculty may even be *more* productive than unmarried faculty (Xu, 2008). Thus, this historical barrier to women in STEM may be more accurately described as a misconception.

Differences in careers. Two other historical barriers to women in STEM are the perceptions that women are less committed to their jobs and are generally less competitive than men (National Academy of Sciences, 2007; Xu, 2008). In a study of tenured and tenure-track fulltime university faculty in STEM disciplines, attrition and turnover intentions were measured for both men and women to determine if these constructs could be reasons women are underrepresented in STEM. The analysis showed that women do not intend to leave their academic careers any more often than do men in the same profession (Xu, 2008). Whereas the results of this study rule out attrition intentions as a potential cause of women's underrepresentation in STEM, the study also provides evidence that women in STEM are equally committed to their careers as men. This analysis also provides further support against a previously discussed historical barrier (i.e., women's family responsibilities are the cause of their underrepresentation). If women were more distracted by their family responsibilities, they would likely be less committed to their profession.

The belief that women are less competitive than men can perhaps be attributed to gender stereotypes. Ceci et al. (2014) proposed that adolescent girls do not compete well on tests when stereotype threats are present, especially when girls are sensitized to gender

prior to the test. The authors believed that this sensitization to gender causes doubts in girls' math ability, causing anxiety, and this anxiety lowers performance. Further evidence can be found when comparing results on math tests when girls are outnumbered by boys to when they are grouped with other girls. When girls are in perceived competitions against other girls, they perform better on math tests; however, when girls are outnumbered by boys, they perform worse (Ceci et al., 2014). It seems likely that women could be just as competitive as men if these stereotypes were non-existent, thus removing some of the anxiety women possess as a result. Another way to examine competitiveness in STEM disciplines is by the number of applicants who plan on entering academic employment. If men are more competitive, it seems likely that a higher proportion of men would apply for jobs in STEM disciplines. However, evidence shows that men and women with doctorates plan to enter academic employment in similar proportions (National Academy of Sciences, 2007). Thus, competitiveness does not appear to be a true barrier to women in STEM. The literature has shown some discrepancies in the careers of men and women STEM professionals, but these will be discussed in detail later in the review.

Fewer women are qualified. Another popularly held belief as the cause of women's underrepresentation in STEM is that there simply are not enough qualified women professionals to be equally represented with men. This belief is based partially on the assumption that as time moves on, more women will be qualified to enter these positions, and their representation will increase as a result (National Academy of Sciences, 2007). However, this claim has been disputed as well. As already been mentioned in this review, the number of women pursuing STEM doctorates has greatly

increased in the last 40 years (Bilimoria et al., 2008), and there is now very little difference in the likelihood of men and women to enter STEM doctoral programs (Ceci et al., 2014). Yet, women still are underrepresented in academic STEM disciplines. Further evidence revealed that women's representation decreases at every step along a tenure-track academic career (National Academy of Sciences, 2007).

There are several other potential barriers believed to be part of the reason women are underrepresented in STEM. Ceci and colleagues (2014) conducted a thorough review of this topic, and listed several other commonly-held, but not necessarily historical, potential explanations for this phenomenon. These explanations include: pay per published article, citations per published article, and discriminatory journal and grant reviewing. The review stated that these reasons are not supported empirically, thus ruling them out as potential barriers.

Despite evidence against several historically held beliefs about barriers to women in STEM, it is still apparent that women are underrepresented. Notwithstanding the fact that similar proportions of men and women pursue STEM doctorates and plan to enter STEM careers, women are still underrepresented. This makes it clear that other barriers must be contributing to this phenomenon. Before going into detail about these potential barriers, it is important to note that there is likely not a single barrier that is solely responsible for women's underrepresentation in STEM; it is more likely that there are several barriers that all contribute.

Emerging barriers. One potential barrier that has already been mentioned is gender stereotypes. As previously discussed, adolescent girls perform better when competing against other girls than when they are outnumbered by boys (Ceci et al.,

2014). However, a similar handicap due to gender stereotypes seems to be present in the workplace as well. Men have traditionally dominated STEM fields, and women are now entering a work environment that favors men, causing some women to continuously question their own abilities (National Academy of Sciences, 2007). Xu (2008) also recognized this trend when studying attrition rates of women in STEM. The researcher reported that women often feel they are receiving insufficient research support, have concerns about advancement opportunities, and feel limited freedom in their expression of ideas. These are very serious concerns which are not shared by their male counterparts, and can be very discouraging to women who want to seek academic careers in STEM disciplines. The stereotypes that lead to this environment are likely fueled by prejudices that many are unaware they possess. A review of barriers to women in STEM stated that most people (both men and women) hold implicit biases which greatly affect evaluations of employees and their work (National Academy of Sciences, 2007). The review further reported that research has shown people are more likely to hire men than equally qualified women, are more likely to give credit to accomplishments of men than identical ones of women, and are more likely to give the benefit of the doubt to men over women. It is critical that employers in academic STEM disciplines, and other disciplines, become aware of these implicit prejudices and do not let them affect their decisions because the consequences have such negative impacts on women. Gaining awareness of these prejudices will be very difficult, because these findings suggest that even scientists who believe they are being objective and fair are not immune to these predispositions.

More evidence of implicit bias at work was reported in a recent study by Proudfoot, Kay, and Koval (2015). The authors found that, according to supervisors,

stereotypically masculine characteristics are more strongly associated with creativity. Additionally, men are more often given credit for creative input than are women with identical ideas. This is just another example of a workplace-based stereotype that contributes to the discrimination against women. It also was found that women are often passed over for leadership positions because their creativity was not recognized, which the authors proposed as an explanation to why women are more absent from STEM than men.

Another possible barrier, which stems from implicit biases, is that women have limited opportunities at work. It's already been stated that women have a smaller chance of being hired than men, but those women who are hired suffer from isolation and a delay in advancement (Xu, 2008). Because of this, these women are in lower ranking and non-tenured positions, which usually result in lower salaries, heavier teaching loads, and the necessity of serving on more committees. Unfortunately, all of these factors may lead women to be dissatisfied with their jobs, which may lead to turnover (Xu, 2008). If women are leaving their STEM careers because of job dissatisfaction due to limited opportunities that men do not share, these limited opportunities seem like a plausible explanation for women's underrepresentation in STEM.

King (2008) examined advancement of working mothers in academia. The researcher used a questionnaire to compare senior faculty's perceptions of commitment, availability, and desire for advancement for colleagues who were mothers and fathers. The results showed that mothers' attitudes about their careers were consistently underestimated by senior faculty, while similar attitudes of fathers were overestimated. This is further evidence of stereotypes, whether implicit or explicit, present in the

workplace. The same study also found no evidence of commitment or attitudes about work to be barriers to women in STEM. In another study, King (2015) found further evidence of stereotypes present in the workplace. Namely, the author proposed that women face discrimination when they become pregnant. As soon as women announced they were pregnant, they were met with discriminating acts, such as rudeness, decreased eye contact, hostility, and more. Interestingly, they were not met with discrimination when acting in a manner consistent with feminine stereotypes. This bias often results in women waiting to start a family. Unfortunately, this can result in the formation of another stereotype. It has been found that during the pre-tenure stage of their careers, women are less likely to get married and have children (Mavriplis et al., 2010). This results in a reinforcement of the perception that a woman cannot be successful and raise a family at the same time.

Some research has emerged that suggested women have a strong preference for flexible work conditions that is not normally shared by men (Ceci et al., 2014; Xu, 2008). This thinking has led some to believe that a woman's personal choice is a cause of their underrepresentation in STEM. Xu (2008) reported that women prefer to avoid research-oriented jobs, as well as isolated and competitive work environments; they instead favor environments that put an emphasis on teaching. This preference is a result of free choice and could partially explain the unequal representation in academic STEM disciplines, which usually are more research-oriented. This premium that women tend to place on flexible work can often result in lower wages and promotion for some STEM disciplines (Ceci et al., 2014), which, again, may lead to job dissatisfaction. This indirect relationship between flexible work conditions and job dissatisfaction is further evidence

that there is not one single barrier to women in STEM, but several, interconnected barriers that can account for women's underrepresentation in academic STEM professions.

More evidence of personal choice being a barrier to women in academic STEM disciplines is reported in a longitudinal study conducted by Wang, Eccles, and Kenny (2013). The authors found that participants who were skilled in multiple areas (i.e., math and verbal ability) while in high school were less likely to choose careers in STEM. The authors also reported that women were more likely to be high in both verbal and math abilities than were men. This suggests that women, when highly skilled in multiple areas, are more likely to enter careers other than STEM.

As mentioned above, family constraints are not a typical barrier to women in academic STEM disciplines; however, finding work/life balance often results in barriers. A popular press article reported the struggles women face in the workplace after starting families (Miller, 2014). The article discussed the gender gap between men and women in business and stated that prioritizing family does not statistically explain this gender gap. Thus, while prioritizing family over work is not necessarily a barrier women face, men's expectations, public policy, and employers block the level of achievement for women. The article reported no differences in the work-related goals of men and women, yet women are driven to care for their families instead of reaching high levels of achievement. The article stated that most of the women who left work to care for their children reported feelings of stigmatization from their employers, which essentially pushed the mothers out of the workplace.

Whereas the article described above is from popular press, it does have some empirical support. Research has found that women often face pressures in balancing their careers and families (Mavriplis et al., 2010; Rosser, 2004). Often, women have a difficult time securing positions in the same geographical area as their partners, which creates added stress and can result in a barrier to their own careers. Similarly, the current career model of society does not fit with women's biological clocks or their desire to establish a family (Mavriplis et al., 2010). This academic model for advancement, especially in tenure-track positions, promotes a lock-step progression that requires a lot of hard work and a lot of time until one's career is "made." However, this rigid model interferes with the prime years in women's lives for them to have children. The researchers claimed that this disproportionately penalizes women, contributing to a slower advancement path. Other barriers include lack of freedom to select a research topic (Mavriplis et al., 2010), tight resources (Rosser, 2004), poverty (Beekman & Ober, 2015), and workplace norms (Miller, 2014).

Potential Explanations for the Leaky Pipeline

Much of the evidence generated by research to explain the leaky pipeline has resulted in the barriers described above, specifically gender stereotypes and unfavorable work environments (Blickenstaff, 2005; Etzkowitz & Ranga, 2011; Settles, Cortina, Malley, and Stewart, 2006). In sum, many of the barriers women perceive they are met with at work contribute to the leakage in the pipeline, keeping some promising women from ever entering the workforce in the first place.

Some women in STEM may feel they are met with isolating and unfavorable work environments, and these feelings are not shared by men (Xu, 2008). In a similar

study, Settles et al. (2006) used a survey to investigate the effect of negative personal experiences and perceptions of the workplace environment/culture on work outcomes (i.e., satisfaction, productivity, etc.). The results showed that a woman's perception of her work environment is related to work outcomes, specifically *negative* perceptions often resulted in *negative* outcomes whereas *positive* perceptions resulted in *positive* outcomes. Furthermore, it was reported that women who felt the climate they worked in was sexist tended to experience less job satisfaction. The researchers proposed that negative outcomes are at least a partial explanation for leaks along the pipeline. Evidence of unfavorable work conditions being related to leakage has been found in several other reports as well (i.e., Blickenstaff, 2005; Etzkowitz & Ranga, 2011).

In an analysis of the leaky pipeline, Blickenstaff (2005) reported a lack of support for biological basis and woman being less qualified than men as explanations to women's underrepresentation in STEM. Additionally, the author proposed that the leaky pipeline model is insufficient in explaining women's underrepresentation. He proposed that the pipeline is not leaking, but rather a gender filter is in place preventing women from gaining equal representation in STEM disciplines. This line of thinking shifts the focus from women being the issue to improving STEM as a whole. Instead of concentrating on why women fall out of the pipeline, the author suggested that it is necessary to create environments where women STEM students and workers will be more likely to succeed (Blickenstaff, 2005). It is important to note that there is no single cause for the filter, which is consistent with the belief that there is no single barrier. A multi-faceted solution is necessary to fix the filter, thus improving STEM.

Etzkowitz and Ranga (2011) proposed that the leaky pipeline model is outdated as well. In this review, the authors proposed that a "vanish box" model is more appropriate. According to Etzkowitz and Ranga, the leaky pipeline assumes that when women leave academic STEM professions, they are considered lost to science. However, they point out that new occupations that combine science and business are emerging and women often leave academia for these new professions. It is reported that these new career paths present women with more favorable work conditions, thus attracting them away from universities (where unfavorable environments have been reported). The vanish box model identifies women leaving academic STEM for these new STEM opportunities as a recoupment, not a loss of women scientists. According to the model, women meet blockages at each milestone of their academic STEM career that are not present to men. These blockages are similar to what has already been discussed (i.e., stereotypes, unfavorable work conditions, etc.). When met with these blockages, women vanish from STEM, then reappear in these new occupations as they emerge (Etzkowitz & Ranga, 2011).

The vanish box model is a much more favorable way to view leakage because it is not necessarily a bad thing when women leave academic STEM positions. When women leave for jobs that are still a part of STEM, they are not lost to science as the leaky pipeline model suggests. However, whereas this may be a more favorable view of leakage, it does not account for the negative work environments and implicit biases to which women in academic STEM disciplines are exposed. Not all women who leave academic STEM professions enter these new fields; so, attention must still be given to

women in new professions as well. There is little research on this model as of yet; it will be important for future researchers to assess it empirically.

Facilitators to Women in STEM

There have been numerous studies on barriers to women in STEM disciplines as potential explanations to their underrepresentation. This research has focused primarily on providing evidence against traditionally-held barriers. Because substantial evidence against many of these barriers has been produced, perhaps focus should shift to identifying current barriers to women. Some research has identified several potential barriers, but it would be beneficial if a more comprehensive list was produced. Additionally, more evidence should be generated in support of these non-historical barriers.

Perhaps an equally important topic to barriers women face in STEM disciplines is *facilitators* to women in STEM disciplines. It is very important to understand what is keeping women from joining academic STEM professions, but focus also should be given to factors that motivate and support those women who stay in their academic careers and to view them favorably. A major benefit to researching barriers (and facilitators) can be found at an organizational level as well. If universities (and other STEM organizations) can become aware of the various barriers women face, they can attempt to restructure their culture to avoid them. And, by being informed of facilitators to women in STEM disciplines, they can implement policies that promote these facilitators. This would be beneficial to women, the organization, and STEM professions as a whole. It is critical that more qualified STEM professionals enter the workforce, but it is even more important that all people have an equal opportunity to contribute to the

field. As of now, this is not the case, as women are underrepresented in STEM disciplines despite the equal proportion of men and women STEM graduates. By identifying barriers, and implementing new facilitating policies, women should begin to become equally represented in the field.

Some research already has identified potential facilitators. For example, mentors and role models have been identified by several researchers as being an influential facilitator (Bilimoria et al., 2008; Blickenstaff, 2005; Etzkowitz, Kemelgor, Neuschatz, Uzzi, and Alonzo 1994; Ramsey, Betz, & Sekaquaptewa, 2013). However, while mentors offer women many benefits, it has been shown that mentors can be detrimental to women's career in academics as well. In a report by Etzkowitz et al. (1994), the authors reported that senior female STEM faculty developed similar values and work styles of older men. This development resulted in unintended consequences for the younger women faculty; namely, the different value systems removed the availability of relevant role models. So, whereas the availability of senior faculty members to look up to is important, it is not enough; it is essential that women have access to positive role models, men or women, who share similar values.

Another identified facilitator is the implementation of certain policies that improve women's overall workplace experience. Research has identified the following polices/programs as facilitating women's careers in STEM disciplines: policies regarding child care, parental leave, recruitment and retention; slowing the tenure clock; pre-tenure workshops on research, teaching, and academic service, written and oral communication, negotiation, and work-life balance; facilitating partner hires; recognizing and validating work in extra teaching and service beyond what is required; compensating for lost

research time due to extra teaching and service; and grant-writing seminars (Etzkowitz et al., 1994; Mavriplis et al., 2010; Rosser, 2004).

However, similar to mentors, policy implications can be detrimental to a woman's STEM career as well. Whereas policy change can be beneficial, the existence of policy alone does not promise facilitation of women's academic careers. Ryan and Kossek (2008) found that, depending on how policy is implemented, it can either break down barriers or create new ones. The authors identified four attributes that influence how policy affects these barriers: supervisor support, universality, negotiability, and quality of communication. Lack of supervisory support, particularistic policies, unfair negotiations, and ineffective or selective communication can all have negative effects for women. Thus, something that is intended to aid in decreasing workplace barriers ends up contributing to the problem. However, the authors noted that when policies are implemented well, they do contribute to breaking down barriers. They provided the following suggestions to promote positive results: supervisors remove obstacles to policy use and promote feelings of respect and inclusion through support, policies are open to all employees, polices avoid a one-size-fits-all approach, and policies are effectively communicated to employees.

King (2015) suggested that workplaces can eliminate workplace stereotypes and, as a result, facilitate the careers of women. If organizations can address stereotypes, and present information inconsistent with stereotypes, this barrier can essentially be eliminated. King also stated that organizations should do more than simply offer pregnancy plans; supervisors should be supportive enough that pregnant women can discuss their employment status and plans prior to taking maternity leave. This builds a

psychological contract between the woman and her supervisor, thus easing any doubts or concerns she may have had about maternity leave.

Further facilitators identified by Bilimoria et al. (2008) include: networking, leadership development, education and training, and childcare. Effective leadership also has been identified as a facilitator by other researchers (Settles et al., 2006; Valian, 2014).

Summary

In summary, there are a number of potential barriers women may face in academic STEM careers which may contribute to the leaky pipeline. Many of these barriers, unintentional or not, are institutional and correctable. It is important to identify any potential barrier in order to correct the underrepresentation of women in academic STEM careers. Perhaps equally important is to identify facilitators to the academic careers of women in STEM. The purpose of the current study is to develop a questionnaire to identify potential barriers and facilitators at Western Kentucky University (WKU).

Current Study

The purpose of the current research is to develop a questionnaire to objectively assess both barriers and facilitators to academic careers for women in STEM disciplines. This questionnaire was created with the intention of it eventually being administered at WKU to identify barriers and facilitators to women faculty in STEM. Perhaps, when presented with both facilitators and barriers, women will realize the support they are receiving or could be receiving in a more facilitative work environment. Additionally, the results of the questionnaire study should objectively demonstrate that barriers do exist and may expose barriers a woman is experiencing that she may not have realized were

there. Additionally, exposure to the questionnaire may assist men in identifying any implicit biases they have. Further, the results may promote a more facilitative environment by showing men and women the possible facilitators the university could implement.

In this study, critical incidents were collected from male and female WKU faculty across all disciplines. These critical incidents were used to develop a questionnaire for future administration to male and female WKU faculty in STEM and non-STEM disciplines. The resulting questionnaire data should enable an objective assessment of barriers and facilitators to women in STEM at WKU. The primary focus of the current study was item generation and categorization for the development of a questionnaire. The result of this study is said questionnaire that will be used to identify perceived barriers and facilitators to the academic careers of women in STEM disciplines at WKU.

Method

Throughout this study, the National Science Foundation (NSF) definition of STEM disciplines was used. This definition includes the fields of chemistry, computer and information technology science, engineering, geosciences, life sciences, mathematical sciences, physics and astronomy, social sciences (anthropology, economics, psychology, and sociology), and STEM education and learning research (Gonzalez & Kuenzi, 2012).

Participants

Data were collected from 140 faculty members at WKU. Participants were recruited through email and were encouraged to respond in order to support an NSF grant application for research on barriers and facilitators to academic careers at WKU. All

faculty were sent the email, regardless of their gender and/or discipline (i.e., STEM or non-STEM).

There were 153 participants who completed the survey; however, 13 responses were completely blank and were removed. Of the 140 remaining respondents, 34.3% were male, 62.9% were female, .7% identified as "other," and 2.1% chose the option "prefer not to say." The average number of years the participants have been employed at WKU was 11.8 years (*SD* = 11.12); three of the 140 participants did not answer this demographic question. Most of the respondents (i.e., 93.6%) were full-time faculty members, 54.3% of whom were tenured, 22.9% were on the tenure track, and 22.9% were not on the tenure track.

Materials

An open-ended questionnaire was administered to participants (see Appendix A) to elicit critical incidents (CIs) of barriers and facilitators. The questionnaire was administered online. The first page of the questionnaire asked participants to identify demographic information. This included sex, years employed at the university, employment status (full-time or part-time), and tenure status (tenured, tenure track, not tenure track). Participants were then asked to think of situations where their career at the university was facilitated by a behavior/policy/procedure. They were then prompted to list the antecedent/situation, behavior/policy/procedure, and consequence (the result of the facilitating behavior/policy/procedure) for up to three facilitators. Following completion of identifying facilitators, participants were asked to identify up to three barriers in the same manner. The questionnaire also contained a section asking

respondents to identify their priorities for WKU. This information was collected for a purpose unrelated to the current study.

Procedure

Participants were emailed a formal request to complete the questionnaire along with the link to the survey. Participants provided basic demographic information and the antecedent/situation, behavior/policy/procedure, and consequence for up to three facilitators and three barriers. The resulting CIs were categorized and used as response options on a questionnaire designed to more objectively assess potential barriers and facilitators to academic careers at WKU.

Results

Respondents were given the option to contribute one to three facilitators and one to three barriers. Repetitive responses were consolidated. The resulting CIs elicited by the questionnaire were merged with barriers/facilitators identified in the literature. Eliminating non-responses, consolidating repeated responses, and merging barriers/facilitators identified in the literature resulted in 176 potential facilitators and barriers. Fifteen categories were identified by the researcher. A qualitative analysis (i.e., Q-sort) was conducted to categorize each CI into one of the 15 categories. The categories were narrowed to 12 through several discussions between the researcher and a Ph.D.-level industrial-organizational psychologist, who served as a subject matter expert (SME). The 176 CIs were then categorized into one of 12 categories of facilitators and barriers: Teaching, Service, Research Support Other Than Funding, Research Funding, Professional Development, Policies: Promotion and Tenure (P&T), Policies: Hiring, Policies: New Child Leave/FMLA Policies, Policies: Other Policies, Fairness of Policy

Implementation and Practice, Administrative Leadership/Vision, and Mentoring. The allocation of CIs to categories was reviewed twice by the researcher and the SME. Once each CI had been successfully categorized, the CIs were edited into neutral terms so each CI could be used as a response options for both barriers and facilitators.

Each CI was then condensed into a concise statement. The CIs were used as response options in the resulting questionnaire designed to identify barriers and facilitators (to be administered at a future time). An open-ended response option of "Other" was included in each category, as was a "None in this category" option. When completing the questionnaire, respondents will be asked to select up to three facilitators and up to three barriers in each of the 12 categories. Respondents will then be asked to rate the strength of the selected barrier(s)/facilitator(s) in each category and will be given the option to leave a brief comment. The final questionnaire may be found in Appendix B.

Discussion

Relation to the Literature

As expected, several of the CIs reported as responses to the survey were reported in the literature reviewed in this paper. Gender bias, for example, was often identified as a barrier, and effective leadership was often identified as a facilitator. Many responses were related to leadership/mentoring, as many respondents identified this as both a facilitator *and* a barrier. This finding is consistent with research by Etzkowitz et al. (1994) about the absence of relevant role models for female STEM faculty. In the CI survey, the presence of a supportive leader was often cited as a facilitator, as was mentoring by those in leadership. Also, the lack of support from leaders was just as often

mentioned as a barrier, suggesting great differences in leadership across the various departments at WKU.

Gender bias was mentioned often as a barrier. Namely, some participants described entering a work environment dominated by men as being harmful to their career. Male faculty members dominating a given department could lead to a working environment that favors men, which the National Academy of Sciences (2007) identified as a potential barrier to the careers of women in STEM. A potential workplace culture that favors men is consistent with other barriers identified by respondents. The culture and/or the work environment were identified as being a barrier to multiple career facets, including promotion and tenure, research support, teaching, and leadership.

Some of the consequences of potential barriers identified in the earlier literature review were identified by survey respondents, although they were not linked to a cause in the present research. Xu (2008) reported that, because of implicit gender biases, women have limited opportunities at work, resulting in lower salaries, heavier teaching loads, and serving on multiple committees. Several of the WKU respondents identified low salary, heavy teaching load, and service requirements (i.e., serving on multiple campus committees) as barriers to their careers. However, they did not state gender bias as the reason for these barriers. It is possible that an implicit bias led to these barriers and the faculty members may be unaware of any such bias, but the data in this study do not address this question.

Many of the potential facilitators identified from the literature also were mentioned by respondents; however, it was the *lack* of these facilitators that WKU faculty members often reported as barriers. As already mentioned, a lack of effective

leadership/mentors was a commonly cited barrier. Other barriers identified include the lack of childcare at WKU, not slowing the tenure clock after pregnancy, difficulty in achieving work-life satisfaction, and lack of recognition for extra teaching and service. The presence of each of these practices was identified as a facilitator by multiple researchers (e.g., Etzkowitz et al., 1994; Mavriplis et al., 2010; Rosser, 2004). There were a number of facilitators reported by WKU respondents that were consistent with the literature. These include workshops on research, teaching, and academic service; leadership development; and grant-writing seminars.

Questionnaire Development

After the survey responses were collected, the CIs needed to be categorized. The researcher initially defined categories based on policies found in the WKU Handbook. Eight policies were identified from the handbook to be used as categories. Teaching, research, and service also were included as categories based on the suggestion of the SME. These three areas are central to the tenure process at WKU and are central to the career of each faculty member at WKU. Categories defined by the reviewed literature also were included. In total, 15 categories were initially identified along with 38 subcategories. CIs were initially sorted into the 38 subcategories. The idea was to have each major category as a section in the final questionnaire and to present each subcategory as a checklist for participants to identify which they experienced as a barrier or facilitator. However, it was determined that the number of categories needed to be reduced. Thus, the subcategories and categories were consolidated and reduced to 15 categories. The subcategories were eliminated altogether in favor of using each category as the question stem for the final questionnaire. The categories were reviewed again and

finalized by the researcher and the SME, resulting in the 12 categories of Teaching, Service, Research Support Other Than Funding, Research Funding, Professional Development, Policies: Promotion and Tenure (P&T), Policies: Hiring, Policies: New Child Leave/FMLA Policies, Policies: Other Policies, Fairness of Policy Implementation and Practice, Administrative Leadership/Vision, and Mentoring.

Once the 12 categories were finalized and the responses had been categorized, the researcher needed to determine the best way to structure the questionnaire. The researcher considered asking if the respondent experienced any barriers in a given category (e.g., "Have you experienced any of these barriers to your career in Teaching?") and using the barrier CIs as a checklist. The same format would have been used for the facilitator CIs. After much consideration, it was determined that the best format was to re-word each CI into neutral terms and use all CIs in a given category as response options for both facilitators and barriers in that category. The question stem was similar to the example above. An example of this item stem is "Have you encountered policies and practice related to **TEACHING** that **FACILITATED** your career at WKU?" and "Have you encountered policies and practice related to **TEACHING** that were **BARRIERS** to your career at WKU?" Additionally, an open ended "Other" response option was added to each list of barriers and facilitators, providing participants the option to write in a barrier/facilitator they may have experienced that was not included in the item responses.

The list of potential responses (i.e., facilitators or barriers) in a given category range from 7 to 27. A major goal of this questionnaire is to capture the critical barrier/facilitators present at WKU in a concise manner. It is important that only *actual* facilitators and barriers that have had a *significant* impact on a faculty member's career

are identified. Accordingly, it was decided to limit participants to three barriers and three facilitators for each category. The researcher did not want respondents to identify *potential* barriers/facilitators to their careers or insignificant barriers/facilitators. Limiting the number of responses should cause respondents to identify the barriers/facilitators in each category that had the most impact on their careers.

It was debated if only listing the potential barrier and facilitator options would be sufficient to provide meaningful results. The researcher decided to have participants rate the strength of each selected barrier and facilitator after identifying them. The purpose of this rating was to enable the researcher to determine the severity of experienced facilitators and barriers. A minor barrier is still a barrier, but likely would not impact a career as much as a significant barrier. Simply listing the options for participants to identify would preclude differentiating between the potential strength of the impact of each barrier/facilitator. Thus, after selecting which barriers/facilitators apply to the participant, s/he will be directed to another item asking him/her to "Rate the strength of the selected barrier(s)/facilitator(s)," and will be given the following options: "Not a barrier/facilitator," "Minor barrier/facilitator," "Moderate barrier/facilitator," or "Major barrier/facilitator."

Due to the neutral and brief description of the response options, the researcher included a place for participants to write a brief comment about each barrier/facilitator they selected. However, respondents are not required to leave a comment. It was believed that providing the participants this option would allow them to clarify their selections if they felt the need to. This information also could be of use when analyzing the data after the questionnaire is administered.

Conclusion

The final questionnaire may be found in Appendix B. The questionnaire will be administered to faculty of Western Kentucky University as early as the Spring 2016 semester. As with the CI survey, this questionnaire will be administered to both male and female faculty in both STEM and non-STEM disciplines. The results of the questionnaire should provide an objective description of the barriers and facilitators experienced by women in STEM disciplines at WKU, as well as provide comparison data from both men and women and those in non-STEM academic disciplines.

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APPENDIX A

Identifying Facilitators, Barriers, and Faculty Priorities at WKU

This is Part 1 of a 2-part study addressing facilitators and barriers to faculty careers at WKU and identifying faculty priorities for the university.

The purpose of Part 1 is to elicit information that will be used to inform the content of a questionnaire to be administered early spring 2016 (Part 2). In this Part 1 Survey, you will be asked to identify actual examples of facilitators and barriers that you may have encountered (or have first-hand knowledge) in your academic career at WKU. Next you will be asked to identify your priorities, as a faculty member, for the university.

The information obtained in this part of the study will be used to develop a questionnaire that will then be administered to WKU faculty to obtain more objective information about faculty facilitators, barriers, and priorities (i.e., Part 2 of the study - Spring 2016).

The results from the Part 2 questionnaire will be used for two purposes:
(1) To inform the work on an NSF grant under application by OCSE Dean, Dr. Cheryl Stevens, that will address university practices that serve as facilitators and barriers to faculty careers at WKU, and
(2) To provide our faculty regent, Dr. Barbara Burch, with an objective basis for sharing relevant information with the Board of Regents.

Both Dr. Burch and Dr. Stevens have endorsed this study.

This study has been reviewed by the WKU IRB and found to be [EXEMPT].

Study 1:
Identifying Facilitators, Barriers, and Priorities

Demographics

Below, you are asked to provide your sex, number of years at WKU, and whether you are full-time or part-time, and whether you are a tenure-track faculty member. This demographic information will help ensure we have a representative sample of faculty responding to this survey.

Your responses are anonymous. No individual responses will be reported.

1. Sex: ____Male ___Female ___Other ____ Prefer not to say

2. Years employed at WKU: _____ (number of years)

3. Employment Status: ____Full-time ____Part-Time

4. Tenure Status: _____Tenured _____Tenure Track ____ Not Tenure Track

Identifying Facilitators, Barriers, and Priorities

Below, we ask you to anonymously identify facilitators, barriers, and priorities at WKU. For each section you will be limited to three examples, so please include those examples you believe are the most significant.

Do NOT use specific names. Your examples should be written in generic terms.

Facilitators

Think of ***situations where*** your career at WKU was **facilitated by behavior/policy/procedure.** In your examples, explain the situation surrounding the facilitation, the facilitation itself, and the result or consequences of the facilitation. Below please provide up to 3 examples of facilitators to your career at WKU.

Include the ABC's:

- **Antecedent / Situation**: What was happening? What were relevant factors that came into play? What information is needed to understand the situation? (180 characters)

- **Behavior/Policy/Practice**: What specific organizational behavior/policy/practice (i.e. actions of others, policies, organizational culture, etc.) served as a facilitator to your career?

- **Consequence (The result of the facilitating behavior/policy/practice)**: Explain how the behavior/policy/practice served to facilitate your career. What was the result or outcome?

Barriers

Think of ***situations where*** you experienced a **barrier** in your career in academics. In your examples, please explain the situation surrounding the barrier, the barrier itself, and the consequences of the barrier. Below please provide up to 3 examples of barriers to your career at WKU.

Include the ABC's:

- **Antecedent / Situation**: What was happening? What were relevant factors that came into play? What information is needed to understand the situation? (180 characters)

- **Behavior**: What specific organizational behavior behavior/policy/practice (i.e. actions of others, policies, organizational culture, etc.) caused the barrier?

- **Consequence (The result or impact of the barrier)**: Explain why the behavior/policy/practice was a barrier and the result or outcome of the barrier?

Priorities

Salaries and Health Insurance are recognized as campus priorities and will be included on the survey in Part 2 of this study (i.e., the questionnaire developed based on responses to this survey). Accordingly, below we ask several questions about your opinion of Salaries and Health Insurance. We then ask you to identify your top 3 Priorities in addition to Salary and Healthcare. You also are asked to RANK your top 5 priorities. Please use each rank (i.e., 1, 2, 3, 4, 5) only once across all priorities. Thank you.

1. Salary
In terms of your priorities for WKU, where does SALARY rank?

My number 1 (top) priority
My number 2 priority
My number 3 priority
My number 4 priority
My number 5 priority
NOT among my top 5 priorities.

Briefly describe your opinion about university priorities concerning salaries.

2. Health Insurance
In terms of your priorities for WKU, where does HEALTH INSURANCE rank?

My number 1 (top) priority
My number 2 priority
My number 3 priority
My number 4 priority
My number 5 priority
NOT among my top 5 priorities.

Briefly describe your opinion about university priorities concerning health insurance.

Below, you are given the opportunity to identify up to 3 additional priorities that are important to you in order to be most successful in your work as a faculty member. Briefly describe the faculty priority and how it impacts you and your work.

1. Priority: (describe briefly)

    1a. In terms of your priorities for WKU, where does THIS PRIORITY RANK?
        My number 1 (top) priority
        My number 2 priority
        My number 3 priority
        My number 4 priority
        My number 5 priority
        NOT among my top 5 priorities.

    1b. What makes this a priority for you:

    1c. How does this priority impact you or your career?

2. Priority: (describe briefly)

    2a. In terms of your priorities for WKU, where does THIS PRIORITY RANK?
        My number 1 (top) priority
        My number 2 priority
        My number 3 priority
        My number 4 priority
        My number 5 priority
        NOT among my top 5 priorities.

    2b. What makes this a priority for you:

    2c. How does this priority impact you or your career?

3. Priority: (describe briefly)

    3a. In terms of your priorities for WKU, where does THIS PRIORITY RANK?
        My number 1 (top) priority
        My number 2 priority
        My number 3 priority
        My number 4 priority
        My number 5 priority
        NOT among my top 5 priorities.

    3b. What makes this a priority for you:

    3c. How does this priority impact you or your career?

Thank you for taking the time to complete this important survey. The aggregated responses from this survey will be used to develop the Part 2 Questionnaire that will be administered Spring 2016 to WKU faculty to obtain an objective indication of facilitators and barriers to faculty careers at WKU and to identify faculty priorities.

The results from the Part 2 questionnaire will be used for two purposes:
(1) To inform the work on an NSF grant under application by OCSE Dean, Dr. Cheryl Stevens, that will address university practices that serve as facilitators and barriers to faculty careers at WKU, and
(2) To provide our faculty regent, Dr. Barbara Burch, with an objective basis for sharing relevant information with the Board of Regents.

Both Dr. Burch and Dr. Stevens have endorsed this study.

APPENDIX B

Identifying Facilitators and Barriers for WKU Faculty
Questionnaire Directions and Structure

Directions:

This survey is being conducted to support an NSF grant application submitted by Dr. Cheryl Stevens, Dean of Ogden College of Science and Engineering, and is intended to identify policies and practices that serve as facilitators or barriers to faculty careers at WKU. Most individuals will be able to complete this questionnaire in approximately 20 to 40 minutes.

This questionnaire is formatted in a manner different from most questionnaires you are familiar with. Please read the directions carefully.

This questionnaire contains 12 categories of potential facilitators or barriers to your career at WKU. These facilitators and barriers were identified from the survey administered to WKU faculty fall 2015 and from the research literature on academic careers.

The 12 categories of facilitators and barriers are:
1. Teaching
2. Service
3. Research Support Other Than Funding
4. Research Funding
5. Professional Development
6. Policies: Promotion and Tenure (P&T)
7. Policies: Hiring
8. Policies: New Child Leave/FMLA Policies
9. Policies: Other Policies
10. Fairness of Policy Implementation and Practice
11. Administrative Leadership/Vision
12. Mentoring

· For each of the 12 categories, you will be asked to identify BOTH facilitators and barriers that have had an ACTUAL SIGNIFICANT impact on your career at WKU.
· All potential facilitators/barriers have been written in neutral language as the same action or policy may serve as a facilitator or as a barrier for different faculty members. Thus, the lists of potential facilitators and potential barriers within a category are identical.
· Within each category, you will be limited in the number of facilitators and barriers you may identify. **Please identify only facilitators and barriers that have *actually* had a *significant* impact on your career at WKU.**
· You may skip any category that has not impacted your career at WKU.

DIRECTIONS FOR EACH CATEGORY

IDENTIFYING FACILITATORS

Within each category, you will first be asked to identify a limited number *of facilitators you have experienced at WKU that have had a significant impact* on your WKU career as a faculty member.

1. You will be asked to check which, if any, of the facilitators listed have actually served as a facilitator that significantly impacted your own career at WKU. For some categories, you likely will have NONE that apply to you.
2. You will be limited in the number of facilitators you may identify within each category.
3. When you identify an actual facilitator that has significantly impacted your career, you will be asked to rate the strength of this facilitator.
4. After rating the strength of the facilitator, you will then be given an opportunity to add a brief comment about the facilitator you identified.

IDENTIFYING BARRIERS

After you have identified which, if any, facilitators apply to you for a given category, you will then be asked to identify which, if any, barriers in the same category apply to you. You will be presented with the same list you saw when identifying facilitators. This time, you will be asked *to identify actual significant barriers to your career at WKU*. If you have not encountered barriers for a given category, you may skip to the next category.

1. You will be asked to check which, if any, of the barriers listed have actually served as a barrier that significantly impacted your own career at WKU. For some categories, you likely will have NONE that apply to you.
2. You will be limited in the number of barriers you may identify within each category.
3. When you identify an actual barrier that has significantly impacted your career, you will be asked to rate the strength of this barrier.
4. After rating the strength of the barrier, you will then be given an opportunity to add a brief comment about the barrier you identified.

NOTE:

- **Please do NOT identify *potential* facilitators or barriers.**
- **Please do NOT identify facilitators or barriers that you are familiar with from someone else's experience. Please *identify your own* facilitators and barriers.**
- **Please do NOT identify facilitators or barriers you experienced somewhere other than WKU.**
- **Please DO identify only facilitators and barriers that have *actually had a significant impact* on your career at WKU.**

Thank you!

Demographics

Responses are anonymous and only aggregated data will be reported. We would like to compare responses for groups such as males/females, rank, pre or post tenure. If you prefer not to respond to a demographic item, you may skip that item. Please answer the following demographic items.

Sex

- ◯ Male
- ◯ Female
- ◯ Prefer not to respond

Employment status

- ◯ Full-time
- ◯ Part-time

Rank

- ◯ Instructor
- ◯ Assistant Professor
- ◯ Associate Proffesor
- ◯ Full Professor

Tenure Status

- ◯ Non-tenure track
- ◯ Pre-tenure tenure track
- ◯ Tenured

Is your faculty position in a STEM discipline (Chemistry, Computer and Information Technology Science, Engineering, Geosciences, Life Sciences, Mathematical Sciences, Physics and Astronomy, Anthropology, Economics, Psychology, Sociology, and STEM Education and Learning Research)?

- ◯ Yes
- ◯ No

Please indicate the **primary** racial or ethnic group with which you identify. (If you are of a multi-racial or multi-ethnic background, indicate that group with which you identify **most of the time**.)

- ◯ African American/Black
- ◯ American Indian/Alaskan Native/Aleut
- ◯ Asian
- ◯ Hispanic/Chicano/Latino
- ◯ Middle Eastern
- ◯ Native Hawaiian/Other Pacific Islander
- ◯ White/Caucasian
- ◯ Other: (Please specify)
- ◯ Prefer not to respond

Teaching

Have you encountered policies and practice related to **TEACHING** that **FACILITATED** your career at WKU?

- ◯ Yes
- ◯ No

You may check up three **FACILITATORS** related to **TEACHING**.

- ☐ Course reduction to write grant proposals
- ☐ Department head awarding teaching opportunities
- ☐ Opportunity to teach elective course(s) specific to area of expertise
- ☐ Reduced teaching load for new faculty
- ☐ Teaching an uncompensated overload
- ☐ Teaching a compensated overload
- ☐ Time requirements of teaching load
- ☐ Time requirements of administration duties
- ☐ Teaching core course(s) that other faculty lack expertise to teach
- ☐ Other: _____
- ☐ None in this category

Rate the strength of the selected facilitator(s).

	Not a facilitator	Minor facilitator	Moderate facilitator	Major facilitator
» Course reduction to write grant proposals	◯	◯	◯	◯
» Department head awarding teaching opportunities	◯	◯	◯	◯
» Opportunity to teach elective course(s) specific to area of expertise	◯	◯	◯	◯
» Reduced teaching load for new faculty	◯	◯	◯	◯
» Teaching an uncompensated overload	◯	◯	◯	◯
» Teaching a compensated overload	◯	◯	◯	◯
» Time requirements of teaching load	◯	◯	◯	◯
» Time requirements of administration duties	◯	◯	◯	◯
» Teaching core course(s) that other faculty lack expertise to teach	◯	◯	◯	◯
» Other: _____	◯	◯	◯	◯
» None in this category	◯	◯	◯	◯

Have you encountered policies and practice related to **TEACHING** that were **BARRIERS** to your career at WKU?

- ◯ Yes
- ◯ No

You may check up three **BARRIERS** related to **TEACHING**.

- ☐ Course reduction to write grant proposals
- ☐ Department head awarding teaching opportunities
- ☐ Opportunity to teach elective course(s) specific to area of expertise
- ☐ Reduced teaching load for new faculty
- ☐ Teaching an uncompensated overload
- ☐ Teaching a compensated overload
- ☐ Time requirements of teaching load
- ☐ Time requirements of administration duties
- ☐ Teaching core course(s) that other faculty lack expertise to teach
- ☐ Other: _____
- ☐ None in this category

Rate the strength of the selected barrier(s).

	Not a barrier	Minor barrier	Moderate barrier	Major barrier
» Course reduction to write grant proposals	◯	◯	◯	◯
» Department head awarding teaching opportunities	◯	◯	◯	◯
» Opportunity to teach elective course(s) specific to area of expertise	◯	◯	◯	◯
» Reduced teaching load for new faculty	◯	◯	◯	◯
» Teaching an uncompensated overload	◯	◯	◯	◯
» Teaching a compensated overload	◯	◯	◯	◯
» Time requirements of teaching load	◯	◯	◯	◯
» Time requirements of administration duties	◯	◯	◯	◯
» Teaching core course(s) that other faculty lack expertise to teach	◯	◯	◯	◯
» Other: _____	◯	◯	◯	◯
» None in this category	◯	◯	◯	◯

CIs Used as Response Options for All Categories

1. Teaching

Course reduction to write grant proposals

Department head awarding teaching opportunities

Opportunity to teach elective course(s) specific to area of expertise

Reduced teaching load for new faculty

Teaching an uncompensated overload

Teaching a compensated overload

Time requirements of teaching load

Time requirements of administration duties

Teaching core course(s) that other faculty lack expertise to teach

Other: _____

None in this category

2. Service

Compensation for extra service

Equitable distribution of service requirements

Flexibility in department allowing for service role opportunities

Reduced service responsibilities for new faculty

Service requirements

Other: _____

None in this category

3. Research Support Other Than Funding

Adequate research books in the library

Availability of sabbaticals

Course load that enables research

Course reduction to write grant proposal(s)

Department head finding appropriate lab space

Department size supporting sabbatical application

Earned course reduction to enable research time

Graduate Assistants

Interlibrary Loan service from the WKU Libraries

IRB policies and procedures are clearly explained

IRB policies and procedures are consistently enforced

IRB policies and procedures are accurately enforced

IRB applications are turned around/approved in a timely manner

IRB provides due process in investigating protocol questions

Staff support for research is provided on an objective basis (e.g., need, equally, or merit-based)

Support for building maintenance and repairs

Support staff dedicated to departmental instruments

Time to prepare grant proposals

Other: _____

None in this category

4. Research Funding

Administration communicating realistic and accurate expectations for available research funding

Funding early in research to gather preliminary data for larger grant proposals

Funding for graduate student research and travel

Funding for international travel to conduct research

Funding to attend conferences to present research

Internal funding for research

New faculty research funding/grants

Small grants to initiate research

Summer research grants

Startup funds for new faculty

Support for research for part-time faculty

Support for travel for part-time faculty

Quick turn around on small internal grants

Transparency in communicating how start-up money can be used

Other: _____

None in this category

5. Professional Development

Center for Faculty Development workshops on teaching and learning practices

Department head support to enable participation in distance learning programs

Department level funding for travel for professional conference

Departmental resources for creative endeavors

Development practices offered through the education and distance learning programs

Funding for additional training and education

Funding to attend conference workshops

Funding to earn required CEUs for licensing or certification

On-campus training and development to contribute to teaching

On-campus training and development to contribute to research

Opportunities for leadership development

Opportunities to network

Opportunities for professional development

Part-time faculty career path

Pre-tenure workshops on research

Pre-tenure workshops on service

Pre-tenure workshops on teaching

Pre-tenure workshops on work-life satisfaction

Pre-tenure workshops on grant writing

Professional development funding

University funding to attend professional development workshops/conferences

Other: _____

None in this category

6. Policies: Promotion and Tenure (P&T)

Ability of Provost to override department vote on P&T

Ability of Dean to override department P&T vote

Administrative responsibilities for pre-tenure faculty

Communicating realistic expectations for funding for research and travel to new faculty

Departmental policy for P&T

Different criteria across colleges in P&T requirements

Direction and feedback from department head regarding progress toward P&T

Discretion of Provost in finalizing P&T decisions

Instructor lines converted to tenure track

Requirement to meet standards in teaching, research, AND service for P&T

Requirement of administrator returning to faculty ranks to (re)apply for promotion

Policy separating tenure and promotion as independent decisions

Teaching load of pre-tenure faculty

Other: _____

None in this category

7. Policies: Hiring

Active recruitment of diverse faculty

Following process in WKU hiring protocol

Giving hiring preference to under-represented group members

Hiring based on ability of candidate to meet job requirements rather than personal preferences

Hiring based on knowledge, skill, and ability to perform job rather than irrelevant personal characteristics

Policy to conduct a search when a non-tenure track position is changed to tenure track

Policy to allow hiring temporary full-time faculty without a search

Supportive policies for dual career couples

Other: _____

None in this category

8. Policies: New Child Leave/FMLA Policies

Courtesy of colleague(s) toward pregnant faculty member

Covering responsibilities for another faculty on new-child leave without compensation

Covering responsibilities for another faculty on new-child leave with compensation

Department head working with faculty member to determine length of new child leave

Familiarity with pregnancy leave policy by dean

Familiarity with pregnancy leave policy by department head

Familiarity with pregnancy leave policy by faculty member

Interpretation of pregnancy leave policy by department head and/or dean

Receiving course load reduction with full pay while on new-child leave

Stopping the tenure clock for pregnant faculty member

Unpaid FMLA/maternity and paternity leave

Other: _____

None in this category

9. Policies: Other Policies

Availability of childcare

Flexibility in faculty schedules

Salaries accurately reflect value to WKU

Salaries at WKU as they compare to benchmark salaries

Salary compression

Support from counseling services when a traumatic event occurs in campus community

WKU faculty tuition waiver/scholarship

WKU parking policy

WKU policy to allow external faculty consulting

Other: _____

None in this category

10. Fairness of Policy Implementation and Practice

Administrators ensuring policies and practices are implemented without bias

Administrators providing support for dual-career couples

Colleagues who are supportive of individuals with disabilities

Consistently implementing ADA policies

Departmental recommendations to higher administration for funding based on merit rather than subjective or biased criteria

Department/University awards given based on merit rather than subjective or biased criteria

Each faculty member contributing his/her fair share to non-teaching responsibilities

Equally crediting men and women for contributions to university mission

Equally crediting men and women for creative input

Equitable salaries based on qualifications and merit

Freedom from retaliation for opposition to illegal discrimination on campus

Freedom from retaliation for making a claim or participation in investigations of illegal discrimination on campus

Opportunities for collaboration on grants are offered based on merit rather than subjective or biased criteria

Opportunities for teaching desired course are offered based on merit rather than subjective or biased criteria

Opportunities for article authorship are offered based on merit rather than subjective or biased criteria

Providing reasonable accommodations under ADA

Selectively enforcing policies

Top administrators consistently following policies and procedures

Other: _____

None in this category

11. Administrative Leadership/Vision

Assisting with transition to retirement

Compensation decisions based on merit rather than subjective or biased criteria

Considering consequences for faculty of administrative decisions

Creatively/flexibly implementing policies

Familiarity with policies and procedures

Giving benefit of doubt equally to men and women

Implementing innovative programs, policies, and practices

Implementing policies in a consistent manner

Making last minute decisions

Practices for funding different areas in university

Providing resources to support faculty

Referring faculty to appropriate policies and procedures

Recognizing work-life interaction in administering policies

Reflecting on institutional history, past policies, and current policies when making administrative decisions

Setting and communicating clear expectations for faculty performance decisions

Transparency in communication

Trust in administration by faculty

Trust in faculty

Truthfulness in communication from administration

Value administration places on service

Value administration places on grant work

Virtual hiring freeze on new faculty positions

Other: _____

None in this category

12. Mentoring

Availability of appropriate role models

Department head actively engaging in working with faculty on their research

Department head actively engaging in working with faculty on their service

Department head actively engaging in working with faculty on their teaching

Department head advising on grant opportunities

Department head collaborating with faculty on grant proposal

Department head encouraging research activity

Department head recommending professional development

Department head providing career guidance to faculty member

Department head providing direction and feedback regarding requirements for P&T

Faculty assisting on another faculty member's grant proposal preparation

Faculty working in isolation

Individual assistance from department head with research

Individual assistance from department head with service responsibilities

Individual assistance from department head on teaching practices

Senior faculty collaborating with junior faculty on research

Senior faculty initiating collaboration with junior faculty on research

Support for new program director appointed from current faculty

Support of colleagues for research

Support of colleagues for service

Support of colleagues for teaching

Support of dean for research

Support of dean for service

Support of dean for teaching

Support of department head for research

Support of department head for service

Support of department head for research

Other: _____

None in this category