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# Physical design tools support and hinder innovative engineering design

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**Abstract:** Engineers use various physical tools (e.g., computers, smartboards, notes, and prototypes) to support their design work. To understand cognitive processes underlying the innovative design process and to reveal the characteristics of innovation-supporting environments, we examined the pattern of tool use in 43 interdisciplinary engineering design teams enrolled in a full-semester Product Realization course. Teams worked all semester on a single project, with each team being assigned a different industry-sponsored project. Group meetings were video-recorded. Team success was measured in terms of meeting client requirements, and groups were divided into high, medium, and low success. Low success groups (relative to high and medium) used smartboards and prototypes less often and paper notes relatively more often. The results suggest that more successful groups focused on group discussion, supported by large sharable screen, and transitional thinking from abstract ideas to concrete products.