Int. J. Engng Ed. Vol. 22, No. 3, pp. 496–502, 2006
Printed in Great Britain.

0949-149X/91 $3.00+0.00

Facilitating Design Learning in a Cooperative Environment: Findings on Team Functioning*

GÜL E. OKUDAN
Engineering Design Program, The Pennsylvania State University, University Park, PA 16801, USA. E-mail: gkremer@psu.edu

SUSAN MOHAMMED
Department of Psychology, The Pennsylvania State University, University Park, PA 16801, USA

Design learning is generally done collectively, but more needs to be known about how students can work better in teams. This paper presented the results of a study measuring student perceptions of team functioning and the changes that occurred over the course of the semester as students transitioned from an initial, guided project to an open-ended, industry-sponsored project. Students generally had positive perceptions of team functioning, including relatively high levels of conflict resolution, collective efficacy, and teamwork behaviors. As compared with the first project, team members reported more time spent together outside of class, greater conflict resolution behaviors, and higher individual growth for the second project.

Keywords: design teams; collective learning; design tasks.

INTRODUCTION

AFTER A SCIENCE-CONTENT focus in the engineering curriculum as a result of the Grinter Report [1] in the middle to late 1960's, engineering educators began to react to students' lack of understanding in design. This concern produced several studies that concluded with a recommendation to incorporate design throughout the four-year curriculum. As a result, in the 1970's and early 1980's, first-year design courses and course segments were common at ABET accredited institutions [2]. Since the late 1980's, there has been a national movement to increase the amount of exposure that undergraduate engineering students receive to engineering design, especially at the first-year level. Sheppard and Jenison [3] identify four factors behind this movement: (1) recognition of first-year attrition and the use of design teaching to prevent it, (2) government funding to support the spread of design teaching at the first year through the 'Coalition' program, (3) pressure from industry regarding the mismatch between what engineering schools were supplying and what industry needed, and (4) a strong acquiesce from cognitive scientists regarding the appropriateness of design problem solving to facilitate learning.

Furthermore, strengthening the view against engineering education focusing solely on the acquisition of basic and applied science knowledge, Schön [4] argued that engineering practitioners are 'problem solvers who select technical means best suited to particular purposes.' He therefore suggested that engineering educators should focus on problems with uncertain and conflicting decision variables. This led to a renewed focus on design, which was adopted as the key driver for learning at the first-year level in the engineering curriculum. Many articles discuss various applications of design at different institutions and the general understanding for how design should be taught (e.g., Bucciarelli [5]—ECSEL coalition, TIDEE [6, 7]). Accordingly, there is now a set of guidelines for pedagogically solid design tasks. These guidelines promote the inclusion of the following into design teaching [8]:

1. authentic hands-on tasks,
2. familiar and easy-to-work materials using known fabrication skills,
3. clearly defined outcomes that allow multiple-solution pathways,
4. collaborative work and higher order thinking,
5. multiple design iterations to improve the product, and
6. clear links to a limited number of science and engineering concepts.

The current trend for first-year engineering education is the adoption of industry-sponsored, and/or service learning projects. The practice of using industry-sponsored projects for senior-level or capstone courses is being replicated at the first-year level, with the hope for the same level of

* Accepted 21 November 2005.

success. With service learning projects, students engage in experiential design learning during which they apply their knowledge for design to meet local community needs [9].

Since design was adopted in the engineering curriculum in the 1970s, the curricula improved, but harvesting the fruits of these efforts had limited success. Accordingly, despite the fact that the importance of product (process, system, etc.) design efficiency and effectiveness has long been recognized (e.g., [10–14]), there is room for improvement. For example, Gupta and Wilemon [15] suggested that products that meet their development budget but come to market late generate substantially less profit than those that exceed their budget but come to market on time. Attesting to the continuing need to improve product design efficiency, Boujut and Laureillard [13] stated that: 'New organizations, based on concurrent engineering principles, after many years of experimentation within various companies and industrial domains, still suffer from a lack of efficiency.' Although design efficiency as measured by time to market is critical to the success of new product development efforts, efficiency does not guarantee success. Walsh [16] stated that 90% of new product development team efforts fail, and Flint [14] acknowledged that '. . . products continue to fail at alarmingly high rates,' which indicates the continued importance of effectiveness in the product design process.

There could be several reasons for the continued need to emphasize design. Among them, two are related to engineering education:

1. Design teaching: Both design faculty and design practitioners argue that further improvements are necessary in design teaching (Todd *et al.* [17] and MacMaster [18] in [19]). Furthermore, Pahl [20] pointed out that the knowledge of technical systems or analysis is not sufficient to understand the thought processes yielding successful designs. He argued that thought processes should be studied to improve design methodologies. However, research on design thinking has not yet comprehensively answered questions regarding how design is done, and accordingly, there is no consensus on how it should be taught [19].
2. Facilitation of design learning in a team setting: In design learning, the use of cooperative settings has been predominant. Cooperative learning is the instructional use of small groups so that students work together to maximize their own and each others' learning [21–22]. In cooperative learning settings, individual accountability is structured to the assessment as well as interdependent team level accountability [23]. Design learning facilitation in a cooperative environment is not trivial. In addition to difficulties arising from the nature of multifaceted design problems as well as the complexity of designing as a task, new layers of complexity are added in cooperative settings due to the involvement of a set of team members with potentially different backgrounds and dispositions undertaking the challenge of arriving at a design.

Therefore, we argue that facilitation of design learning is coupled with the complexities of the cooperative environment and that studying design learning should involve variables that reflect the complexity and dynamism of the learning environment. Accordingly, by drawing upon the psychology literature focusing on collaborative task situations, we present the variables pertaining to design team functioning that we studied, and provide the results of a conducted study. First, below, we explain how we conceptualized our research on design learning and performance.

CONCEPTUALIZATION OF THE DESIGN LEARNING AND PERFORMANCE RESEARCH AND ITS BOUNDARIES

We see the design learning environment as dynamic with several actors providing and receiving input/feedback. For example, the design learning facilitator (professor, etc.) chooses the design tasks/projects, designs the process on which teaching will be based, sets the assessment/expectation standards, and forms the teams. The teams that are given the design task influence team composition by providing feedback to the instructor, the design process they follow, and their expectations. All these actors and their activities in this dynamic design learning environment are influenced by predominantly outside parties setting the desired outcomes for design learning (individual and team level learning, and grades), design outcomes (perceptions regarding teaming, communication (design report) and artifact performance), and long term effects (retention, increased interest in engineering). Figure 1 depicts these relationships. In the figure, arrows indicate input/feedback sources and directions in the dynamic learning environment.

Conceptualizing the essential elements of the research to investigate various issues of the dynamic design learning environment, and hence its boundaries as seen in Fig. 1, a team of scholars has been collecting and analyzing data as well as documenting results since the Fall of 2003. As a continuation of this effort, we present our findings regarding team functioning in a dynamic, cooperative design learning environment in this paper.

The study sample consisted of selected Introduction to Engineering Design course sections at The Pennsylvania State University. Students in this course complete two design projects over the course of a 15-week semester. The first project is orchestrated in that students follow the procedural outline of a design manual, whereas the second project is industry-sponsored and more open-

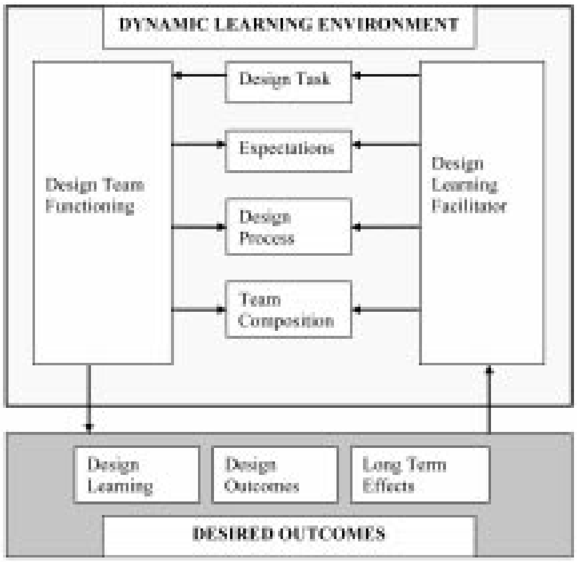

Fig. 1. Research conceptualization for design teaching/learning in a team setting.

ended. The requirements of these projects include generating feasible design ideas, narrowing down and selecting an idea for full development, and completing design drawings as well as a prototype for the selected solution. Below, we present our findings regarding design team functioning in a dynamic environment.

DESIGN TEAM FUNCTIONING

Because students work in teams of four or five people in order to complete the design projects, the current analysis of data was intended to assess student perceptions regarding team functioning. Each variable is described briefly below.

- **Intragroup conflict** has been delineated into three types: relationship, task, and process [24]. Relationship conflict reflects personality differences, tension, and annoyance among group members, whereas task conflict reflects differences in viewpoints and opinions regarding a group task [25–26]. Process conflict refers to differences in how task accomplishment will be carried out, including who should do what and how much responsibility members should receive [24]. Most research has focused on relationship and task conflict (e.g., [26–27]), although a few studies have found that process conflict negatively affects group morale and performance (e.g., [25, 28]).
- A three-item **conflict resolution** scale assessed the degree to which team members successfully resolved each of the three types of conflict referenced above.
- **Interdependence** reflects the extent to which team members have to work together collectively to accomplish a task. For example, team members who work together mostly independently and then pool results would have a lower degree of interdependence than team members who worked together as a whole group.
- Defined as a group's shared sense of competence to organize and execute action [29], **collective efficacy** has been shown to positively predict team performance (e.g., [30]).
- **Teamwork behaviors** reflect the extent to which team members engaged in positive activities such as helping each other with tasks, maintaining a positive attitude about the team, and respecting one another.
- Hackman [31] proposed several dimensions of team effectiveness, including:
  - Team member growth—reflects the extent to which individuals work better as a result of having joined the team and better appreciate different types of people;
  - Team viability—assesses the extent to which team members desire to continue interacting with their team as opposed to finding a different team with which to work.

Table 1 summarizes Cronbach's alpha for each scale reported in the results. As shown, all scales had adequate levels of internal consistency reliability.

Table 1. Internal consistency of study variables (Cronbach's alpha)

	Fall semester, 2003		Spring semester, 2004	
Variables	Introductory project (mid-semester) $N = 137$ Scale reliabilities	Industry-sponsored project (End of semester) $N = 112$ Scale reliabilities	Introductory project (mid-semester) $N = 130$ Scale reliabilities	Industry-sponsored project (End of semester) $N = 141$ Scale reliabilities
Task conflict	0.76	0.76	0.78	0.71
Relationship conflict	0.86	0.85	0.86	0.89
Process conflict	0.83	0.81	0.76	0.81
Conflict resolution	0.84	0.86	0.85	0.85
Collective efficacy	0.78	0.76	0.72	0.81
Teamwork behaviors	0.86	0.89	0.81	0.88
Satisfaction with the team	0.77	0.86	0.81	0.76
Individual growth of team members	0.69	0.69	0.78	0.69
Team viability	0.79	0.77	0.79	0.76

Table 2. Design team functioning related results

Individual-level Variables	Fall semester, 2003 M = Mean, SD = Standard deviation: Introductory project Mid-semester	Industry-sponsored project End of semesterr	T-statistic for paired samples test	Significance	Spring semester, 2004 M = Mean, SD = Standard deviation: Introductory project Mid-semester	Industry-sponsored project End of semesterr	T-statistic for paired samples test	Significance
Average hours per week team spends together outside of class	M = 1.90 SD = 1.72	M = 4.93 SD = 5.05	–6.53	0.00	M = 1.81 SD = 1.59	M = 4.15 SD = 9.46	–2.54	0.01
Average length of meetings	M = 1.32 SD = 0.85	M = 2.23 SD = 1.09	–7.40	0.00	M = 1.59 SD = 1.33	M = 1.87 SD = 1.55	–1.61	0.11
Working together as a whole team	M = 4.26 SD = 1.12	M = 3.99 SD = 1.26	2.03	0.04	M = 4.14 SD = 1.31	M = 4.20 SD= 1.23	–0.38	0.70
Working individually and pooling work	M = 2.57 SD = 1.22	M = 2.67 SD = 1.08	–0.76	0.45	M = 2.67 SD = 1.29	M = 2.91 SD = 1.23	–1.65	0.10
Task conflict	M = 2.06 SD = 0.66	M = 2.16 SD = 0.66	–1.33	0.19	M = 2.15 SD = 0.55	M = 2.18 SD = 0.69	–0.51	0.62
Relationship conflict	M = 1.54 SD = 0.74	M = 1.64 SD= 0.75	–1.48	0.14	M = 1.68 SD = 0.78	M =1.69 SD = 0.82	–0.03	0.98
Process conflict	M = 1.79 SD = 0.87	M = 1.77 SD = 0.75	0.19	0.85	M = 1.82 SD = 0.68	M =1.76 SD = 0.69	0.73	0.47
Conflict resolution	M = 3.80 SD = 0.70	M = 4.11 SD = 0.75	–4.18	0.00	M = 3.74 SD = 0.76	M = 3.97 SD = 0.86	–2.27	0.03
Collective efficacy	M = 3.76 SD = .87	M = 3.90 SD=.89	–1.49	0.14	M = 4.01 SD = 0.74	M = 3.84 SD = 0.92	1.79	0.08
Certainty that would receive desired team grade	M = 86.72 SD = 9.23	M =89.47 SD = 9.94	–2.82	0.01	M = 86.79 SD = 9.28	M = 87.84 SD = 13.10	–0.72	0.47
Teamwork behaviors	M = 3.95 SD= 0.64	M = 4.09 SD = 0.69	–2.27	0.03	M = 3.81 SD = 0.60	M =3.87 SD = 0.76	–0.73	0.47
Satisfaction with the team	M = 3.96 SD = 0.80	M = 4.10 SD = 0.82	–1.65	0.10	M = 3.93 SD = 0.80	M = 4.02 SD = 0.79	–1.00	0.32
Individual growth of team members	M = 3.65 SD = 0.68	M = 3.85 SD = 0.77	–2.15	0.03	M = 3.74 SD = 0.81	M = 3.96 SD = 0.78	–2.20	0.03
Team viability	M = 4.14 SD = 0.88	M = 4.03 SD = 0.95	1.00	0.32	M = 4.25 SD = .78	M = 3.98 SD = 0.94	2.56	0.01
Vote to make decisions	M = 2.49 SD = 1.15	M = 2.84 SD = 1.35	–2.40	0.02	M = 2.61 SD = 1.19	M = 2.88 SD = 1.22	–1.94	0.06
Consensus decision making	M = 3.82 SD = 0.91	M =3.92 SD = 0.98	–0.85	0.40	M = 3.72 SD = 1.09	M = 3.55 SD = 1.07	1.46	0.15

Note: Most variables were assessed on a 1–5 scale (1 = strongly disagree, 5 = strongly agree)

The study sample for the Fall 2003 semester consisted of 152 students (65.8% male) across four separate class sections. The study sample for the Spring 2004 semester consisted of 175 students (89% male) across five separate class sections.

RESULTS

Table 2 presents results pertaining to the variables of design team functioning. Because the team processes develop over time, a comparison was made between data collected during the middle of the semester (after completion of Project 1) and at the end of the semester (after completion of Project 2). Moreover, data were collected across two semesters in which two separate industry-sponsored design projects were assigned. The design task for the Fall semester involved a countermeasure design for rocket propelled grenade (RPG) attacks. Design activities included generating and selecting concepts for detection of a RPG attack and deployment of the countermeasure for the attack. The design task for the Spring semester was to design an air velocity controller for a variable velocity fume hood.

Table 2 compares variable means for the first (mid-semester time frame) and second (end of the semester time frame) design projects for both Fall and Spring semesters. Analyses were conducted at the individual-level of analysis. In examining the means, students generally report positive perceptions of team functioning, including low levels of conflict and relatively high levels of conflict resolution, collective efficacy, teamwork behaviors, team satisfaction, individual growth as team members, and team viability. As shown in Table 2, students significantly increased the average number of hours they spent together outside of class from Project 1 to Project 2 for both the Fall and Spring

Table 3. Significant changes overtime per project

Variable	Fall 2003 RGP counter-measure design	Spring 2004 Air velocity controller design	Both projects
Average hours per week team spends together outside of class			×
Individual growth of team members			×
Conflict resolution			×
Average length of team meetings	×		
Working together as a whole team	×		
Certainty that would receive desired team grade	×		
Teamwork behaviors	×		
Vote to make decisions	×		
Team viability		×	

semesters. In addition, the average length of meetings also increased, although there was not a significant difference for the spring semester. These results are not surprising, given the increased complexity of the industry-sponsored design project as compared with the guided first project. Although means for the three types of conflict generally increased over time, these changes were not significantly different. However, team members did report higher levels of conflict resolution for the second project across both the Fall and Spring semesters. By the end of the semester, students were better able to resolve their conflicts successfully.

Table 3 presents a reduced version of the study results presented in Table 2 by indicating only the variables for which a significant change was observed over the course of the semester. As seen in the table, there were significant increases for the time spent outside the class time, individual growth, and conflict resolution. However, many more significant differences emerged over time for the Fall 2003 semester (average length of team meetings, working together as a whole team, certainty that team would receive desired team grade, teamwork behaviors, and voting to make decision) as compared with the Spring 2004 semester (team viability). We attribute this variability to the selection of the industry-sponsored project. Brief descriptions of these design projects are given in Table 4.

One major difference between the Fall and Spring projects was the level of open-endedness and ambiguity involved in the design task. For example, while conceptually designing a grenade counter-measure was more difficult, a number of design criteria effectively restricted the design solutions (e.g., design teams had to use the radars that were in sponsoring company's product portfolio), and this fact made it easier for students to focus on potential designs. In addition, because of the differences in the level of information availability across the two projects, and the fact that it was harder to visualize air velocity controllers and how they work, design teams could not conceptualize the design problem they were given quickly.

Table 4. Industry-sponsored design projects

Semester	Brief description
Spring 2004	Design and construct a prototype device to maintain a specified fume hood face air velocity.
Fall 2003	Develop a concept that is effective in defending against a rocket-propelled grenade attack. Students will be introduced to the basic principles of systems engineering through both an understanding of the sequence of design steps they traverse, as well as the nature of the work performed in each of those steps.

Overall, our results indicate that students did perceive differences in team functioning over time and across projects. As compared with the first design project, team members reported spending more time together outside of class, more individual growth as a result of being a part of a team, and an increased ability to resolve multiple types of conflict for the industry-sponsored design project. The variability in results across semesters was attributed to differences in the type of the industry-sponsored project. However, a more detailed analysis of the collected data is necessary to specifically identify the relationship between measures of team functioning and the design project type.

CONCLUSION

This paper presented the results of a study measuring student perceptions of team functioning and the changes that occurred over the course of the semester as students transitioned from an initial, guided project to an open-ended, industry-sponsored project. Despite the numerous challenges involved with the process of design in a team context at the freshman-level, students generally reported positive perceptions of team functioning, including relatively high levels of conflict resolution, collective efficacy, teamwork behaviors as well as low levels of conflict. In addition, they reported being satisfied with their teams, being better able to appreciate different types of people, and desiring to continue interacting with their team as opposed to finding a different team with which to work. Given the stress of completing a difficult industry-sponsored project in a limited time frame, these results are quite promising for the value of collaborative design learning.

Reflecting the increased demands as the semester unfolded, team members reported spending more time together outside of class, more individual growth as a result of being a part of a team, and increased ability to resolve multiple types of conflict for the industry-sponsored design project. Overall, the results point to the importance of carefully selecting design projects to develop and maintain high levels of team functioning.

REFERENCES

1. L. E. Grinter, Report on evaluation of engineering education. *Journal of Engineering Education*, 1955, pp. 25–60.
2. D. L Evans, B. W. McNeill and G. C. Beakley, Design in engineering education: past views of future directions, *ASEE Engineering Education*, July/Aug, 1990, pp. 517– 522.
3. S. Sheppard and R. Jenison, Freshman engineering design experiences: an organization framework. *International Journal of Engineering Education*, **13**(3), 1997, pp. 190–197.
4. D. A. Schön, *Educating the Reflective Practitioner*, Jossey-Bass, (1987) p. 9.
5. L. L. Bucciarelli, Learning by design—what have we learned? *Proceedings of the ASEE Annual Conference and Exposition*, Session 2666 (1998).
6. M. S. Trevisan, D. C. Davis, R. W. Crain, D. E Calkins and K. L. Gentili, Developing and assessing statewide competencies for engineering design, *Journal of Engineering Education*, **87**(2), 1998, pp. 185–193.
7. D. C. Davis, D. E. Calkins, K. L. Gentili and M. S. Trevisan transferable integrated design engineering education—Final report, (1999) http://www. tidee.cea. wsu.edu.
8. D. Crismond, Learning and using science ideas when doing investigate-and redesign tasks: a study of naïve, novice, and expert designers doing constrained and scaffolded design work, *Journal of Research in Science Teaching*, **38**(7), 2001, pp. 791–820.
9. E. Tsang, J. Van Haneghan, B. Johnson, E. J. Newman and S. Van Eck, A report on service learning and engineering design: Service-learning's effect on students learning engineering design in 'introduction to mechanical engineering, *International Journal of Engineering Education*, **17**(1), 2001, pp. 30–39.
10. M. A. Maidique and B. J. Zirger, A study of success and failure in product innovation: The case of the U.S. electronics industry, *IEEE Transactions on Engineering Management*, **EM31**(4), 1984, pp. 192–203.
11. E. F. McDonough, III, and G. Barczak, The effects of cognitive problem solving orientation and technological familiarity on faster new product development, *Journal of Product Innovation Management*, **9**(44), 1992, p. 52.
12. G. Lynn and A. E. Akgün, Innovation strategies under uncertainty: a contingency approach for new product development, *Engineering Management Journal*, **10**(3), 1998, pp. 8–37.
13. J. F. Boujut and P. Laurellard, A co-operation framework for product-process integration in engineering design, *Design Studies*, **23**, 2002, pp. 497–513.
14. D. J. Flint, Compressing new product success-to-success cycle time: Deep customer value understanding and idea generation, *Industrial Marketing Management,* 31, 2002, pp. 305–315.
15. A. K. Gupta and D. L. Wilemon, Accelerating the development of technology-based products, *California Management Review*, **32**,(2), 1990, pp. 24–44.
16. W. Walsh, Get the whole organization behind the new product development, *Research Technology Management*, **33**(6), 1990, pp. 32–36.
17. R. H. Todd, and S. P. Magleby, Evaluation and rewards for faculty involved in engineering design education, *International Journal of Engineering Education*, **20**(3), 2004, pp. 333–340.
18. J. H. McMasters, Influencing engineering education: One industry perspective (aerospace), *International Journal of Engineering Education*, **20**(3), 2004, pp. 353–371.
19. C. Dym, A. M. Agogino, O. Eris, D. D. Frey and L. J. Leifer, Engineering design thinking, teaching and learning, *Journal of Engineering Education*, January, 2005, pp. 103–120.
20. G. Pahl, How and why collaboration with cognitive psychologists began. In *Designers: The Key to Successful Product Development,* Darmstadt Symposium, Darmstadt, Germany, (1997).
21. K. A. Smith, D. W. Johnson, R. T. Johnson, Structuring learning goals to meet the goals of engineering education, *Engineering Education*, **72**(3), 1981, pp. 221–226.
22. D. W. Johnson, R. T. Johnson and K. A. Smith, Cooperative learning: Increasing college faculty instructional productivity, ASHE–ERIC Report on Higher Education, Washington, D.C., The George Washington University, (1991).
23. K. A. Smith, S. D. Sheppard, D. W. Johnson and R. T. Johnson, Pedagogies of engagement: Classroom-based practices, *Journal of Engineering Education*, January 2005, pp. 87–101.
24. K. A. Jehn and E. A. Mannix, The dynamic nature of conflict: A longitudinal study of intragroup conflict and group performance, *Academy of Management Journal*, **44**(2), 2001, pp. 238–251.
25. K. A. Jehn, A qualitative analysis of conflict types and dimensions in organizational groups, *Administrative Science Quarterly*, **42**, 1997, pp. 530–557.
26. T. L. Simons and R. S. Peterson, Task conflict and relationship conflict in top management teams: The pivotal role of intragroup trust, *Journal of Applied Psychology*, **85**(1), 2000, pp. 102–111.
27. C. K. W. De Dreu and L. R. Weingart, Task versus relationship conflict, team performance, and team member satisfaction: A meta-analysis, *Journal of Applied Psychology*, **88**(4), 2003, pp. 741–749.
28. K. A. Jehn, G. B. Northcraft and M. A. Neale, Why difference makes a difference: A field study of diversity, conflict, and performance in workgroups, *Administrative Science Quarterly*, **44**, 1999, pp. 741–763.

29. A. Bandura, *Self-efficacy: The Exercise of Control*, Freeman, New York, (1997).
30. S. M. Gully, K. A. Incalcaterra, A. Joshi and J. M. Beaubien, A meta-analysis of team-efficacy, potency, and performance: Interdependence and level of analysis as moderators of observed relationships, *Journal of Applied Psychology*, **87**(5), 2002, pp. 819–832.
31. J. R. Hackman, Work teams in organizations: An orienting framework. In J. R. Hackman (Ed.), *Groups That Work* (*and Those That Don't*), Jossey-Bass, San Francisco, CA (1990).

Gül E. Okudan is an Assistant Professor of Engineering Design at The Pennsylvania State University. She received her PhD from University of Missouri-Rolla. Her research interests include intelligent shop floor control, manufacturing strategy modeling and measurement, solid modeling, product design, and product design teams. Her published work appears in journals such as *Journal of Engineering Design, Journal of Engineering Education, European Journal of Engineering Education and International Journal of Technological Innovation and Entrepreneurship.* She is a member of ASEE and ASME. She is also a National Research Council-US AFRL Summer Faculty Fellow of the Human Effectiveness Directorate for 2002, 2003 and 2004.

Susan Mohammed is an Associate Professor of Industrial and Organizational Psychology at The Pennsylvania State University. She received her PhD from The Ohio State University. Her research focuses on teams and decision making, with a special emphasis on team mental models, team composition and decision styles. Her published work appears in journals such as *Organizational Behavior and Human Decision Processes, Personnel Psychology, Journal of Management, Journal of Organizational Behavior, and Organizational Research Methods*. She currently serves on the editorial board for *Organizational Behavior and Human Decision Processes*.