AC 2007-1515: EXPLORING THE RELATIONSHIPS AMONG PERFORMANCE ON ENGINEERING TASKS, CONFIDENCE, GENDER AND FIRST YEAR PERSISTENCE

Jennifer Light, University of Washington

Jennifer Light is an Assistant Professor of Engineering at Lewis-Clark State College in Lewiston, Idaho and a National Academy of Engineering CASEE post-doctoral fellow researching engineering education with the University of Washington Center for Engineering Education. Her research interests are first year programs for engineering and science students, gender and persistence in engineering, and the development of engineering identity in engineering students.

Russell Korte, University Of Minnesota

Russell F. Korte is a doctoral candidate in Human Resource Development and Strategic Management and Organization at the University of Minnesota. He is also a research assistant for the university's Institute of Technology in collaboration with the Center for the Advancement of Engineering Education. His research interests include learning, socialization, and performance in education and the workplace.

Ken Yasuhara, University of Washington

Ken Yasuhara is a Ph.D. candidate in Computer Science & Engineering at the University of Washington at Seattle and a graduate research assistant with the Center for the Advancement of Engineering Education. His interests include recruitment/retention, gender equity, and mixed-methods education research in computer science.

Deborah Kilgore, University of Washington

DEBORAH KILGORE is a Research Scientist in the Center for Engineering Learning and Teaching (CELT) and the Center for the Advancement of Engineering Education (CAEE), University of Washington. Her areas of specific interest and expertise include adult learning theory, student development, and women in education.

Exploring the relationships among performance on engineering tasks, confidence, gender, and first year persistence

Abstract

In this exploratory study our analyses show that although first-year women performed equally well as their male counterparts on an engineering task, they reported significantly lower self-ratings of confidence in their intellectual and technical abilities (math and science) than men, yet still persisted at the same rate as their male counterparts during the first year. These findings stand in contrast to other studies which have shown self-confidence to be positively related with successful achievement of goals (i.e. performing an engineering task successfully, graduating from an engineering program). Therefore, we seek to explain this apparent contradiction through expectancy and cognitive dissonance theory and suggest that first year programs have a unique opportunity to help students by aligning their expectations with engineering school experience and increasing the potential for successful completion of an engineering program.

Introduction

Despite a decade of programs aimed at attracting women and minority students to engineering,[1,2] enrollment in engineering programs continues to be flat or declining. High attrition during the first two years,[3,4] and a lack of diversity in engineering students[1] raise concerns nationally about maintaining a competitive edge and future technological advancement. As a result of recent studies focused on engineering retention, a greater understanding of academic pathways into and out of engineering is emerging. Among the growing literature on engineering student diversity is an unclear picture of the relationship, if any, between self-confidence and success. The study described in this paper examines first-year female and male students' performance on an engineering task as it is related to their self-confidence and persistence in engineering education. Our goal here is to contribute to our ongoing research efforts to understand how students think about engineering, how they conceive of themselves as engineers, and how these understandings influence their practices as they develop into engineers.

In this exploratory study we use data from the Academic Pathways Study, a longitudinal, multi-institution study (n = 160). Our analyses show that although first-year women reported significantly lower self-ratings of confidence in their intellectual and technical abilities (math and science) than men, they performed equally well on an engineering performance task, and likewise persisted at the same rate as their male counterparts during the first year. These findings stand in contrast to other studies which have shown self-confidence to be positively related with successful achievement of goals. Therefore, we seek to enrich our understanding of any potential relationship by asking the following questions:

Are there particular "types" of confidence aligned with gender?

What accounts for women's equal success in terms of performance and persistence in the first year of their engineering education in comparison to men, despite their self-reported lower confidence in their intellectual and technical abilities?

In this paper, we will summarize the literature on confidence, persistence, and gender in engineering, describe our methods in greater detail, introduce our findings with respect to these research questions, and discuss implications for research, theory and practice.

Confidence, Persistence, Performance and Gender

It is generally believed that self-confidence and persistence in higher education are positively related. For example, Burtner[5] found that self-reported confidence in math and science ability along with the belief that an engineering degree enhances career security was a predictor of both short- and long-term persistence. Lack of confidence in math and science ability combined with extrinsic motivators for entering engineering (expectation of high pay and good job opportunities) was associated with attrition from engineering school.

Astin[4] studied academic self-confidence in general and specific aspects of academic self-confidence, such as confidence in math or problem solving. He found that academic self-confidence improved through participation in college and involvement with faculty, though not the same for men and women. Women's greater involvement with faculty was correlated to decreasing confidence in math abilities, suggesting that it is not simply the quantity but rather the quality of faculty-student interaction that leads to increased student confidence.

Other literature on persistence shows a more complex picture of self-confidence and persistence. For one thing, students demonstrate different patterns of self-confidence. One student may be confident about her math skills while not so confident in her interpersonal abilities while another may feel the opposite. For example, Besterfield-Sacre *et al.*[6] found that men were more confident than women in their physics and engineering background knowledge, but both men and women rated their confidence in math and chemistry similarly.

Furthermore, research has shown that self-confidence is a perception that is not always accurately related to one's actual abilities to achieve one's goals. For instance, Besterfield-Sacre *et al.*[7] found that students who left engineering in good academic standing had lower confidence in their engineering and science skills than students who left in poor academic standing.

Numerous studies indicate women tend to have lower confidence in their abilities than their male counterparts, regardless of their actual performance. Belenky *et al*.[8] cited research showing girls with higher IQ scores express unrealistically low expectations of success. Seymour & Hewitt[9] found that women in science, technology, math, and engineering reported lower confidence than men in their technical abilities, as did Hawks & Spade.[10]

Felder *et al.*[11] also found a difference in women's and men's beliefs in their abilities. Throughout their study, participants were asked to predict their grade in certain classes. Women tended to under-predict their grades while men's predictions were more accurate. Furthermore, men consistently were more confident than women in their academic preparation. In this instance, women's performance was not positively correlated with their self-confidence, and this persisted through the junior year.

These gender differences are important, because they demonstrate that the relationship between self-confidence and success is not at all straightforward. Felder *et al.*[11] found that the women participating in a longitudinal study of gender differences at North Carolina State University entered with better traditional predictors of success – higher levels of parental education and SAT scores, better study skills, and participated in classes specifically designed to reduce or eliminate factors purported to work against women in the classroom, yet still did not persist at greater ratios than men. In fact, men did better, especially at the upper end of the grade spectrum.

These and other research studies show that while self-confidence is one of many positive outcomes for college students, its relationship to successful outcomes is not a simple positive one. Bandura's[12] concept of self-efficacy may be a better construct when examining students' perceptions of their capabilities and their likelihood to perform well on an engineering task.

Self-efficacy is widely used to mean one's perception of one's own capability to accomplish tasks effectively. This is distinct from confidence, which Bandura found too abstract to mean anything significant in terms of outcomes, where self-efficacy, as Bandura[12] wrote, "…refers to belief in one's agentive capabilities that one can produce given levels of attainment." In other words, confidence is a more general sense of one's capabilities, while self-efficacy is grounded in specific abilities as they relate to specific tasks and outcomes. Confidence is related to self-efficacy, but does not carry the same weight with respect to desired outcomes nor does it define self-efficacy in its entirety.

Measures of self-efficacy indicate the level of confidence individuals have in their ability to achieve specific outcomes or implement courses of action.[13] In an extensive meta-analysis of 60 independent studies gathering data from over 50,000 students, Valentine, DuBois, and Cooper[14] found a relationship between domain-specific self beliefs and academic achievement. However, the effect was small and led them to posit the influence of moderator variables in the self-beliefs and achievement relationship.

Methods

The data used in this study were collected as part of the Academic Pathways Study (APS), a multi-institutional, longitudinal study of engineering student experiences directed by the NSF-funded Center for the Advancement of Engineering Education. The APS uses both quantitative and qualitative methods to elicit data regarding the undergraduate engineering student experience. These methods include surveys, both structured and unstructured interviews, ethnographic observations, and the administration of several short engineering performance tasks.

In this paper, we analyze data gathered in the first year from an engineering performance task, and survey questions about students' self-confidence to conduct an exploratory study on possible relationships between these measures.

Performance

Academic success in engineering can take many forms. In this study, we examined students' performance on an engineering task. As detailed in Kilgore *et al.*,[15] students were asked in each year of the Academic Pathways Study to address specific engineering problems devised first to elicit responses that reflect aspects of their engineering knowledge and skills, and second, to reveal how they apply this learning to engineering design practice. One of the problems given to students in the first year was a closed-ended question about the information they would need to design a playground. Figure 1 contains the text of the question.

You have been asked to design a playground. You have a limited amount of time and resources to gather information for your design. From the following list, please put a check mark next to the FIVE kinds of information you would MOST LIKELY NEED as you work on your design:

- Availability of materials	- Body proportions
- Budget	- Handicapped accessibility
- Information about the area	- Labor availability and cost
- Legal liability	- Maintenance concerns
- Material costs	- Material specifications
- Neighborhood demographics	- Neighborhood opinions
- Safety	- Supervision concerns
- Technical references	- Utilities

Figure 1. Text of the Information-Gathering Task.

The purpose of the information-gathering task was to orient respondents toward the information-gathering component of the design process. The problem itself was drawn from a related body of work by Atman and her colleagues. In this research, verbal protocol analysis was used to provide rich descriptions of design processes used by various populations, including freshman and senior undergraduate students and practicing engineering professionals. The process of gathering information is one of the important distinctions across these population.[16-18] The problem statement and kinds of information used in the problem statement displayed in Figure 1 are drawn directly from this work.

As shown in Table 1, each of the kinds of information was classified as either detail- or context-oriented (or neither, in the case of one item). The process for interpreting the focus of these items is described in depth in Kilgore *et al.*[15]

Table 1. Kinds of information from playground design task, categorized as detail- or context-oriented or neither.

Detail-oriented	Context-oriented	Neither
Availability of materials	Body proportions	Supervision concerns
Budget	Handicapped accessibility	
Labor availability and cost	Information about the area	
Maintenance concerns	Legal liability	
Material costs	Neighborhood demographics	
Material specifications	Neighborhood opinions	
Technical references	Safety	
	Utilities	

Imagine a playground design without regard for the children who will use it, or the contours and quality of the physical surroundings in which it will be built. Or, imagine a playground designed without consideration of the kinds of materials, the labor or the funding available for the endeavor. In either case, the design would be random, and only useful by sheer luck. Therefore, we considered a participant's response to the playground information gathering task as *balanced* if two or three of their five selections for most needed kinds of information were context-oriented. If a participant's playground response included fewer than 2 or more than 3 context-oriented items, we interpreted the response as being *unbalanced*. Balance, in this case, is aligned with successful performance, where imbalance is not.

Confidence

As part of the Persistence in Engineering survey[19] given in both the winter and spring of the first year, students were asked, "Rate yourself on each of the following traits as compared with the average person your age. We want the most accurate estimate of how you see yourself." The traits listed were self confidence (intellectual), self confidence (social), self understanding, leadership ability, public speaking ability, math ability, science ability, computer and programming skills, written communication skills, and business ability. The scale for rating these abilities was 0 to 4 for "lowest 10%," "below average," "average," "above average," and "highest 10%," respectively. In this exploratory study, confidence construct item means from the first two survey administrations were compared by gender at the item level using the Mann-Whitney U test for each of the two administrations of the survey in the first year. All analyses were performed using SPSS v. 11.5.

Persistence

Persistence data was collected from each of the participating institutions at the beginning of the year following the one in which students had been active participants in the study. Therefore, all students who left the engineering major sometime between the beginning of one year to the next were recorded as having left after year 1, but no distinction was made between those who left mid-year and those who left at the end. Persistence rates were calculated by dividing the number of persisters at any given time by the total number of students who began.

Analysis methods

In our analysis of balance of information needed, we examined whether there were any differences in the ways women and men responded to the playground task. To complement our gender analysis, we also compared the confidence ratings of participants whose playground responses are balanced and unbalanced. For the gender comparisons, we employed the two-sided Fisher's exact test, which appropriately handles large differences in marginal frequencies. For each of the comparisons of confidence, which were ordinal ratings, we employed the Mann-Whitney *U* test.

Results

Gender Differences in Confidence

In the first APS winter 2004 survey, women reported significantly lower relative levels of intellectual self-confidence, computer and programming skills, and business ability. Interestingly, and similar to the Besterfield-Scare Pittsburgh Engineering and Attitude Survey,[6] women and men showed no difference in their confidence levels with respect to their math and science abilities. Additionally, responses regarding social self confidence, self understanding, leadership ability, public speaking ability, and written communication skills showed no gender differences. Table 2 provides details where there were significant gender differences. On average, women rated their confidence in their intellectual abilities as being average to above average, while men rated their confidence in their intellectual abilities as being above average. Women considered that their computer and programming skills were below average to average, while men considered theirs as average to above average. Women felt they had average business abilities, while men reported that theirs were average to above average.

Table 2. Winter 2004 significant confidence Mann-Whitney *U*-test results

Question	Gender	N	Mean	*z*	Significance	Average Rank
intellectual self confidence	Female	60	2.7000	-3.110	.006	65.64
	Male	96	3.0729			86.54
Confidence in computer and programming skills	Female	60	1.7333	-4.222	.000	59.90
	Male	96	2.5000			90.13
Confidence in business ability	Female	60	2.0500	-2.092	.020	69.02
	Male	95	2.4105			83.67

At the end of the first year women self-reported significantly lower intellectual self confidence, public speaking ability, math ability, science ability, computer and programming skills, and business ability, than men. Confidence items where there was no gender difference included: social self confidence, self understanding, leadership ability, and written communication skills. Table 3 provides details where there were significant gender differences. Similar to the first survey administration, women reported significantly lower intellectual self confidence, and rated their computer and programming skills and business ability lower than their male counterparts did. In addition, women rated their public speaking, math and science abilities lower. For instance, on average women reported they had average to above average math and science abilities, while men reported that their math and science abilities were at least above average, or even in the top 10% among their peers.

Table 3. Spring 2004 significant Mann-Whitney *U*-test results

Question	Gender	N	Mean	*z*	Significance	Average Rank
Intellectual self confidence	Female	58	2.66	-3.243	.001	62.61
	Male	92	3.14			83.63
Confidence in public speaking ability	Female	58	2.12	-2.590	.010	64.39
	Male	92	2.55			82.51
Confidence in math ability	Female	58	2.84	-3.493	.000	61.80
	Male	92	3.26			84.14
Confidence in science ability	Female	58	2.71	-4.121	.000	59.16
	Male	92	3.21			85.80
Confidence in computer and programming skills	Female	58	1.84	-4.312	.000	56.96
	Male	92	2.61			87.19
Confidence in business ability	Female	58	1.97	-3.208	.001	61.83
	Male	92	2.50			84.12

As data from this and other studies indicate, there are gender differences in confidence. Confidence in intellectual abilities, computer and programming skills, business ability, ability to apply math and science principles in solving real world problems, and critical thinking skills are consistently rated lower by females.

<u>Balance of Information and Confidence</u>

In our analysis of those participants who responded to the playground survey question, we began with a gender comparison. Seventy-three percent of women and 64% of men had balanced playground responses, but we found that this difference is not statistically significant ($p > 0.05$, $N = 143$, 36% F). In spite of their lower self-confidence, women performed at least as well as men did on the engineering performance task.

Given our expectation of a relationship between performance and self confidence, we also examined whether mean confidence ratings differed significantly between participants with balanced and unbalanced playground responses. With the exception of one item, leadership ability ($p < 0.05$, $N = 142$), we found no statistically significant difference in mean confidence ratings. (The sample size differs from above, because not all participants responded to both the playground and confidence questions.) Those participants whose playground responses were balanced had higher self-ratings in leadership ability on average (mean 2.84 out of 4.00 *vs.* 2.57 for participants with unbalanced playground responses).

As data from this and other studies indicate, there are gender differences in self-reported confidence levels. Confidence in intellectual abilities, computer and programming skills, and business ability do not appear to be related to performance on engineering tasks nor on persistence during the first year. Women who had lower self-confidence in their general intellectual and math/science abilities performed as well as men who indicated higher confidence in their intellect and math/science confidence on the engineering performance task. Interestingly enough women initially entered school with higher math/science confidence levels but by the end of the year lowered their ratings.

Persistence

Analysis of student persistence in engineering at the end of the first year and again at the end of the second year found females persisted at similar rates to their male counterparts but at higher levels the second year. Table 4 shows persistence by gender at the end of year one.

Table 4. Persistence in engineering after year 1.

Gender	Persistence	Number	Percentage
Female	Persist	53	89.8
	Exit year1	6	10.2
	Total	59	100
Male	Persist	87	90.6
	Exit year1	9	9.4
	Total	96	100

Women and men persisted at the same rates during that first year although early indications appear that women are persisting at higher rates in after the first year of engineering school. Gender differences in student confidence of their intellectual and math/science abilities does not appear to affect how students approach engineering tasks nor does it correlate to persistence – at least in the first year.

Discussion

In this exploratory study, we have shown that while men enter engineering reporting higher confidence in themselves than women, they do not perform better on an engineering task nor are they more likely to persist. Indeed, beyond the first year, we see that women are more likely to persist than men. These findings are contrary to what the theory of self-efficacy would predict, where a positive relationship between confidence and success would be predicted. That is, the greater one's belief in one's abilities to achieve the objectives, the greater one's chances are of achieving those objectives.

Therefore, we surmise that there are additional differences associated with gender in play here. Gender-based non-cognitive persistence factors are documented in the literature; however, a gender-based theory of engineering student departure has not been fully explained. Based on the patterns seen in this and other studies,[7, 11, 20] a combination of expectancy and cognitive dissonance theories may provide one possible explanation for the paradox between gender differences in confidence and persistence. This may have ramifications for first year programs.

Expectancy theory states that one's level of motivation is related to the perceived value of the outcome (valence) and the expected level of effort needed to achieve the outcome.[21] Haugen, Ommundsen, and Lund[22] found that expectancy was a common attribute of several personality dispositions related to the concept of self, optimistic-pessimistic attributional style, motivations, cognitive anxiety, and self-handicapping tendencies.

Expectancy theory suggests that lower self confidence should increase the expected level of effort needed to study engineering. If women generally have lower levels of confidence in their engineering-related knowledge and skills, the theory states that they should expect to work harder to achieve the valued outcomes (i.e., perform engineering tasks well, graduate from engineering school). Conversely, if men have higher levels of confidence in their engineering-related knowledge and skills, then they should expect less effort required to graduate. Cognitive dissonance theory may explain why women have lower confidence levels yet perform and persist on par with men.

Tesser[23] describes cognitive dissonance theory as a mechanism to regulate self-esteem, in which people strive to achieve and maintain cognitive balance and will take actions to reduce cognitive imbalance or dissonance—usually through attitude change. We hypothesize that greater alignment between expectations and experience—less dissonance—requires less radical change in the individual. In other words, those whose expectations more closely matched their experience undertook less radical measures to achieve balance. Men had greater confidence in themselves going into engineering education, and therefore perhaps suffered more disillusionment than women as they experienced academic challenges in the first year of study.

Becoming an engineer requires completing a rigorous program of study likened to a socialization process into the profession. Studies on socialization into organizations have shown that misalignment between expectations and ensuing experience are a major factor in loss of commitment and attrition. Interventions that align expectations to levels more congruent with experiences increase commitment and retention.[24] Cognitive dissonance theory suggests that if expectations are misaligned with ensuing experiences the tension motivates people to seek ways to reduce the tension (by changing behaviors, beliefs, or goals).[25] It is possible that as engineering students are socialized into engineering education, the alignment of their expectations with actual experience may influence persistence more than initial confidence or self-efficacy. That is, students' persistence may be related to the degree that their expectations align with their academic program experiences. The finding that women perform engineering tasks equally as well as men and that they persist at equal rates (and higher in the second year) than men may, in part, be due to their lowered confidence at entry. Rather than experiences of disillusionment, women may be more realistic in their expectations of difficulty at the outset of their engineering program. On the other hand, women's greater persistence may be a function of the perceived value of an engineering degree. For women, an engineering degree may be of greater marginal value than it is for men.

Other factors may influence the persistence of students besides gender. For example, due to the predominantly male culture in engineering, the women who choose to enter the field may have self-selected based on higher levels of commitment than their male counterparts. The women in this study may come into the program with higher levels of commitment that would manifest in higher levels of persistence. Even if this self-selection process plays a larger role, it is also likely that the roles of expectancy and cognitive dissonance play an important part of this self selection. This is an important area for future research.

Ramifications for first year programs may be to ease the transition from high school to college with emphasis on realistic expectations for performance. First year programs that bring this common gender issue to light may create awareness for both males and females along with successful study and learning techniques that equip future engineering students with both the cognitive and psychological awareness needed to complete their engineering education.

Acknowledgements

This material is based on work supported by the National Science Foundation under Grant No. ESI-0227558, which funds the Center for the Advancement of Engineering Education (CAEE). CAEE is a collaboration of five partner universities: Colorado School of Mines, Howard University, Stanford University, University of Minnesota, and University of Washington. We would like to acknowledge the contributions of colleagues from the survey team of the Academic Pathways Study who designed the survey from which some of the results in this study are based. Special thanks to Cindy Atman and the ETD and UMN teams.

References

1. Chang, J. C., *Women and minorities in the science, mathematics and engineering pipeline.* 2002, CA: ERIC Clearinghouse for Community Colleges: Los Angeles, CA.
2. Gibbons, M. T., *The Year in Numbers*. 2006, American Society for Engineering Education.
3. Goodchild, F. M., *The Pipeline: Still Leaking*, in *American Scientist Online*. 2004.
4. Astin, A., *What matters in college? Four critical years revisited*. 1993: Jossey-Bass.
5. Burtner, J., *The Use of Discriminant Analysis to Investigate the Influence of Non-Cognitive Factors on Engineering School Persistence.* Journal of Engineering Education, 2005: p. 335-338.
6. Besterfield-Sacre, M., Moreno, M., Shuman, L. J., and Atman, C. J., *Gender and Ethnicity Differences in Freshmen Engineering Student Attitudes: A cross-Institutional Study.* Journal of Engineering Education, 2001: p. 477-488.
7. Besterfield-Sacre, M., Atman, C. J., and Shuman, L. J., *Characteristics of Freshman Engineering Students: Models for Determining Student Attrition in Engineering.* Journal of Engineering Education, 1997: p. 139-148.
8. Belenky, M. F., Clinchy, B. M., Goldberger, N. R., and Tarule, J. M., *Women's Ways of Knowing The Development of Self, voice, and Mind*. 1986: Basic Books, Inc. 256.
9. Seymour, E. and Hewitt, N. M., *Talking About Leaving Why Undergraduates Leave the Sciences*. 1997, Boulder: Westview Press. 429.
10. Hawks, B. K. and Spade, J. Z., *Women and Men Engineering Students: Anticipation of Family and Work Roles.* Journal of Engineering Education, 1998: p. 249-256.
11. Felder, R. M., Felder, G. N., Mauney, M., Hamrin, C. E., Jr., and Dietz, J. E., *A Longitudinal Study of Engineering Student Performance and Retention III Gender Differences in Student Performance and Attitudes.* Journal of Engineering Education, 1995(April): p. 151-163.
12. Bandura, A., *Self-efficacy: Toward a Unifying Theory of Behavioral Change.* Psychological Review, 1977. **84**(2): p. 191-215.
13. Bandura, A., *Self-efficacy: The exercise of control*. 1997, New York: Freeman.
14. Valentine, J. C., DuBois, D. L., and Cooper, H., *The relation between self-belief and academic achievement: A meta-analytic review.* Educational Psychologist, 2004. **39**(2): p. 111-133.
15. Kilgore, D., Atman, C. J., Yasuhara, K., and Baker, T., *Engineering Thinking and Doing in the First Year: Some Findings from the Academic Pathways Study.* Journal of Engineering Education (under review), 2007.
16. Bursic, K. M. and Atman, C. J., *Information Gathering: A Critical Step for Quality in the Design Process.* Quality Management Journal, 1997. **4**(4): p. 60-75.

17. Atman, C. J., Chimka, J. R., Bursic, K. M., and Nachtmann, H. L., *A Comparison of Freshman and Senior Dngineering Design Processes.* Design Studies, 1999. **20**(2): p. 131-152.
18. Atman, C. J., Adams, R. S., Mosborg, S., Cardella, M. E., Turns, J., and Saleem, J., *Engineering Design Processes: a Comparison of Students and Expert Practitioners.* Journal of Engineering Education (in review), 2006.
19. Eris, O., Chen, H., Bailey, T., Engerman, K., Loshbaugh, H. G., Griffin, A., Lichtenstein, G., and Cole, A. *Development of the Persistence in Engineering (PIE) Survey Instrument*. in *American Society for Engineering Education Annual conference & Exposition*. 2005. Chicago, Illinios: ASEE.
20. Tinto, V., *Leaving College: Rethinking the Causes and Cures of Student Attrition*. 2nd ed. 1993, Chicago: University of Chicago Press.
21. Miner, J. B., *Organizational Behavior: Foundations, Theories, and Analyses*. 2002, Oxford: Oxford University Press.
22. Haugen, R., Ommundsen, Y., and Lund, T., *The concept of expetancy: A central factor in various personality dispositions.* Educational Psychology, 2004. **24**(1): p. 43-55.
23. Tesser, A., *On the confluence of self-esteem maintenance mechanisms.* Personality and Social Psychology Review, 2000. **4**(4): p. 290-299.
24. Wanous, J. P., *Organizational Entry: Recruitment, Selection, Orientation and Socialization of Newcomers*. 2 ed. 1992, Reading, MA: Addison-Wesley Publishing.
25. Hunt, M., *The Story of Psychology*. 1993, New York: Doubleday.