Teamwork in University Physics 1 and Calculus 1 …

… a trial run

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Teams vs Groups (presentation to students)

Teamwork in Physics

"A team is a small number of people with complimentary skills who are committed to a common purpose, performance goals, and approach for which they hold themselves mutually accountable"

Katzenbach &Smith
The Wisdom of Teams

Team vs Group Performance

- "Group" sometimes about as effective as individual members
- A Team can create a greater impact and be more effective

Teams this term

- Four students – rotating "roles"
- Stay together the whole term (important to access/build strengths)
- Create "Codes of Cooperation" – help create accountability
- Periodic "Process Checks" to promote the health of the team – identify concerns

Team Projects/Grades

- In-class, informal projects (teams/pairs sit together in lecture)
- Common team project worked on during workshops
- Individual and/or Team grades recorded
- Homeworks/Tests – individual effort

How are teams formed?

- Heterogeneous mix of students
- Sort by GPA and gender (if necessary)
- Mixture of high/low GPAs
- 4 in a team seems best (3, 5 if necessary)
- Roles assigned (*sort of ..*)
  - Likely vary by project
- Team conflicts dealt with by instructor with **whole team** present

Roles students play in teams?

Recorder/Summarizer – Project author and organizer
Taskmaster – Keeps team on task – keeps track of time/responsibilities
Devil's Advocate – Provides an "opposite" viewpoint – challenges assumptions
Fact or Reference Checker – Checks for internal consistency – monitors "constraints" in the system
Consensus Checker – Monitors agreement among the members
Encourager – Provides optimism that the project can be done – acknowledges forward movement
Gatekeeper – Monitors contributions from team members – encourages equal input
Facilitator – Monitors "health" of the team function – tries to spot problem areas

Task Roles/Gambits	Group Maintenance Roles/Gambits
Recorder/ Summarizer • Shall we say it this way? • Let me read this back to you to make sure it's right. • Let me sum up what we have decided. • Here's what we have accomplished so far – we have one section left to draft. **Taskmaster** • Let's get back to the main point • I think we need to move on to the next question. We only have three minutes left to get the job done. • Who is going to take responsibility for tracking down that information?	**Consensus Checker** • Do we all agree? • Is that answer okay with all of you? • Any final thoughts before the recorder writes that down? • I'm not convinced that everyone is all right with that decision. Can we do a quick poll? **Encourager** • Let's think hard. I'm sure we can figure this out. • We're doing a wonderful job with this. • That's a great answer. • Let's give ourselves a hand for that!

Presentation of Teamwork to students?

- Brief introduction to Teamwork (PPT show)
- “Icebreaker” scenario (Space Survival)
  - Stranded on Moon – rank order items for survival
  - First rank individual, then Team, compare expert
- Discuss results of teamwork vs individual
- Discuss possible roles in Teams
- Work on Code of Cooperation

You are stranded on the Moon …
And have to travel 300 km to shelter ..

- Individually - rank order (1=important, 3=not important) the following items : signal flares, bottles of oxygen, nylon rope
- Now talk with neighbors – rank order …
- Compare with “experts” ranking
- Did your “team” come closer than “individual”?

Icebreaker – Space Survival

SPACE SURVIVAL Team Building Exercise

Step 1: (Do this step now) Each person is to individually rank each item. 1 is most important; 15 is least important. Do not discuss the situation or the task until each member has finished the individual ranking

Step 2: (To be done after the following mini-lecture on team roles.) Rank order the 15 items as a team. Once discussion begins don't change your individual ranking.

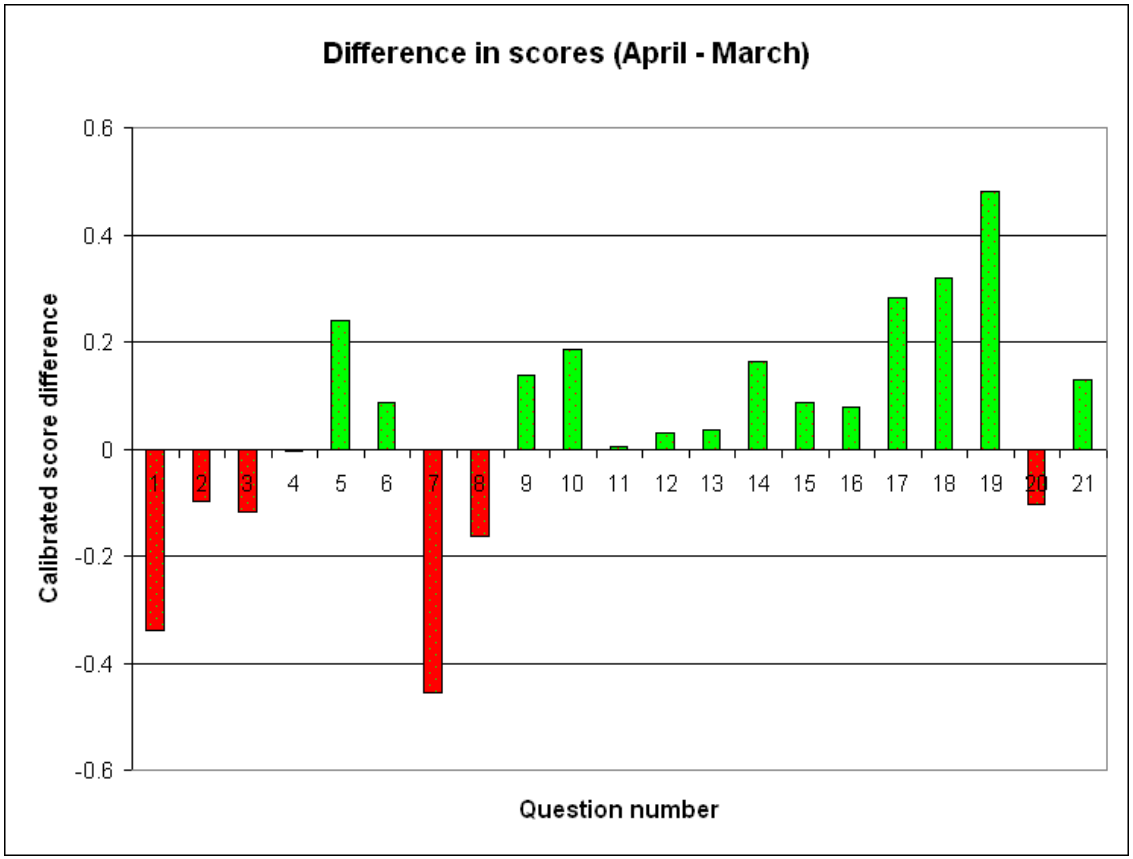
Items	Individual Ranking	**Step 2** Team Ranking	**Step 3** Expert Ranking	**Step 4** Difference Ranking |1-3|	**Step 5** Difference Ranking |2-3|
Box of Matches					
Food Concentrate					
20 meters of nylon rope					
Parachute silk					
Portable heating unit					
Two .45 caliber pistols					
One case dehydrated milk					
Two 50 kg tanks of oxygen					
Stellar map (of the moon's constellations)					
Life raft					
Magnetic compass					
25 liters of water					
Signal flares					
First aid kit w/ hypodermic needle					
Solar-powered FM receiver/transmitter					
Total the absolute differences of Steps 4 and 5 (low number is "good") ->					
				Your Score	**Team Score**

Team Process Checks

- Sample questions
  - My team members criticize ideas, not each other.
  - We have a difficult time staying focused and on track.
  - Some people seem to do the bulk of my team's work.
  - When conflict arises in the team, it is likely to be a battle or, at best, a waste of time.
- Delivered in Blackboard (course management software)
- Results shared individually with Teams

Initial results of TPC – Spring 2006

- *Compare "scores" on TPC early vs later in term*

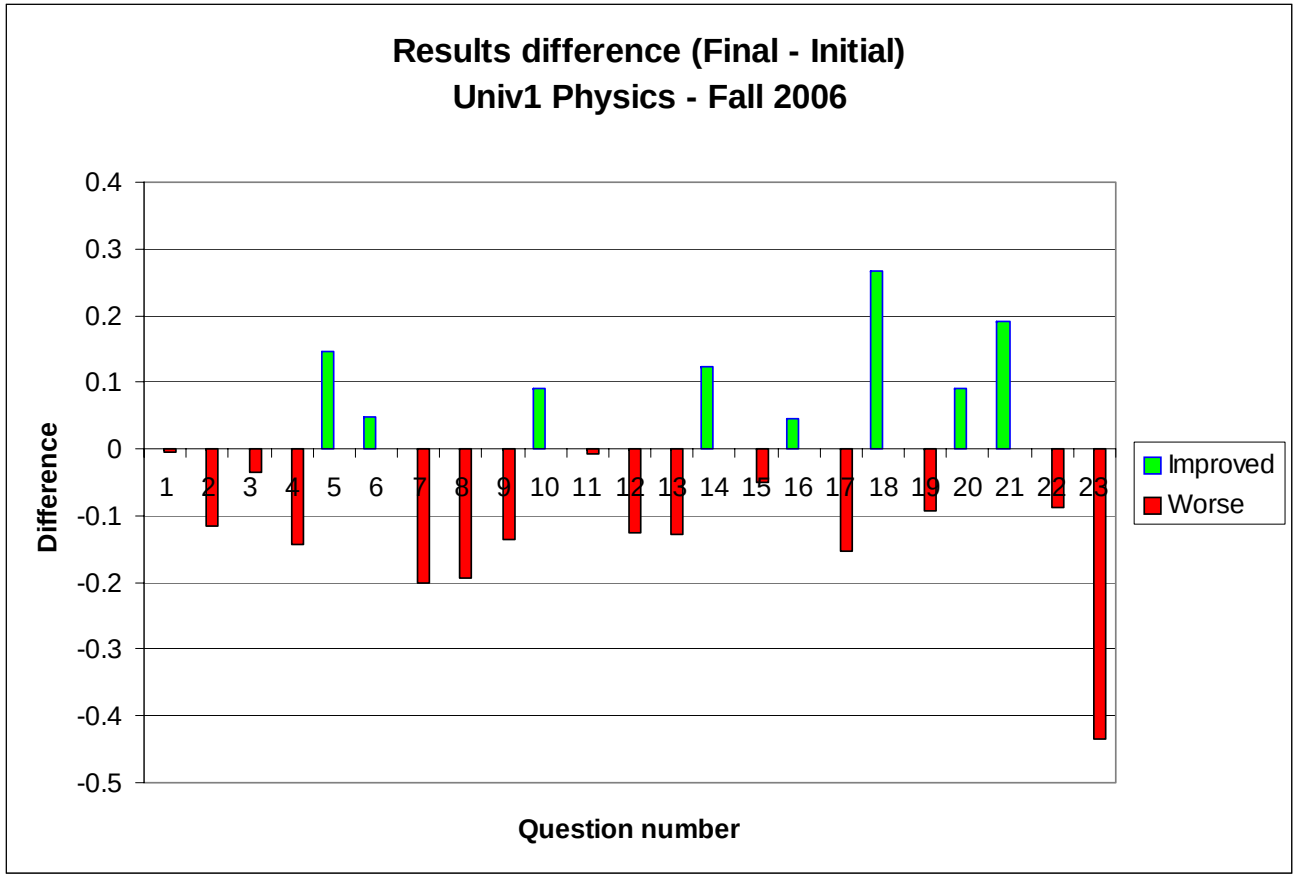


Look at selected questions ..

Selected answers that got WORSE by end of the term		**March**	**April**	Indicator
Q1	My team may agree on a solution but not every member "buys into" that solution.	*2.20*	*2.54*	***Low = good***
Q7	We have a difficult time staying focused and on track.	*1.47*	*1.92*	***Low = good***
Q8	My team ignores conflicts among team members.	*3.07*	*3.23*	***Low = good***
Selected answers that got BETTER by end of the term		**March**	**April**	Indicator
Q5	My team tries to get everyone's ideas before making a decision.	4.07	4.31	High = good
Q17	When conflict arises in the team, it is likely to be a battle or, at best, a waste of time.	*1.67*	*1.38*	***Low = good***
Q18	My team can assess itself and develop strategies to work more effectively.	4.07	4.38	High = good
Q19	As a team we find it difficult to accept criticism openly and non-defensively.	*1.87*	*1.38*	***Low = good***
		Possible answers		
		1	**Never**	
		2	**Rarely**	
		3	**Sometimes**	
		4	**Frequently**	
		5	**Always**	

Results of TPC – Fall 2006

- *Compare "scores" on TPC early vs later in term*



Look at selected questions ..

Question Selected answers that get WORSE by end of the term		Initial TPC	Final TPC	Indicator
7	**We have a difficult time staying focused and on track.**	1.88	2.08	Low = good
8	**My team ignores conflicts among team members.**	2.53	2.72	Low = good
9	**My team members are clear about what is expected of them.**	4.44	4.31	Low = good
23	**The roles we take on during the team project help the project run more smoothly.**	3.32	2.89	High = good

Selected answers that get BETTER by end of the term		Initial TPC	Final TPC	Indicator
5	My team tries to get everyone's ideas before making a decision.	3.85	4.00	High = good
18	My team can assess itself and develop strategies to work more effectively.	3.71	3.97	High = good
21	We have difficulty completing our work efficiently.	2.94	2.75	Low = good

Possible Answers

1	Never
2	Rarely
3	Sometimes
4	Frequently
5	Always

Mistakes made … not to repeat?

- Need to do more TPC (three? – start, middle end?) *{Missed this goal again in Spring 07!}*
- TPC results shared with students more quickly (feedback into their process!) {*Done!*}
- Standardized pre-post tests not done in Spring Physics (*was done in Fall – not analyzed yet*!)
- Easy to fall back into “old habits” – projects more like “group” work than Team

Next step(s) …

- Other sets of Team teachers now teaching their classes (Fall 2006 and Spring 2007)
- Add questions about "student roles" to TPC survey – to assess effect (*modified "requirement" of roles*)
- "Peer rating" (accounting for individual effort) – need more experimentation
- Faculty observers to monitor class/team process?
- After term finished, compare terms:
  - Same teacher, Team vs no-Team
  - Different teachers, both with Teams
- Add teamwork to Calc2 and UnivPhys2?
  - *Being done now in UnivPhys2 – better team projects also!*

Thank you very much!

This PPT presentation (and others from today that are sent to me) will be posted on the MI-AAPT website and announced via email.

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