Chapter 7
Integrated Product Teams at The University of Alabama in Huntsville

Matthew W. Turner
The University of Alabama in Huntsville, USA

Michael P.J. Benfield
The University of Alabama in Huntsville, USA

Dawn R. Utley
The University of Alabama in Huntsville, USA

Cynthia A. McPherson
The University of Alabama in Huntsville, USA

ABSTRACT

The capstone senior design class in the Department of Mechanical and Aerospace Engineering at The University of Alabama in Huntsville (UAH) is taught as a distributed Integrated Product Team (IPT) experience. Engineering students are teamed with students of different disciplines within UAH and with students at universities in other states and Europe. Because of the distributed nature of these teams, the IPT students must use a variety of technologies to communicate. The authors of this chapter found that the students prefer familiar, informal, contemporary forms of communication, including Google Groups/ Sites, Skype, instant messaging, e-mail, phone calls, and text messaging for team communication and project management, and reject more formalized forms of communication, even if advanced features are offered. Most importantly, the authors found that the effectiveness of all forms of technology based communication tools is greatly enhanced when the students have the opportunity to personally meet prior to the design semester.

DOI: 10.4018/978-1-60960-623-7.ch007

INTRODUCTION

The capstone senior design course in the Mechanical and Aerospace Engineering (MAE) Department at The University of Alabama in Huntsville (UAH) offers students a unique design, teaming, and collaboration experience. This class, referred to as the Integrated Product Team (IPT) class, has collaborative efforts with other departments on campus and multiple external university partners, foreign and domestic. The IPT class teaches students how to implement and affect the design process; furthermore, because of its structure, the IPT class shows students the importance of communication and collaboration, and some best practices for doing both. The use of technology as a communication tool is prevalent in the IPT class – it allows the students to communicate with the instructors, external professional mentors, and students at partner universities.

Currently, the IPT class has three collaborative efforts on campus. As credit for their senior design course, students from the Electrical and Computer Engineering (ECE) Department at UAH serve as the electrical and communications design experts for the team. Students in the UAH English Department's technical editing class provide editing and writing support for the documents teams must prepare (Norman & Frederick, 2000). ECE and editing students directly integrate into the MAE teams, attend team meetings, and participate as full team members. Graduate students in Engineering Management (EM) observe the IPTs as part of their graduate research. In addition, these graduate students offer collaboration advice to the undergraduate students.

The IPT class currently has three external university partners. Ecole Supérieure des Techniques Aéronautiques et de Construction Automobile (ESTACA) University in Paris, France, has been an engineering partner to the IPT class for 11 years (Frederick, et al., 2002). ESTACA has a five-year, master-level program; therefore, their students could be equated to first-year graduate students specializing in space transportation systems. Southern University in Baton Rouge (SUBR), Louisiana, has been a mechanical engineering partner for the past six years. Beginning in Fall 2009, the newest partnership – with undergraduate science students at the College of Charleston (CoC), in Charleston, South Carolina – provides the science rationale, goals, and objectives for the project. The projects for this class are real world, where the fundamental objectives of the mission are to accomplish science-related goal(s). The science students, therefore, define the basic mission objectives and determine instruments that can measure and accomplish their scientific goals (Benfield et al., 2010; Turner et al., 2010). The engineering students design the vehicle (spacecraft, lander, rover, etc.) that houses the science instruments and transports them to the appropriate environment or celestial body.

The IPT class has experimented with several technologies to facilitate collaboration within the IPTs and between the IPTs and their distance partners, including formalized and institutional networks and tools. Students, however, prefer simpler and more familiar tools to those that are more powerful and offer more options. They also prefer less formal and more social forms of collaboration. Moreover, when collaborating with professionals external to the class, students typically prefer asynchronous communication, such as e-mail, because it allows them time to think about their questions and responses. Most students are uncomfortable with professional teleconferences, but the discomfort can be mitigated through preparedness for the meeting. (We often suggest that the students hold several asynchronous discussions and do their research before a teleconference.) This discomfort can also be exacerbated when students are involved in a meeting that has both face-to-face and remote call-in participants. The additional intimidation of face-to-face participants may disquiet some students; however, they almost always benefit from being an observer to a discussion between subject mat-