How Can Encouragement Increase Persistence in Computing?

Anyone who participates in sports or physical training knows the positive effects of encouragement. Research in sports medicine finds substantial improvements in effort and persistence result from frequent exhortations like, “Great job!” and “Keep going; I know you can do it!” This type of communication from trusted sources motivates people to work at a task harder and longer (Bandura, 1997). It promotes career advancement. It equalizes retention of men and women computer science majors, and even increases women’s enrollment, because women more often than men say they entered computer science because a teacher, family member, or friend encouraged them to do it (Cohoon, 2006). Therefore, encouragement can be a powerful tool in an overall effort to bring gender balance to computing.

Encouragement seems to work by increasing the recipient’s self-efficacy (belief in one’s competence to succeed at a particular task). Self-efficacy can be increased in other ways too. For example, both observing someone perceived to be similar to one’s self succeed at the task and experiencing one’s own success at the task contribute to belief in one’s capacity to perform that task. The vicarious method and the verbal persuasion method (encouragement) seem to be particularly effective for increasing the likelihood that women will engage, persist, and put effort into tasks in domains like computing.

HOW TO ENCOURAGE PERSISTENCE

Effective encouragement requires some attention to the content and circumstances of your message. Simply offering “knee-jerk praise or empty inspirational homilies” is not likely to have the desired effect of cultivating belief in one’s competence (Maehr et al., 2008, p. 399). Instead, research suggests that effective encouragement might require a focus on elements over which the performer has control (Schunk & Zimmerman, 2007). It should exhort the performer to keep up the good work instead of praising her innate talent or ability, because people are motivated to work at overcoming challenges only if they believe that their effort increases their chances of success.

Finally, communicating encouragement should be personal, although it also may be public. In other words, announcing the names of those who put forth extra effort and had notable accomplishments can be very effective. Likewise, it might even help to give information that the individual listener can personalize, such as, “Those of you who scored above an xx on this exam should give yourselves a pat on the back. You’re really doing great in the course. Keep it up.” Be certain, however, not to call attention to the gender or race of those you are encouraging and praising. For example, do not say, “The women are really doing great,” because this approach is likely to backfire and undermine women’s confidence.

ENCOURAGING WORDS COUNTER LOW CONFIDENCE

Encouragement increases self-efficacy, which is the belief in one’s ability to successfully perform a task. Because we are more likely to engage in tasks that we believe we can perform successfully, encouragement may be especially useful in male-stereotyped fields such as computing, which are marked by men’s apparent over-confidence and women’s apparent under-confidence. In this context, credible words of encouragement from supervisors and instructors increase women’s entry and persistence by raising their self-efficacy.

RESOURCES

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W.H. Freeman and Company.

Bandura, A. & Cervone, D. (1983). Self-evaluative and self-efficacy mechanism governing the motivational effects of goal systems. *Journal of Personality and Social Psychology, 45*(5), 1017-1028.

Maehr, M. L., Karabenick, S. A.,& Urdan, T. C. (2008). *Social Psychological Perspectives*. United Kingdom: Emerald Group Publishing Limited.

Schunk, D. & Zimmerman, B. (Eds.). (2007). *Motivation and Self-Regulated Learning: Theory, Research, and Applications*. New York: Routledge.

Zeldin, A., Britner, S. and Pajares, F. (2008). A comparative study of the self-efficacy beliefs of successful men and women in mathematics, science, and technology careers. *Journal of Research in Science Teaching, 45*(9), 1036-1058.

Author | J. McGrath Cohoon

Encouragement Works in Academic Settings (Case Study 1)

Increasing Persistence in Computing Through Encouragement

K-12 Education | Undergraduate | Graduate

IMPACT OF ENCOURAGEMENT

A faculty member described how simple it is for him to encourage his students: "It just takes me going to them and saying, 'You do better than you think you do, so keep trying.'" This positive message from someone who should know what it takes to succeed in computing persuades his students to keep trying.

Simple though encouragement is, fewer than half of the faculty members in the average computer science department in the United States say they do it. These faculty members may mistakenly perceive expressions of self-doubt as lack of commitment or ability. These expressions of uncertainty are more likely to come from women as a consequence of society-wide stereotypes that undermine belief in women's technical competence. When faculty members fail to encourage these women, computing loses students who otherwise would have succeeded.

Marissa Mayer, Google's first woman engineer, told how encouragement contributed to her success. She described the boost she got as a Stanford University student. "[Computer-science professor] Eric Roberts, who was my mentor all through Stanford, really reached out to me and said, "You know what? You're really good at this. You could go far in this." As a freshman, she had taken a computer science course to fill a prerequisite and found it intellectually interesting. Thanks to Roberts, she felt "a huge amount of support," which helped her go from never having owned a computer before college to a senior executive at Google.

Another example of how encouragement works comes from focus groups with students at 16 computer science departments in 2001. Most of the students reported a variety of reasons for their choice of a computer science major, with encouragement from parents or teachers being a common theme. One student remembered being initially resistant when her high school AP computer science teacher told her that she should pursue the major in college: "I completely disagreed with him, told him that I didn't want to do it." But those encouraging words from her teacher had planted a seed, and eventually the student "realize[d] that [she] was actually really good" at computing and that she would find the major "really, really fun." Other women also reported that having their faculty advisors say, "Just keep at it. You can do it," helped them persist when they had self-doubt.

A SIMPLE PRACTICE

Encouraging persistence is a simple practice that requires no additional resources. It is typically an element of mentoring, but there is no reason to restrict encouragement to the context of a mentoring relationship. Opportunities for offering encouragement abound during the normal course of daily interaction. It requires only a commitment to cultivating outstanding performance through positive communication.

Encouragement is essential to retention when women express doubts about whether they belong in computing. At this point, the instructor's response can make the difference between persistence and departure. Simply accepting the woman's doubts at face value can facilitate her departure. In contrast, a sincere encouraging response that expresses confidence in the student's ability to succeed and that recommends persistence can facilitate retention.

RESOURCES

Lyons, D. (2010, December 22). Marissa Mayer. *Newsweek*.

NCWIT offers practices for increasing and benefiting from gender diversity in IT at the K-12, undergraduate, graduate, and career levels.

This case study describes a research-inspired practice that may need further evaluation. Try it, and let us know your results.

ncwit.org **Author | J. McGrath Cohoon**

NCWIT Strategic Partners: National Science Foundation, Microsoft, and Bank of America | NCWIT Investment Partners: Avaya, Pfizer, and Merck

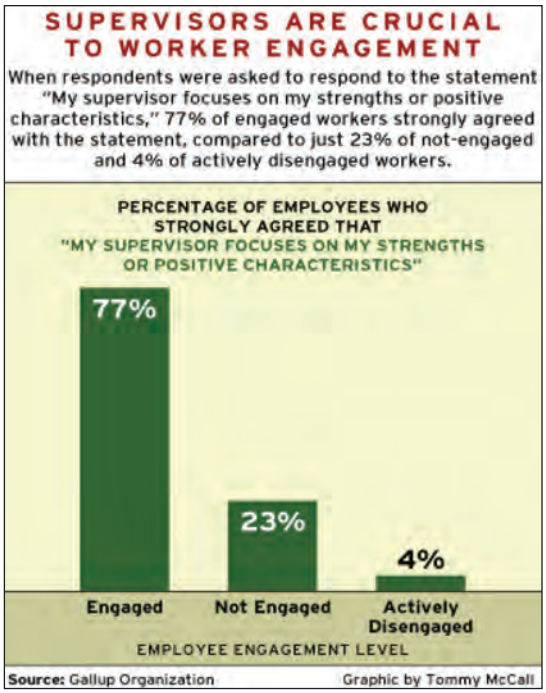
Encouragement is Effective in Work Settings (Case Study 2)

Increasing Persistence in Computing Through Encouragement

Career

IMPACT OF ENCOURAGEMENT

Encouragement is a powerful tool for increasing employee confidence and engagement, but it seems to be underutilized in the workforce. For example, reports from a 2004 Gallup Poll indicate that praise (which is similar, but not exactly the same as encouragement) is a rare experience for most employees. Only 35% of U.S. workers said they had been recognized for their work in the past year. This pattern of underutilizing positive feedback is counterproductive, because data from a 2005 Gallup poll showed that supervisors who focus on their employees' strengths are likely to have employees who are engaged, meaning employees who are likely to "drive innovation and move the organization forward" (Krueger & Killham, 2005). The latter finding is illustrated in the graph to the right from the Gallup Organization, and supports the conclusion that a positive approach to supervising contributes to reduced turnover and improved productivity, profit, and innovation. Encouragement is simply good business practice.



The following example shared by a woman in the NCWIT Workforce Alliance illustrates how encouragement works on an individual level. She experienced a substantial career boost as a consequence of a single encouraging conversation:

"[A few years ago], a colleague of mine was sitting next to me on a plane ride home from a business trip. She was reviewing potential applicants from [our company] for a Society of Women Engineers National Emerging Leader Award and asked how come my application wasn't part of the mix. I told her things like, 'I would never win,' 'My background would never stand up to engineers from other companies.' and 'Forget it.' By the time that 1 hour and 10 min flight was up, she had successfully convinced me to at least apply for the first stage and see where things go. I did apply and can proudly say that I did win one of the SWE National Emerging Leader Awards [that year]. While winning that award was a great national recognition in itself, it opened many doors for me internally, and I will never forget what that colleague did for me by encouraging me to apply for the award."

This example illustrates the profound impact a simple encouraging conversation can have on a career. It can bolster confidence weakened by society-wide stereotypes about women's suitability for careers in computing. These common negative stereotypes undermine belief in women's technical competence, which leads many women to doubt their own abilities or under value their achievements. In this context, encouragement can counteract feelings of self-doubt and play an influential part in attracting and retaining women in computing.

A SIMPLE PRACTICE

Encouraging persistence is a simple practice that requires no additional resources. It is typically an element of mentoring, but there is no reason to restrict encouragement to the context of a mentoring relationship. Opportunities for offering encouragement abound during the normal course of daily interaction. It requires only a commitment to cultivating outstanding performance through positive communication.

Encouragement is essential to retention when women express doubts about whether they belong in computing. At this point, the supervisor's response can make the difference between persistence and departure. Simply accepting the woman's doubts at face value can facilitate her departure. In contrast, a sincere encouraging response that expresses confidence in the employee's ability to succeed and that recommends persistence can facilitate retention.

RESOURCES

Krueger, J. & Killham, E. (2005, December 8). At work, feeling good matters: Happy employees are better equipped to handle workplace stress, relationships, and change, according to the latest GMJ survey. *Gallup Management Journal*. http://nogaps.nl/pdf/Gallup.pdf

Albrecht, S. (Ed.) (2010). *Handbook of Employee Engagement: Perspectives, Issues, Research and Practice*. Northhampton, MA: Edward Elgar Publishing, Inc.

Author | **J. McGrath Cohoon**

NCWIT Strategic Partners: National Science Foundation, Microsoft, and Bank of America | NCWIT Investment Partners: Avaya, Pfizer, and Merck

National Center for Women & Information Technology

PROMISING PRACTICES

One Professor's Approach to Broadening Participation in Computing (Case Study 3)

Increasing Persistence in Computing Through Encouragement

Undergraduate

Gloria Townsend, Professor of Computer Science at DePauw University, shares her personal approach to using encouragement:

I believe in the power of encouragement. For the 33 years I have taught Computer Science I, I have written encouraging notes on test papers of the students I thought were good candidates for majoring in computer science. I also urged our laboratory assistants and my male colleagues to encourage women as much as possible and in as many ways as possible. As a consequence, many female students informed my colleagues and me, "I didn't know I was 'good' at computing, until you told me." Our school's percent of graduating female seniors (in pure computer science) averages 24% — twice the national rate for women in computer science (11.7% in 2011 – Taulbee Survey). I've since learned that my common sense practice of encouragement actually reflects existent research findings. These findings were embodied in a young Microsoft employee's public remark that she was a computer scientist today because her professor wrote on her exam, "CS major???" I was that professor. She and many other women from our school report that encouragement is the reason they major or majored in computer science. So far, the number of men who echo this sentiment? Zero.

It is a bit sad that conditions reduce women's expectation of success in computing, but encouragement is a remarkably powerful tool that all instructors can use to overcome those conditions and broaden participation in computing. No other tool is so cost-effective and trouble-free.

> **"Writing a short note or saying a sentence or two — neither takes any time or effort — yet each has the power to change lives and therefore broaden participation in computing."**
>
> **– Gloria Townsend**

A SIMPLE PRACTICE

Encouraging persistence is a simple practice that requires no additional resources. It is typically an element of mentoring, but there is no reason to restrict encouragement to the context of a mentoring relationship. Opportunities for offering encouragement abound during the normal course of daily interaction. It requires only a commitment to cultivating outstanding performance through positive communication.

Encouragement is essential to retention when women express doubts about whether they belong in computing. At this point, the instructor's response can make the difference between persistence and departure. Simply accepting the woman's doubts at face value can facilitate her departure. In contrast, a sincere encouraging response that expresses confidence in the student's ability to succeed and that recommends persistence can facilitate retention.

RESOURCES

See *NCWIT's Encouragement Works in Academic Settings: Increasing Persistence in Computing Through Encouragement* (www.ncwit.org/academicencouragement) for more examples of the role encouragement from teachers, faculty members, and advisors has played in students' decisions to pursue and persist in computing.

See *NCWIT's Top 10 Ways You Can Retain Students in Computing* (www.ncwit.org/top10retainstudents) for a brief highlight of the top ten evidence-based ways to retain undergraduate students in computing.

NCWIT offers practices for increasing and benefiting from gender diversity in IT at the K-12, undergraduate, graduate, and career levels.

This case study describes a research-inspired practice that may need further evaluation. Try it, and let us know your results.

ncwit.org **Author** | **J. McGrath Cohoon**

NCWIT Strategic Partners: NSF, Microsoft, and Bank of America | NCWIT Investment Partners: Avaya, Pfizer, Merck, Turner Broadcasting System, Inc., AT&T, and Bloomberg