BESTEAMS:
Student Team Experience Differs by Institution Type

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1. Introduction

Project teams are the standard working group in many engineering fields and engineering college curricula. Teams are ultimately judged by the quality of their work product. Teams are a learning environment and a proving ground. Great engineering professionals exhibit excellence in work content and team process skills. Unfortunately, standard engineering curricula do not teach skills for successful team performance. The BESTEAMS Project was formed to develop engineering project team training systems to breach this gap in our curricula. "BESTEAMS" is Building Engineering Student Team Effectiveness and Management Systems.

The BESTEAMS Project seeks to transform the professional engineering environment into one comfortable for all by training engineering students to recognize and accept diverse learning, communication, and behavior styles in their colleagues. BESTEAMS Partners are The Catholic University of America (CUA), Morgan State University (MSU), the United States Naval Academy (USNA) and the University of Maryland (UM) engineering programs. Our partnership represents a wide spectrum of cultural environments with diverse student and faculty populations. We include private and public universities, a historically black college and university (HBCU), a military academy, and majority institutions.

2. BESTEAMS Training Materials

Teams are collections of individuals interacting as the team learns and performs. An effective way to learn to interact in a team is to study ones self through an attribute filter. An attribute filter is a set of characteristics used to classify individuals into categories of similarity (e.g., Myers Briggs Personality Type, gender, or GPA level). The BESTEAMS Engineering Project Team Training System (EPTTS) introduces students to a relevant categorization system allowing them to learn about themselves. The EPTTS exercises explore the effects of different types of diversity on team performance. BESTEAMS is currently testing an EPTTS using learning styles, as defined by the Kolb[1] model.

The EPTTS pilot program includes training in basic team skills. Our intent is to give each student guidelines for effective team functioning. The EPTTS includes short segments in both major area team skills and diversity awareness. Our strategy is to teach team members about a kind of diversity that is relevant to them. We've chosen learning styles as the focus for our EPTTS for two reasons. First, there is intrinsic value in a student knowing his or her own style.

Students who know their own learning style are more confident in their studies, earn better grades, and can apply their acquired knowledge more generally to their course work[2].

In our pilot implementations of the EPTTS, faculty team facilitators lead the class in a two-hour lab session of team training. The material we currently use for this segment of the training is, "Learning in Teams: A Student Guide," written by Gibbs[3]. During the EPPTS, the facilitator guides the students through an exercise on problem solving from different learning style perspectives. Students complete a Kolb learning style inventory and discovering their own style, and that of their teammates. The exercise can continue to include demonstrations of the value of working on teams with diverse learning styles.

3. BESTEAMS Focus Group General Results Found Institution-Based Differences

During 1998 and 1999 we have tested the EPTTS on over 400 students at BESTEAMS Partner institutions. A description of the EPTTS Training is available in a companion paper by the BESTEAMS project, titled "Engineering Project Team Training System (EPTTS) for Effective Engineering Team Management."[4]

Our assessment plan for the EPTTS system includes conducting focus groups on engineering students at partner institutions. We have developed a protocol under which student facilitators organize, conduct, and summarize data from focus groups studying the engineering student project team experience. Students conducted pre-training and post-training focus groups on about 140 students. Table 1 displays the demographic information on the focus groups conducted.

Preliminary review of the focus group data found the following expected general responses to teams projects:
- All students recognize the importance of teamwork in their engineering courses.
- Very few students interviewed have received training in team behavior.
- 25% of the students had neutral or negative attitudes toward engineering team projects.
- Practically all students have had a negative team project experience during their careers.

Table 1 Total Participants in Focus Groups From 12/1/1997 through 12/1/ 1999

Institution	Number of Focus Groups Held	Participant Counts									
		Students		Men		Women		Majority		Non-Majority	
		#	%	#	%	#	%	#	%	#	%
University of Maryland	16	101	71.6	73	80.2	30	60.0	75	74.3	26	65.0
Morgan State University	2	13	9.2	8	8.8	5	10.0	1	1.0	12	30.0
Catholic University	2	13	9.2	3	3.3	10	20.0	13	12.9	0	0.0
U.S. Naval Academy	3	14	9.9	9	9.9	5	10.0	12	11.9	2	5.0
Totals	23	141	100.0	91	100.0	50	100.0	101	100.0	40	100.0

**Table 2 Number of BESTEAMS focus group data sets reviewed for evidence
of institution influence**

Institution	Type	Focus Groups Reviewed
Morgan State University (MSU)	HBCU	2
Catholic University of America (CUA)	Private University	2
United States Naval Academy (USNA)	Military University	3
University of Maryland (UM)	Research I University	9
Total		16

4. Institution-Based Differences

Our focus group data unexpectedly signaled a difference in the experience of students on teams of different institutional types. The facilitators first brought this to our attention. They learned the following from their interactions with students from different institutions:

- The relative competitiveness of the students at the institution impacts the demands on team members to perform and the penalties for non-performance of duties.
- The level of social expectations among team members varies with the culture of the participants and the size of the university.
- The role of the instructor in the team dynamics runs the gamut from passive and sometimes disinterested observer, to sole authority figure, to adversary, depending on the institution.

4.1 Method of Data Reporting

Clear institutional-based differences were unexpected. This led us to examine a sub-section of our focus groups to compare responses across our partner institutions. Table 2 shows the number of focus groups re-visited by institution. Sixteen focus group records were reviewed to compile a list of the most common responses to the focus group questions.

A list of most commonly occurring responses to focus group questions was prepared for the reviewed data set. The most common focus group responses to six questions are reported here in survey style. Each of the following tables displays the most common responses for the question listed in the table. Responses expected to the questions (regardless of student institution) are also indicated.

Once the response lists were made, each focus group data set was reviewed to see if the response was given during the session. If it was, a count was added in the row corresponding to the response and the column corresponding to the institution of the focus group participants. Count and percent of total groups reviewed display the number of the focus groups from the institution mentioning the listed response.

4.2 Most Common Response Frequency by Institution

Table 3 Team preparation response frequency by institution

Question: *What kind of preparation do you get before working in groups?*	ALL		MSU		CUA		USNA		UM	
Answers:	#	%	#	%	#	%	#	%	#	%
Expected: No instruction given	15	93.8%	1	50.0%	1	50.0%	1	33.3%	9	100.0%
Some instruction given	12	75.0%	1	50.0%	1	50.0%	1	33.3%	9	100.0%
Instruction given on team behavior and/or member traits	12	75.0%	0	0.0%	0	0.0%	0	0.0%	9	100.0%
Comments: All groups responded as expected. The number of focus groups at MSU, CUA, and USNA is too small to draw significant conclusions on this question.										

Table 4 Desired team preparation response frequency by institution

Question: *What kind of preparation do you want before working in groups?*	ALL		MSU		CUA		USNA		UM	
Answers:	#	%	#	%	#	%	#	%	#	%
Expected: To get to know team members first then work	7	43.8%	0	0.0%	1	50.0%	1	33.3%	5	55.6%
Expected: Training in team dynamics skills	10	62.5%	1	50.0%	1	50.0%	0	0.0%	8	88.9%
Want instructor monitoring of team behavior	3	18.8%	0	0.0%	0	0.0%	0	0.0%	3	33.3%
Training most beneficial for underclassmen	3	18.8%	0	0.0%	0	0.0%	0	0.0%	3	33.3%
No Training is necessary	4	25.0%	0	0.0%	0	0.0%	0	0.0%	4	44.4%
Training for team work is not possible	1	6.3%	1	50.0%	0	0.0%	0	0.0%	0	0.0%
Comments: 1. MSU groups differ by NOT responding that they need to get to know each other before beginning project work. MSU groups already report a high degree of socializing on their teams before working on projects. MSU students are already doing this to a level not seen at other institutions. 2. A large proportion of UM groups responded that training for team work is not necessary.										

Table 5 Desired team formation method response frequency by institution

Question: *What type of team formation method do you prefer?*	ALL		MSU		CUA		USNA		UM	
Answers:	#	%	#	%	#	%	#	%	#	%
Expected: Want to pick their own group	3	18.8%	0	0.0%	1	50.0%	0	0.0%	1	11.1%
Wanted to be placed in a group	10	62.5%	0	0.0%	1	50.0%	0	0.0%	1	11.1%
Wanted to work with friends	3	18.8%	2	100.0%	0	0.0%	2	66.7%	3	33.3%
Had no preference	3	18.8%	0	0.0%	0	0.0%	0	0.0%	1	11.1%
Comments: 1. More groups at each institution wanted to be placed in a group by an instructor than expected. 2. MSU groups expressed more interest in social aspects of teaming by preferring to work with friends.										

Table 6 Behavior of mixed gender teams common response frequency by institution

Question: *Is behavior different on a mixed gender team?*	ALL		MSU		CUA		USNA		UM	
Answers:	#	%	#	%	#	%	#	%	#	%
Expected: Yes. Women on a team change the dynamics	2	12.5%	0	0.0%	1	50.0%	0	0.0%	1	11.1%
Expected: Men are "hands-on"	9	56.3%	1	50.0%	1	50.0%	1	33.3%	6	66.7%
Expected: Men care about being "right"	5	31.3%	1	50.0%	1	50.0%	0	0.0%	3	33.3%
Expected: Women are good and tidy workers (ideal secretaries)	7	43.8%	1	50.0%	0	0.0%	0	0.0%	6	66.7%
More interpersonal "politics" are involved on a mixed gender team	3	18.8%	1	50.0%	0	0.0%	0	0.0%	2	22.2%
Women feel it necessary to be more aggressive on these teams	4	25.0%	0	0.0%	0	0.0%	0	0.0%	4	44.4%
There are no differences	5	31.3%	1	50.0%		0.0%	0	0.0%	4	44.4%
Personalities are a more influential factor than gender	2	12.5%	0	0.0%	0	0.0%	0	0.0%	2	22.2%
Comments: 1. Very few groups admit outright to differences in team dynamics due to mixed gender teaming. 2. Standard stereotypes are demonstrated in responses from UM (and may be triggering aggressive role playing from women team members at UM). 3. MSU groups responded consistently as being aware of gender differences to a greater degree than other institutions.										

Table 7 Behavior of mixed ethnicity teams common response frequency by institution

Question: Is behavior different on a mixed ethnicity team?	ALL		MSU		CUA		USNA		UM	
Answers:	#	%	#	%	#	%	#	%	#	%
Expected: Yes. Mixed ethnicity teams have different dynamics than single ethnicity teams	2	12.5%	0	0.0%	1	50.0%	0	0.0%	1	11.1%
Expected: Language can be a barrier for non-native English speakers	9	56.3%	0	0.0%	1	50.0%	0	0.0%	8	88.9%
Ethnic diversity is good for team dynamics	3	18.8%	2	100.0%	0	0.0%	0	0.0%	1	11.1%
International students do not have experience in working on teams	2	12.5%	0	0.0%	0	0.0%	0	0.0%	2	22.2%
Personalities are a more influential factor than ethnicity	1	6.3%	0	0.0%	0	0.0%	0	0.0%	1	11.1%
Comments: 1. Groups are not comfortable acknowledging differences in dynamics due to mixed-ethnicity work groups. It appears easier to acknowledge potential language barriers. The reluctance to deal with ethnicity issues was noted by focus group facilitators. 2. MSU groups believe ethnic diversity is beneficial to team dynamics. This response was unexpected. 3. UM groups respond with concern on issues raising the potential for lower effectiveness as diversity increases. 4. USNA has no responses in this spectrum.										

Table 8 Behavior problem solving preference common response frequency by institution

Question: *How do you and should you handle problems within the team?*	ALL		MSU		CUA		USNA		UM	
Answers:	#	%	#	%	#	%	#	%	#	%
Expected: Take the issue up with the instructor	4	25.0%	0	0.0%	0	0.0%	0	0.0%	4	44.4%
Don't go to the instructor	3	18.8%	1	50.0%	0	0.0%	0	0.0%	3	33.3%
Expected: Handle problems within the team	6	37.5%	1	50.0%	1	50.0%	0	0.0%	5	55.6%
Confront the problematic team member	7	0.0%	1	50.0%	0	0.0%	0	0.0%	6	66.7%
Ignore the problems and do the work yourself	3	18.8%	2	100.0%	0	0.0%	1	33.3%	0	0.0%
Prevent the problem member from receiving full credit for the work	2	12.5%	1	50.0%	0	0.0%	0	0.0%	1	11.1%

Comments:
1. UM groups are prepared to act when a member is not meeting expectations.
2. Lack of common responses from USNA groups highlights that they are either not experiencing member performance difficulties or that they deal with difficulties in a very different way.
3. Raising issues with course instructors is NOT the preferred method of handling problems for any group.
4. MSU groups consistently give more passive responses than other institutional groups.

4.3 Summary of Institutional Differences

The results presented here are preliminary and need to be corroborated with the remainder of our focus group data and other assessment tools. Some themes are emerging from the frequency data of our most common responses. These are listed in Table 9.

Table 9 Institutional influence characterization

Institution	Comparative Characterization from Focus Group Responses
Morgan State University (MSU) HBCU	• Displaying a high value on socialization on teams and a low willingness to confront team members on problem issues • Open to benefits of ethnic diversity but still giving some stereotypical responses to gender diversity questions
Catholic University of America (CUA) Small Private University	• No extreme views surfaced in this filtering of the focus group responses • Focus group members were aware of their enviable situation in knowing their classmates very well before having to form teams.
United States Naval Academy (USNA) Military University	• Participants are very comfortable with authority relationships and "chain of command." • Responses in almost all categories are different than all other institutions. Clearly the military atmosphere and/or training has helped these groups overcome many issues that are problematic for other kinds of institutions.
University of Maryland (UM) Research I University	• Responses consistent with a competitive, performance-driven environment • Some responses that no more team training is necessary, but no evidence of any being given.

5. Conclusions

It is clear that institutional influences are present in our focus group responses and should be explored more fully. We may learn how to overcome team problem issues in highly competitive environments by studying institutions that have done it. Institutional influences reinforce the importance of the prevailing environment on the learning experience at all levels. We study these influences to remind us of the need to be cognizant of the institutional impact on student team experiences.

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BESTEAMS PARTNERSHIP
The BESTEAMS (Building Engineering Student Team Effectiveness and Management Systems) Partnership was initiated in 1997 to research engineering project team performance and effectiveness. The BESTEAMS Partnership builds engineering team-centered programs that support effective project team experiences throughout a student's engineering education and across the engineering curriculum. Partners are engineering and education faculty and professionals.