

2006-1656: EXPERIENCES WITH GROUP WORK AT THE UNIVERSITY OF MARYLAND

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Experiences With Group Work at the University of Maryland
or
Managing Groups – In Noir

Introduction

Group work is integrated throughout all levels of the Biological Resources Engineering program at the University of Maryland. The following is a description of some of the successful policies and procedures, inspired by the lawless gun-toting history of the Al Capone era.

Tiny (to audience): “Call me Tiny. I wuz woikin’ wid da mob over on 454 Street, as well as 455 and 484. Da mob, dey don’ woik so well as independent contractors, if you know what I mean, so dey wuz organized into gangs of tree, maybe four. Anymore dan dis, an’ dey don’ have enough t’do. An’ idle han’s ain’t good for morale. Anyway, I wuz talkin’ wid my associate in crime, Big”

Group Work Advantages

Boeing (2004) lists “a profound understanding of the importance of team work” as a desired attribute of a successful engineer. Groups are formed in many of our Biological Resources Engineering courses, including Biological Process Engineering (ENBE 454), Basic Electronic Design (ENBE 455), Engineering in Biology (ENBE 484), Capstone Design (ENBE 485 & 486), Computer Use in Bioresources Engineering (ENBE 241), Biological Control Systems (ENBE 471), and most other courses in the program.

There are advantages to group work for both the student and instructor. For the student, working in groups encourages teamwork and social skills necessary to later career life. For the instructor, grouping students reduces the amounts of assignments to be graded. For both, groups promote cooperative learning and enhance speed and thoroughness of communications from the instructor to students. Changes in assignments or schedules are more confidently communicated as long as group members assist by telling other group members. Perhaps most importantly, the quality of prepared submissions is improved if group members represent a diverse range of skills and experiences from which to draw.

Chadha and Nicholls (2006) emphasize the need for teaching transferable skills to students. They highlight several definitions for “transferable skills” as follows:

1. “skills that are developed within one situation (education) and are useful when transferred into another (employment) – (Fallows and Steven, 2000)
2. skills that are needed in any job and which enable people to participate in a flexible and adaptable work force – (Bennett et al., 2000).”

Metkowski et al. (2000) in their study of learning outcomes, stated that a) complex combinations, motivations, attitudes, values, strategies, behaviors, self-perception, knowledge of concepts and procedures, and dispositions form attributes; and b) a complex attribute cannot be observed directly. It must be inferred from performance. Such an observation is made of students in our group projects at the University of Maryland.

Tiny (to Big): "So, you got dem stiffs, an' stiff-ettes, organized into gangs. How'd it go?"

Big: "Good, boss. Over on 485 and 486 dey choose who dey want t'woik wid. On most of da udders we give 'em an offer dey can't refuse about who dey haft ta woik wid. On some streets dey keep woikin' wid da same mugs for a coupla toims. On udder streets dey get shifted aroun' during da toim. Dat keeps 'em on dere toes a liddle betta."

Populating Groups

Groups are formed in some of our courses ad lib; others are assigned group members. There is enough group work in our courses that students know each other very well. This overcomes the natural tendency to pick only one's friends as partners in a group. Furthermore, even when students are allowed to pick their own choices for group members, they are most likely to include one or two members who do not have the most outstanding academic records as long as they know that those members give honest efforts. There are a few students who have earned reputations as slackers. These students have trouble joining a group unless assigned.

Tiny: "Do dey all get along togedder?"

Big: "Most of the da time, boss. Dey really get t'know each udda, you know?"

Changing Groups

Although some groups are reluctant to change composition in midcourse, most students prefer changes in group membership once they are exposed to this procedure. In several of our courses, groups are reassigned two, three, or four times during the semester at natural change points. In one course the change comes at the end of each chapter in the book. In another, the change comes after each exam. In a third course, the change comes after completion of a multi-week electronic project.

The advantages of changing group compositions are several:

1. students get to know each other very well by working closely with a wide range of other students.
2. class morale and cohesiveness strengthens

3. group member peer evaluations are based upon a wider range of samples
4. students are exposed to a wider diversity of cultures and approaches than otherwise would be the case, and human tolerance improves.

In other cases, especially in Capstone Design, where the project outcome requires a long period (2 semesters) of group continuity, groups are not changed. By that time, however, students have gotten to know each other very well.

Tiny (to audience): "An' I did know. I keep tabs on dem stiffs, and I have each an' every one of dem tell me in writin' how dey all is actin' together. If dey wanna rat on each udder, dat's ok, too. Da main t'ing is dat I get t'know who woiks well wid d'udders, an who don't. Den I adjust their course pay-off accordin'ly. An' I don' mind sharin' this stuff wid Big heah."

Peer Evaluations

Group peer evaluations of individual efforts are required at key points in the course, usually at the points when groups are reconstituted. Evaluations are submitted individually to the instructor without the knowledge of other group members. A copy of the form is attached.

In most cases, however, long essays accompany some of the poorer ratings, and it is not hard to determine if problems exist.

Initially, students had a hard time being critical of their peers. With time, however, students became much more honest.

These ratings are converted into numerical scores with "Excellent" = 8 and "No Show" = 0. The scores for all members from all members are then summed and normalized so that 100= average expected effort. Some students average over 100, and some average less. If a student is consistently over 100 (≥ 105) for the entire semester (several evaluations) then that student's term grade may be raised by one letter grade. If a student is consistently underachieving (≤ 95), then that student's term grade may be lowered by one letter grade. Raising or lowering grades is not automatic, but is done more often than not. There used to be a few more final grades elevated than lowered, but this has tended to even out lately. There are other means that have been tried to account for group project efforts, but this is the one used most.

Tiny (to Big): "An' dija led 'em all know how dey wuz doin'?"

Big: "I did boss. In mid-toim I give dem a sheet tell'in 'em how dey is doin'. Some of the stiffs, dey can't unnerstan'. Dey tink dey is poifect in all respects. When dey ask questions, I haf ta sometimes tell 'em how impoifect dey really are."

Group Effort Feedback

Whenever possible, a mid-semester group evaluation summary is given to students to let them know how they are doing in the eyes of their peers and the instructor. It is best if this can be done after several peer evaluations have been collected so that participation judgment can be based on as wide a sample as possible, and also to make it fairer. Furthermore, if several peer evaluations contribute to this feedback, group members have less reason to be resentful of a few fellow group members who they can blame for less than satisfactory ratings

This feedback is meant to give students an opportunity to correct unsatisfactory habits and improve their group participation. A copy of the form is attached. In some cases, students complain that other group members have shut them out of meetings and conversations. In other cases, work or class schedules make it difficult to contribute fully. The instructor can offer suggestions to help solve these problems. Comments and recommendations are sometimes heeded and sometimes not. At least the choice to improve or not rests with the individual student.

Tiny (to audience): "How well I know dat, too. When dey foist had ta woik in gangs, dey wuz confused. So, we organized a class on poisonalities and how ta woik togedda. Now I do it every yeah, an' dey eyes, dey wuz opened. We use da Meyers-Briggs poisonality inventory to show 'em dat dey is all diff'rent. Den dey have diff'rent expectations of each udder."

Group Work Preparation

Years ago, one student commented that "you require us to work in groups, but you don't tell us how to do it." As a response, the Meyers-Briggs Personality inventory (Myers, 1993) is now administered and explained at the beginning of each semester in one of the courses. Whereas this test does not directly point to better group participation, it, and the explanations of the various personality traits it measures, does help students to appreciate the diversity of personality types with which they must learn to work. The range of personality types in our program is extremely wide, unlike the normal stereotypical engineering student. Hence knowing that all fellow group members are unlikely to approach learning and problem solving in the same way can be enlightening.

Tiny (to Big): "So, do you know what happens if dey don' cooperate?"

Big: "No boss, wad happens?"

Tiny: "Dey get a cut in reward. Up to one letta grade adjustment eidder way. Sometimes I chill 'em, sometimes I thrill 'em. Da ones dat get chilled, dey always complain. Da ones dat get thrilled, ya never heah from dem."

Big: “No kiddin’? An’ you know what da woid is out on da street?”

Tiny: “No, wazzit?”

Big: “Since we got so many girls in da class, da gangs dey seem t’woik bedda. Dem chicks dey is keepin’ da gangs goin’. Dey is femme fataling dem guys inta woikin’ for dem.”

Accommodating Women

The portion of women in our undergraduate classes is about one-half, and some classes have even been populated by two-thirds women. When this trend was first noticed, the largely male faculty began to ask whether adjustments needed to be made in teaching methods to accommodate different learning styles of women. We came to the conclusion that we had already inadvertently made the required adjustments when we began to form groups in our classes. The women, it turns out, very much appreciated the social interactions afforded by the groups, and very much supported group activities. It was noticed early on that groups including women had much better cohesiveness than all-male groups. Also, although there were several women who complained that they preferred working independently to working cooperatively, there were more complaints from men. These complaints have largely disappeared as students have become more used to team work

Tiny (to audience): “Of course, I knew dat. It’s my business t’know everyt’ing. But I din wanna let on.”

Tiny (to Big): “I know.”

Tiny (to Big): “So, are dese gangs poimanent, do dey stay togedder all de toim?”

Tiny (to audience): “I really knew dat dere wuz nothin’ poimanent, but how could I ‘splain dis to dis joe?”

Big (to Tiny): “Over on 454 street, dey gets moved aroun’. Every time dere’s a new job, dere’s a new gang. Dis woiks out ok. Each stiff gets to woik wid about twelve udder stiffs during de toim. Dat gives ‘em a lotta ‘sperience wid udder types, ya know? It also evens out da talent. Den I get a betta idea about da value of each stiff.”

Tiny: “So wat kinda jobs do ya hav ‘em do?”

Big: “Dey do da usual – homewoiks, design reports, rubouts. Dey also ged a chance to e-valuate design reports from udder gangs—all in secret, of course. Dere’s no stoolin’ here.”

Tiny: “Ya mean you trust dem ta grade udder reports? Are you crazy or sometin?”

Big: “Don’ call me crazy, boss. Sure I trust ‘em. How else are dey donna loin? Besides, I’m lookin’ over dere shoulders when dey do it. I don’ have any trouble.”

Evaluation of Design Reports

One of the tasks assigned to groups is to peer evaluate the work of other groups. There are three major design projects assigned at different times in one transport process course. Groups must work on these projects and submit their reports when due (usually 10 days to 2 weeks after they are assigned). The first review of these reports, before they are seen by the instructor, is a peer evaluation. Reports are allocated so that each is read and evaluated by 3-4 other students in the class, none of which was in the group that submitted the report. There is a form (a copy of which is attached) that solicits specific comments about technical and communication attributes of the report. Evaluators are instructed not to write simple “yes” or “no” entries, but to give meaningful comments. These evaluations are submitted anonymously, except to the instructor, and are graded by the instructor and returned to the group that originally submitted the report.

The advantages of this procedure are these:

1. it assists the instructor in reading and evaluating the reports, because he has the peer evaluations when grading the reports
2. it gives the submitting group feedback from more than just the instructor
3. it gives peer credence to the grade assigned to the report
4. it spreads responsibility for the report grade because similar evaluations often come from several evaluators
5. it gives other students an opportunity to peruse reports of other groups, noting good points and bad, ways to improve their own reports, and things to be avoided
6. it speeds the process of improving submitted design reports
7. it introduces students to peer evaluation procedures, something that they will have to do later in their careers

Tiny: “So, den everyt’in is hunky-dorey?”

Big: “Ya gotta be kiddin’. No, every now and den dere’s a blow-up an ‘dey try to rub out each udder. Dat’s when it gets tricky, ‘cause ya don’t know the exact trut’. It’s like dealin’ wid yer kids when dey fight.”

Conflicts and Resolutions

There have been, are, and will be groups where clashes between members occur. As long as students are all individuals, there will inevitably be times when otherwise reasonable students won’t be able to work together harmoniously. There was an instance when one student who liked to start working right away was paired with another whose work habit was to work furiously right before the deadline. Each student produced excellent work, but neither could bend

to the other's approach. There was another incident when a request was made to the instructor to avoid having to serve as a member of a group with another student with whom she had not been able to get along in the past. When, due to random happenstance, these two students were assigned to the same group, they managed to work together and ended up friends. There were other times when there were students who were very much in the habit of working alone complained vociferously about their groups, requesting that they work by themselves.

This is where the instructor or the teaching assistant must listen to the complaints, offer a sympathetic ear, give suggestions, and remind the complainer that learning to work with others is one thing that they must do to be successful in life. There is usually very little that the instructor can or should do to adjust the expectations or circumstances. Listening is important, suggesting is important, but also important is the fact that this is part of their education.

Tiny (to audience): "I knew about dat. I'd seen how dey can fight an' tussle an' wrestle.

But I don' t'ink he meant all dat. So, I asks 'im . . . whadda ya mean?"

Tiny (to Big): "Whaddya mean?"

Big: "Well, ya can argue wid 'em or you can cajole 'em. You could try to reason wid 'em. Sometimes it woiks, an' sometimes it don't woik."

Tiny: "So whatya do den? Da final solution?"

Big: "The final solution."

Tiny: (to audience): "Coitins. . . concrete shoes . . . da one-way ride outta town. Dey get da kiss an' dey is gone."

Satisfaction

Learning to work in groups pays off for everyone. With over ten years experience in most of our courses and by most of our faculty, we have seen many of the problems associated with groups, and have worked them out. Right now, most of our students are satisfied, most of the faculty are satisfied, and most of the employers are satisfied. Everyone wins.

References

- 1) Bennett, E. Dunne and B. Carré, 2000, Skills Development in Higher Education and Employment, The Society for Research into Higher Education and Open University Press.

- 2) Boeing, 2004, Desired Attributes of an Engineer, www.boeing.com/company_offices/pwu/attributes/attributes.html.
- 3) D. Chadha and G. Nicholls, Teaching *Transferable* Skills to Undergraduate Engineering Students: Recognizing the value of Embedded and Bolt-On Approaches, *The International Journal of Engineering Education*, 22(1): 116-122.
- 4) M. Mentkowski et al., 2000, *Learning That Lasts*, San Francisco: Jossey-Bass, Inc.
- 5) Myers, I.B., 1993. *Introduction to Type*, Fifth Edition, Palo Alto, CA: Consulting Psychologist Press.
- 6) S. Fallows and C. Steven, 2000. *Integrating Key Skills in Higher Education*, Kogan Page Publishers, London.

Peer rating of team members

Please write the names of all your team members, INCLUDING YOURSELF, and rate the degree to which each member fulfilled his or her responsibilities. Such responsibilities include:

1. Attending scheduled meetings.
2. Contributing to discussions.
3. Attempting to communicate clearly and with civility.
4. Listening effectively.
5. Accepting criticism gracefully.
6. Completing tasks fully and on time.

Your responses are used to assign individual grades from group grades. Your responses are confidential. The possible ratings are:

Excellent	Consistently went above and beyond: tutored teammates, carried more than his or her fair share of the load.
Very Good	Consistently did what he or she was supposed to do, very well prepared and cooperative
Satisfactory	Usually did what he or she was supposed to do, acceptably prepared and cooperative.
Ordinary	Often did what he or she was supposed to do, minimally prepared and cooperative.
Marginal	Sometimes failed to show up or complete tasks, rarely prepared.
Deficient	Often failed to show up or complete tasks, rarely prepared.
Unsatisfactory	Consistently failed to show up or complete tasks, unprepared.
Superficial	Practically no participation.
No Show	No participation at all.

These ratings should reflect each individual's level of participation and effort and sense of responsibility, not his or her academic ability.

Team Member	Rating	Comments

Your signature: _____

Comments can be continued on the back.

Group Participation Evaluation
ENBE 454

Name _____

Date _____

Your group participation includes evaluations from _____ groups.

Your participation is evaluated as:

- super excellent (compensates for an unsatisfactory group member)
- excellent
- very good
- satisfactory
- ordinary
- marginal
- deficient
- unsatisfactory
- superficial
- no show

Comments: _____

Recommendations: _____

DESIGN REPORT EVALUATION SHEET

Title of Report _____

Author of Report _____

COMMUNICATIONS

Comments:

Professional Tone

Clearly Written

Well Organized

Effective Use of Illustrations

Grammatical Correctness

Correct Spelling

Paragraph Organization

Avoids Technical Jargon

Summary

Information Content

Statement of Problem

Significant Results

Conciseness

Grammar/spelling

Table of Contents

Complete/Correct

Introduction

Completeness

Information Content

Well Organized

Grammar/Spelling

Design Concept

Clear

Complete

Properly Illustrated

Calculations

Clear

All Required Data Clearly Presented

Bibliography

References Completely Described

All Required References Cited and Included

TECHNICAL

Summary

Important Technical Details Included

Solution Appears Reasonable

Technical Information Useful

Problem Statement Correct

Introduction

Technically Complete

Presents Sufficient Technical Background
for Problem Solution

Fully Used Range of References

Detailed Problem Statement

Correct/Complete

Design Concept

Correctedness

Demonstrates Insight/Imagination

Includes All Necessary Procedures

Includes Extra Desirable Details

Includes Unnecessary/Undesirable Details

Reasonable Directions

Explored Full Range of Possibilities

Calculations

Completeness

Correctness

Reasonable Assumptions

Assumptions Checked When Possible

Choices Reasonable

Required Data Researched (Not Assumed)

When Possible

Illustrations Technically Correct

Appendix

Includes All Necessary Tabular Data

Includes All Required Graphs & Other
Illustrations

Includes all Repetitive Calculations

Positive group experiences, moreover, have been shown to contribute to student learning, retention and overall college success (Astin, 1997; Tinto, 1998; National Survey of Student Engagement, 2006). Properly structured, group projects can reinforce skills that are relevant to both group and individual work, including the ability to: Break complex tasks into parts and steps. Plan and manage time.