evaluations and too many questions may contradict this need and thus break the social rule that requires that the group be friendly and cooperative.

Nevertheless, the development of solutions, as well as positive group performance in general, is hardly based on positive affirmations; rather, it is based on critical evaluations. Furthermore, a good group climate does not guarantee a good group product, although it seems to be an important setting for it. As our study illustrates, it is necessary to state the negative aspects of evaluations in the particular design context that applies to it. Generally, negative statements do not inspire a successful solution search, whereas positive statements may be important in stabilizing the actual situation and the group atmosphere. A productive discussion may evoke and encourage the communicant to create, revise and modify ideas, thoughts and hypotheses. In "creative" moments, such as solution search situations in particular, a good group climate seems to be the basis for an open discussion of different design aspects, especially crucial aspects of the solution. This finding makes the group climate an important issue of design communication and representation in order to create a high performance design team.

Note

1. This method of "critical situations" sounds similar to the "critical incidents" of Flanagan (1954) or the "critical moves" of Goldschmidt (1996), but it follows another concept because the identification of the critical situations takes place according to the requirements of the design process.

References

Badke-Schaub, P 1998. Determinanten der Informationsverfügbarkeit von Arbeits gruppen in der Praxis. In Vortrag auf dem 41.Kongreß der Deutschen Gesellschaft für Psychologie: Dresden.

Badke-Schaub P and C Buershaper 2000. Creativity and complex problem solving in the social context. In Decision making: Social and creative dimensions, edited by C.M. Allwood and M. Selart. Dordrecht: Kluwer.

Badke-Schaub P and E Frankenberger 1998. Zwischen Aufwand und Erkenntnis: Zur Aussagekraft von strukturierten Interviews über zentrale Mechanismen in der Konstruktion. Memorandum Nr. 29, Institut für Theoretische Psychologie, Univeristy of Bamberg.

—— 1999. Analysis of design projects. Design Studies 20:481–494.

Badke-Schaub, P, J Stempfle, and S Wallmeier 2001. Transfer of experience in critical design situations. In Design management: Process and information issues, edited by S Cully, A Duffy, C McMahon, and K Wallace. London: Professional Engineering Publishing, pp 251–258.

Badke-Schaub, P and T Tisdale. 1995. Die Erforschung menschlichen Handelns in komplexen Situationen. In Computersimulierte Szenarien in der Personalarbeit, edited by B Strauß and M Kleinmann. Gottingen: Verlag für angewandte Psychologie.

Blessing, L 1994. A process-based approach to computer-supported engineering design. Thesis, University of Twente, Enschede, the Netherlands. Cambridge: Black Bear Press.

Cross, N and A Cross 1996. Observations of teamwork and social processes in design. In Analysing design activity, edited by N Cross, H Christiaans, and K Dorst. Chichester: John Wiley & Sons.

Dörner, D 1998. Thought and design – research strategies, single-case approach and methods of validation. In Designers: The key to successful product development, edited by E Frankenberger, P Badke-Schaub, and H Birkhofer. London: Springer, pp 3–11.

Dörner, D and AJ Wearing 1995. Complex problem solving: Toward a (computer simulated) theory. In Complex problem solving: The European perspective, edited by PA Frensch and J Funke. Hillsdale, NJ: Lawrence Erlbaum Associates.

Ehrlenspiel, K 1995. Integrierte Produktentwicklung. Methoden für Prozeßorganisation, Produkterstellung und Konstruktion. München: Hanser.

Eisentraut, R 91997). Styles of problem solving and their importance in mechanical engineering design. In: Engineering psychology and cognitive ergonomics, vol. 2, edited by D. Harris. Aldershot: Ashgate, pp. 363–370.
Flanagan, JC 1954. The critical incident technique. Psychological Bulletin 51:327–358
Frankenberger, E 1997. Arbeitsteilige Produktentwicklung – Empirische Untersuchung und Empfehlungen zur Gruppenarbeit in der Konstruktion. Düsseldorf: VDI-Verlag.
Frankenberger, E and P Auer 1996. Standardized observation of teamwork in design. Research in Engineering Design 9:1–9.
Frankenberger, E and P Badke-Schaub 2000. Kritische Situationen als Zugang zum Problemlösen in der Produktentwicklung. In Konstruieren zwischen Kunst und Wissenschaft edited by G Banse and K Friedrich. Berlin: Edition Sigma Rainer Bohn Verlag, pp 237–260.
Goldschmidt, G 1996. The designer as a team of one. In Analysing design activity, edited N Cross, H Christiaans, and K Dorst. Chichester: John Whiley & Sons, Chichester.
Görner, R 1994. Zur psychologischen Analyse von Konstrukteur- und Entwurfstätigkeiten. In Die Handlungsregulationstheorie: Von der Praxis einer Theorie, edited by B Bergmann and P Richter. Göttingen: Hogrefe, pp 233–241.
Hacker, W, P Sachse, and F Schroda 1998. Design thinking – possible ways to successful solutions in product development. In Designers: The key to successful product development, edited by E Frankenberger, P Badke-Schaub, and H Birkhofer. London: Springer, pp 205–216.
Hales, C 1987. Analysis of the engineering process in an industrial context. Dissertation, Cambridge University.
Klimoski, R and S Mohammed 1994. Team mental model: Construct or metaphor? Journal of Management 20:403–437.
Pahl, G and W Beitz 1997. Konstruktionslehre. Handbuch für Studium und Praxis. 4th ed. Berlin: Springer, Berlin.
Perkins, DN 1988. Creativity and the quest for mechanism. In The psychology of human thought, edited by RJ Sternberg and EE Smith. Cambridge: Cambridge University Press.
Pugh, S 1990. Total design; integrated methods for successful product engineering. Reading: Addison-Wesley.
Stäudel, T 1987. Problemlösen, Emotionen und Kompetenz. Die Überprüfung eines integrativen Konstrukts. Roderer: Regensburg.
Sternberg, RJ, ed. 1988. The nature of creativity: Contemporary psychological perspectives. Cambridge: Cambridge University Press.
Witte, EH and S Lechner 1998. Beurteilungskriterien für aufgabenorientierte Gruppen. Gruppendynamik 29:313–325.