
Editorial

Colin J. Neill* and Joanna F. DeFranco

School of Graduate Professional Studies,
Pennsylvania State University,
30 East Swedesford Road,
Malvern, PA 19355-1443, USA
E-mail: cjn6@psu.edu
E-mail: jfd104@psu.edu
*Corresponding author

The scale and complexity of engineering problems has grown considerably in recent decades and now, more so than ever, systems are engineered in collaborative teams. Moreover, discipline and domain knowledge are not sufficient to ensure effective collaboration across a diverse team, especially considering the numerous dimensions of diversity (engineers and non-engineers; multi- and inter-disciplinary teams; cultural, cognitive and ethnic diversity; etc.). In addition, some have theorised that personality traits, cognitive preferences, affective differences and disparate cultural norms variously contribute to team dysfunction and disharmony, and that pro-active measures are necessary to overcome this heterogeneity of thought, perception, interest and capacity. Thus, the importance of team and collaborative research to determine effective proactive measures is important and widely recognised. In this special issue, we will explore new insights in topics related to teamwork and, in particular, student teams. These insights will be helpful to both instructors who employ student teams and to the team members themselves. The overarching goal of the collective research is more effective teamwork.

One of the first issues often dealt with is team formation. Instructors and managers are often faced with the decision of how best to form a team, e.g., randomly, by skill level, and/or by discipline etc. This decision should not be taken lightly since team formation can significantly impact the success of a team. Duck and Potosky examine this issue in their paper and propose procedures designed to help group members understand each other's potential contribution to the team.

Once formed, teams often face the challenge of managing their own diversity and this is of particular interest when that diversity is intentional, as it is in inter- and multi-disciplinary teams. Beddoes and Borrego examine the issues faculty and administrations must consider when designing interdisciplinary programmes where interdisciplinary graduate teams work on multi-year projects. This research looked at the common variables such as team formation and programme orientation and how they relate to team mental models. Harper and Nagel, on the other hand, examine the many types of conflict present on interdisciplinary teams. They used this information to tailor instruction towards helping groups work together.

Conflict is also the focus of the paper by Neumeyer and McKenna. Here, they investigate the role of team conflict caused by communication, open-mindedness, and working towards a common goal. They present how students experience conflict in a

team environment and how these conflicts relate to other aspects of teamwork such as communication, division of work, shared goals, and leadership.

When the ineffective conflict is resolved, teams can begin to build knowledge and often use tools to help in the collaborative and decision making processes. Neill and DeFranco present a collaboration framework for just that purpose, but raise concerns that effective team-working might not facilitate individual learning to the degree one would hope. Collins and Deek propose another framework that applies the activities and benefits of collaborative knowledge-building such as sharing knowledge, resources, and insights with a personalised experience so that the user can further explore and reflect on those knowledge resources that best suits their current understanding. The mechanisms through which consensus and group decision-making is reached is the focus of a paper by Cheng and Deek, who describe the functional requirements of collaborative voting tools that are based upon group support system (GSS) research.

Finally, Soundarajan and Gustafson propose a novel approach to collaborative learning centred on what they term 'learning objects' which enable engineering instructors to frame the students' collaborative learning efforts in such a way that it is tailored to the specific learning activity.

We hope you find this special issue on collaboration useful in spearheading your own research on teams as well as facilitating your teams in more effectively reaching their goals.