INTRODUCTION

"Read the Directions!"

This is one of the most aggravating expressions that I have to repeat over and over again during laboratory exercises. This is the phrase that strains my larynx. This is the phrase that makes me feel that I will become prematurely grey haired. This is the reason why I know there has to be a better way.

One of my favorite innovations in how I grab the student's attention is my noise making devices. Level one is the squeaky toy. This is my 'polite' attention getter. It says "Ok, finish what you're saying, then look my way". Level two is the whistle. Being a referee, I always have a whistle somewhere handy. It's invaluable when taking kids outside, on a field trip, and – as I have learned – during laboratory activities. The whistle says "I'm not mad at you, but I need EVERYONE's attention – right now!" Level three is shouting. That says "You've ticked me off, so Watch Out!"

I always feel that I've failed a little when I have to hit level three. Like many teachers, I would imagine, I much prefer to operate with the kids' respect – not their fear. Of course, in a pinch, I'll take what I can get. Lab exercises had historically brought this out and vexed me quite seriously at times.

For a few years leading up my research here, I could not understand why ninth graders would, time and time again, wait (seemingly helplessly) for me to tell them what to do next.

Indeed, all they had to do…was to read the directions! Why couldn't they latch onto this idea that I repeatedly shouted until my face was flush?

While I was tempted to simply blame it on the inherent 'ineptness' of freshmen, I knew I needed to look at the underlying reasons. In these lab exercises, I had tried groups that were students selected and groups that I had selected. Even with the verbal cue to "have someone designated to read to everyone else", that directive was seldom taken up. What was lacking was an effective leader who had a vested interest in making his or her group stay as productive as possible.

Oh Captain, My Captain…

This realization spurred the formation of my captain concept. Each group needs a leader, but few if any students would volunteer to step up into the role. I could tell a student that they were in charge, but where was the motivation? I spoke often to the students about playing to their strengths in terms of the 'roles' that people tend to fall into with regards to group work dynamics (executors, creative, sequencers, refiners, and flexors). (Fahden, 1995) However, none of those strengths implies that that person must lead.

My answer came in the form of an unfair grade. Last year, before the current model that I will describe, I tried applying a penalty to the grade of the student designated as the 'leader' if their group did not finish in the prescribed time frame. This evoked a resentful response in the students and seemed largely ineffective; as I often penalized the majority of leaders, not just a few.

"So, what if the unfair grade came in the form of a different rubric?", I asked myself. I have a generic formatted rubric for laboratory reports (the final product of a laboratory group) that adds up to a nice twenty five points. Maybe the leader of each group could be graded on a rubric that added up to fifty points instead.

In the interest of a reasonable time turn around to the students, I often employed sample grading for the analysis questions. Correcting every item for every student would become unwieldy. I tend to identify the key topic questions, grade those carefully, and simply look for completion on the rest of the report. For the group leader, whom I will refer to as the 'captain' herein, their lab report would be weighed in total – examining all elements: report format, adherence to organization protocols, quality and presentation of data collected, accuracy and completion of tables and/or graphs, accuracy and completion of calculations, and reasonably accurate answers to analysis and concluding questions.

Finding Equity amongst the unfair system

To be fair, with all this unfairness, every kid in the room would have to be captain at some point. This sets up a situation, over the course of a semester, which each student would be under a high amount of stress during a selected lab period. They knew, before getting started, that their report would be under a high degree of scrutiny. They had to aim for perfection to have a chance of doing well. If they did not, it would have a significant impact on their semester grade.

For the rest of the labs, these students would be crew (as I will refer to herein) to another captain. While a lower stress designation, students would be aware that another

student in their group was under that same pressure. My theory was that this should encourage the student to want to take a more active role to ensure his or her captain's success, especially as that captain might 'crew' for them in the future, when it was their turn as captain.

To help summarize, this system is unfair to the captains only in the short term. As everyone gets the same treatment, it is equitable (grade wise) in the larger framework of the semester. My overall question was: Could it be an effective way of getting the groups to run more independently and thus more efficiently?

The last piece to fall in place was the method of selection. It seemed only fair to me that if I was to put this burden on a student of being captain, that *they* should select a crew that should best help them attain success.

One element I recognize with the work I am presenting here is it may not be applicable for all schools. For my group of students, in our specific setting, this research and application of methods was workable. To better understand that setting, I will put my school in context.

My school in context

Dighton Rehoboth Regional High School is a suburban school with two contributing towns (Dighton & Rehoboth), each with their own middle schools. There are approximately 950 students, mostly (96%) Caucasian, with a large Portuguese contingent. Socioeconomically, our population is largely middle class – as we have lost some enrollment (typically the more affluent) to private schools in recent years. 6.5% of our students are on free or reduced lunch. Last year, 87.7% of our seniors went on to two or four year colleges last year.

My 9th grade Physical Science classes are just three of ten sections of the same course being offered. My three classes have the following ratios for general education to special education: Period five (one of eighteen on IEP, two others with 504 plans), Period six (three of twenty on IEP, three others with 504 plans), and Period seven (three of twenty three on IEP, two others with 504 plans). I teach two other courses: oceanography and environmental science. Many students from either town do not know many of their classmates in September (as they attended different Middle schools). This was likely significant, as the lack of a pre familiarity with their peers likely affected their individual selection criteria.

The freshman physics course is designed to prepare the students for the MCAS Introductory Physics Test in early June and is time structured to cover all topical units addressed in that test. All of this is in accordance with the Massachusetts department of education science frameworks.

My classroom is shared with only one other teacher (also teaching physics). However, with a preparatory period between her class and mine, there is little difficulty in maintaining control over sequence with respect to laboratory investigation activities.

<u>Argument</u>

In this paper, I will argue that while the disproportionate grade incentive has merit, the student picked groups do not fall in line with anticipated or expected goals of heterogeneity and fair distribution of talent for each group. Student selected groups, however, while tending toward homogeneity, tend to offer a social familiarity that can be used to evoke an altruistic response towards academic goals.

The conundrum of setting cooperative learning groups into motion effectively is one intrinsic to lab based science, as well as other curricula. So as a science teacher, to understand how a group will function most efficiently (in terms of time management, delegation of responsibilities, and a goal orientated approach and attitude) is to know how to maximize teaching potential for labs, and related work in other subjects. The limitations of available equipment often necessitate that students work in (sometimes large) groups, though that alone does not qualify as cooperative learning. Motivating students to work together toward common understanding of a shared task does qualify as cooperative learning and I believe my research offers an insight to one effective application.

Additionally, I would hope that those looking at this would see the progression of my methodology, and the corresponding effects. From this, they could then *leapfrog* my earlier errors and gain a more effective management strategy for this skill, in their own application.

Methods

I knew the first thing I would have to know is *who* the students were in terms of social standing. Numbers in my grade book spoke to academic standing, but I needed a different viewpoint. In mid September I conducted my first sociogram. I had located the technique in the Hubbard and Power text, and was intrigued enough to apply it. I showed each of my three classes of ninth graders a transparency of the text's exemplar, told them that their answers (as well as the results) would be for my research only (not shared), and I put the central question on the board. "If you could pick anyone in this room, who do you think would be BEST ABLE to

help you do well as a leader of a lab group? Rate them: first choice, second choice, third

choice."

I collected the responses, tallied the results in an excel spreadsheet, and generated a

bar graph. From the numerical value of the 'votes' each student received, I attached the labels:

Star, High range, Low range, and Isolate. I realized within just a few weeks that this first

sociogram was deeply flawed with respect to the fact that each class was composed of students

from different middle schools. Thus, their assessment of each other was compromised by their

unfamiliarity with one another.

At the beginning of this project, I set out to compare and contrast how Stars and High

range students fared in the captain role versus their Isolate and Low range counterparts. To this

end, I designed a post lab survey – to be completed by everyone. Captains answered four

questions, rating their impressions of their effectiveness and comfort in the role as well as their

evaluation of the disproportionate grade as being effectively motivating. Crew answered five

questions, rating their captains' performance as well as their own, their comfort with being led,

and the degree of motivation they felt in knowing their captain was being graded more

stringently.

Prior to carrying out the first lab in this study (Lab 1B), I had my designated captains in

each class (I chose three stars and two isolates in each class) and had them stand at the front of

the classroom. They were instructed to take turns picking the rest of the students (seated) until

all were accounted for. Upon reflection, I decided to interview a few of the physical education

teachers in a 'working lunch' to get their opinions on team selection (as it is a constant topic in

their subject area). The results of that talk influenced a modification to my next group selection process. I realized that I had put a bit of an overt social burden on the captains to pick 'friends' over (potentially) other more qualified students. Also, there was the stigma at the end for the "last picks". This is also reflected in the field notes that I kept throughout the study. (P.E. teachers personal communication, *10/22/10*)

For the next lab (Lab 20A), I altered my group selection strategy. My grade book software allows me to generate and print seating charts with student pictures. So, for this lab, I had my designated captains (this time high and low range students) approach my desk discreetly. They were each handed a different color highlighter and told to take turns picking until all students were selected. I felt this got around the previous problems. Though, as I was to discover, other elements would render this insufficient as well.

I utilized the same post lab survey as Lab 1B and continued keeping field notes. This time however, I attempted to generate survey result reports for each captain. I soon found the process both time exhaustive and statistically insignificant for the recipient (some captains only steered a crew of two other students). While I opted not to share the results with the captains (foreseeing that sharing the results might elicit resentment between some students), I did see the significance of refining the scope of the surveys to focus in more acutely on the captains.

For the next lab (Lab 19A), I utilized the same group selection strategy as Lab 20A. While I watched the captains for this lab (an even mix of captains – star, high range, low range, and isolates), I saw the same socially based picks happening from previous lab. I decided to work with the current model for Lab 19A, with a plan for revision in the next lab.

One new tool I started employing here was the behavior monitoring chart. For each captain, I noted the following data and subjective assessments: Special Ed. Status, gender, engagement level (one→five), ability to delegate responsibility (one→five), data collection completed in a timely manner (one→five), post data collection collaboration (one→five), readily communicating with his/her crew (one→five), and additional comments or observations. I performed this for each of the three classes. In most cases, I pulled the captains aside during the second day of the lab for just a few minutes to have them self assess on each of the criteria I listed above. Predominantly, their self assessment was either the same as my own, or they were more critical of their performance.

For this lab, I chose to narrow my post lab surveys to just the captains. I asked them eight questions, focusing on their impressions and ratings of their own effectiveness, comfort, time management, motivation similar to earlier surveys. Due to emerging themes in my data, I asked new questions centering on their preferences for group selection criteria (i.e. social vs. academic) and gender preferences for group work.

The next lab of study was Lab 20B. For this lab, I altered the group selection format. As before, the selection was made by pre determined captains discretely with color indication. At this point, I was simply selecting students whom had not yet taken the captain role in previous labs, but had demonstrated some level of competency – based on previous grades. The new aspect that I added was to divide the potential crew into "Fantasy draft rounds". Using the same picture generating program, I printed off three to four pages per class – each showing five of their classmates to choose amongst. I arranged each group of five by similar academic

performance. If a captain picked last in one round, they would pick first in the next round. I felt this would eliminate some of the homogeneity inherent with previous lab picks.

Several past practices were repeated without revision for Lab 20B. I continued with the same behavior monitoring chart, post lab captain surveys, and field notes. My field notes are notes sequentially (surrounding the days of each lab) and are subdivided into Field notes (direct observations), methodological notes (involving the research and including changes in where/when I take notes), Theoretical notes (where I examine ideas on *what is happening*), and Personal notes (notes on moods, anecdotal opinions, etc…).

While I had intended to include the next lab as a part of this research (Lab 21 A), time constraints did not allow for it. My department currently utilizes a common mid year exam for each class, and a periodic check in revealed that I had fallen behind pace. One of the disadvantages to doing these cooperative learning group laboratory approaches (as opposed to the much quicker teacher demonstrated lab) is the time commitment. I do believe the students internalize the experience better when they generate and analyze the data themselves, but the time pressure of the mid year (and ultimately the MCAS exam in June) demands that a content pace be followed. As such, Lab 21A was done in a different format. The huge variances in the way it was carried out, I felt, excluded that activity from this research.

Themes, Data, and Analysis

The emerging themes I have encountered through the course of carrying out this investigation, as well as comparing my findings to those established in related journal literature are as follows. I have noticed that student picked groups get homogenized, with regard to

talent and ability, regardless of the directive given "choose those whom you believe would be best able to help you complete the lab." Also, while homogeneous with respect to social status, gender played a negligible role in group selection and interaction. Lastly, it seems that the seemingly unfairly weighted grade was significantly effective in spurring better task orientation and production of the final product – the laboratory report.

Theme #1: "He's gotta be in my group…"

As stated, I have noticed that student picked groups get homogenized, with regard to talent and ability, regardless of the academically centered directive given. I believe this is because that for this age group and perhaps for several other age groups as well, social status takes priority over academic success as the primary picking motivation for these students when selecting groups. Apparently, the logic of picking those most capable, able, and talented is outweighed by the seemingly illogical motivation (illogical from my point of view anyway) of choosing those with whom you identify with and relate best to – regardless of their academic ability. This suggests that at this junction of their development, social connections often outweigh academic achievement. While I had not focused on this initially (and thus had not looked for it), there is undoubtedly research done in this area.

Post lab surveys (for all four labs) that were completed by students showed a high correlation to this claim. The majority of captain respondents indicated that social comfort level did significantly influence their choices. Also, when briefly interviewed, several expressed a desire to not "dis" – disrespect their friends by not having them in their group. Apparently, they

feared the social backlash more intensely than the potential academic backlash. This is logical for them, from the point of view of the elevated value of social connection.

Group selection sheets (all four labs) also gave direct evidence of this. Socially awkward students (who tended to also be lower performing) tended to pick one another. Within each of the three classes where I applied my research, the dominant patterns kept emerging of social cliques finding each other. The only success I had in this regard was picking more than one member of the same group as a captain. Following group selection, I would hear a captain actually apologizing to her friend: "Sorry I couldn't get you, (other captain) already picked you before I could".

I have assembled two sociograms to help identify *who* these students are. I recognize that my first sociogram was flawed because of the students' lack of familiarity with one another at the beginning of the year. A more recent sociogram showed a few changes, most notably how the class at large had a perception of intelligence based more on verbal/tactile participation than on academic achievement (i.e. the failing student who is very vocal during labs, even if he doesn't turn one in, is viewed by many as 'smart'). This also reinforced for me which groups were picking which students. Highly rated students tended to stay with highly rated students, and vice versa.

One student, Tim, was uniquely identified in the second sociogram. Tim's classmates chose him as both "smart" and a desired partner. I believe this would not have been the case if Tim's grades in the class were more public knowledge – as he is currently failing badly.

Tim is repeating this class, has special education status, and is a very vocally and tactilely active member of lab groups "*in class*". After the data collection and conversation is done, unfortunately, Tim does no follow up work. Consequently, he has been receiving zero's for his individual lab reports. That he is participative in class makes me question how I might incorporate other (less paper driven) participation grades. It is unfortunate, and arguably unfair, that Tim is only assessed via the final product.

As students do not have the same access or knowledge of each other's grades that I do, they may perceive someone who sounds "smart" or at least is willing to put him/herself out there as smart. The performance those students give; while difficult to grade on a paper test, is worthy of merit and suggests the application of some variety of participation grade

Theme #2: "Woman of 'Steele' "

While students did tend to homogenize with respect to social status, gender did not appear to play a significant role. This was a bit of a surprise in light of my literature review. For example, Mitchell (2004) found that "Women, for example, are more likely to drop out of a group if they are the only female, especially in nontraditional setting".

One of my Post lab survey (Lab 19A and 20B) questions attempted to tap into this. I had asked "Do you tend to feel more comfortable in a group of the same gender, or both boys & girls together." With one exception, every survey returned was answered with "I prefer mixed gender groups". The one exception, comically enough, was from a somewhat precocious boy who preferred to work with all females. This coupled with the survey question responses

mentioned above, suggest that gender is secondary in importance to social status for student group selection.

All of the group selection sheets also backed this up with showing me actual picks. Surely enough, males and females were generally well distributed. One interesting exception was in my male numerically dominated period five class. Of the four girls in the class, two might be characterized as 'punk rock' girls, while the other two are more 'cheerleader' ish. As might be expected, they tended to gravitate toward their counterparts within each clique over and over again, though when they were in a group with all males (of the same clique) they functioned just as well.

From my own observational field notes (field notes 10/26), I did observe that during their interactions with others in their group (both male and female), female captains in all classes seemed to have little to no difficulty in addressing their 'crews', regardless of the crew gender. One example of this was Steele, a very social girl (and one of the 'punk rocker's mentioned above) who had no reservations ordering around her male subordinates when she took her turn as captain.

Theme #3: "Hey, I need to get this done right! … So help out".

The last emergent theme I have found is the heightened task orientation and participation that led to production of the summative project – the lab report. I would claim that for most students, a seemingly unfairly weighted grade stated at the outset of a cooperative learning group task, leads to a better motivation to spur on a more efficient and effective effort – both in leadership of the group and in formulation of lab reports. This is

largely based on informal comparisons to previous years' reports, when I was not employing this system

From my field notes (10/22), I observed several situations, where the captain would self advocate to his/her group that "hey, I need to get this done right! So help out… ", and other directions to that effect. The effectiveness of prompting this response did correlate largely to the academic status of the students involved. Interestingly, lower performing students put in the captain role did 'step up' to the task in quite a few instances to put forward work superior to their previous efforts. One such example was Keanu (incidentally, this was the boy previously mentioned who preferred to work in an all girl group): whose group was efficient in terms of time management. Keanu, and his crew, all scored 70% or higher on Lab 19A (for which he was captain).

Student grades also speak to the efficacy of this process. Both captain and crew were graded on a similar rubric; the main difference being the weight of the grade (crew scored x/25, captain scored x/50). Percentage wise, captains tended to do well when in charge. Notable exceptions tended to correlate well with reduced social status – as indicated from the sociogram.

In my post lab surveys, I had asked 'crew' if the prospect of their captain receiving a more weighted grade influenced how effectively they felt they 'wanted' to work to help their captain out. The majority of respondents [60% lab 1B, 75% lab 20A – when crew were surveyed], indicated that "yes, I wanted to see them do well". I do not expect that this anticipated response governed the captains' initial reasoning for picking them; though the psychology of the decision process is intriguing. I find it intriguing because I suspect that

altruism is the governing aspect that I may exploit for better student performance. While I did not ask the question of the students, I am now curious: Did the captains pick crew strictly for social connection, or was there an expectation that the social connection implied an academic expectation upon selection?

Literature Review

A science class's laboratory investigations are the subjects' inherently 'built in' differentiated instruction. Science teachers have long looked at these activities to build content skills: manipulating variables in systems, observing natural phenomena, engaging in the scientific method, etc… We have also looked, socially, to these activities to help with the emotional security and maturity of our students as they learn to interact on a group goal. Parsons (2008) explicitly points to us: "such an exploration (into factors that influence group members' status) is pressing as science teachers unquestioningly view group work as the panacea to addressing inequities in science education". (p. 1472)

Cooperative learning groups in a school can be viewed as a critical social developmental instrument. Johnson (1984) points to "Rise of suicide rates among teenagers…, presence of a permanent criminal underclass…, a general social malaise characterized by a loss of confidence in our future and in our ability to solve our societal problems…, changes in the family through divorce…" (p. 5) as various reasons to engage in cooperative learning.

As I work with students who, by the limitations of available equipment, are forced to work in groups, having effective motivators is a vital topic for me. The effectiveness of these

groups has often been compromised by the lack of delegation of tasks within the group. The occasions when I lost my composure, shouting at top volume "Read the directions, read the directions, read the directions…" were a direct outfall of a real problem. One teacher (me) cannot logistically oversee five different groups, each at a different stage of the process

In order to motivate my students, I tried to tap into role assignment, with an emphasis on the leadership role to attempt *positive interdependence*. Johnson (1984) says this can be "…achieved through mutual goals; division of labor, dividing materials, assigning students different roles" and that it "requires face to face interaction among students". (p. 8) To that end, all students are working toward producing laboratory reports – which present data collected, analyze patterns, and draw inferences.

Johnson (1984) also argues that cooperative groups (compared to traditional groups) exhibit "Clear individual accountability where every student's mastery of the assigned material is assessed" and that "All members share responsibility for performing leadership actions in the group. In traditional learning groups, a leader is often appointed" (p. 9). I personally question if these two aspects have to be mutually exclusive prerequisites. I offer that an appointed leader, given a higher motivation (in my study – a more heavily weighted grade), should rise to the challenge *because* of they are in a group that they have chosen. I realize that violates the findings of many, including Mitchell (2004), who concluded "Studies that examined time on task found that students displayed less on task behavior when they were in student selected groups"(p.22). This is echoed by Johnson (1984): "Having students select their own groups is often not successful …often are homogenous". (p. 32)

What each of these studies lacks; however, is an underlying *imbalance* in assessment. I contend that there is a relationship between a higher stakes assessment and motivation to lead in a group setting. Potentially, this could lead to a better overall product (the lab report) which would indicate a more pervasive achievement of goals within the groups. However, I recognize that several other factors can and do influence this outcome.

Parsons (2008) offers that "status is important in group work because it affects student participation, and subsequently student understanding and learning". (p. 1471) I have seen this when cooperative groups have been effective. Those students who assume a role, either self appointed or otherwise directed, seem to work more purposefully during class and tend to generate products that reflect a better understanding than had they not taken such a role.

There is an abundant amount of the research on group roles within cooperative learning. Parsons (2008) "identified three roles: leader, helper, and non contributor (active & passive). Leaders typically devised the group's action plan, coordinated events, and served as a liaison between students and teachers. Helpers worked in cooperation with the leader to formulate and implement plans, and non contributors were not productively engaged in tasks".

Parsons also defines "…leading roles were conceptualized as proactive behaviors that dictated the nature of actions taken in the progress and/or completion of tasks. The supporting roles were defined as sustaining behaviors that upheld and promoted occurring and/or past actions". (p. 1477) Other researchers further delineate roles. For example, Johnson (1984) uses a Summarizer checker, a researcher runner, a recorder, an encourager, and an observer to keep track of how well the group is collaborating.

I have chosen the roles of: *captain* (leader and facilitator), *reader* (helps sequence the groups steps), *recorder* (takes down data to be shared later), and when size allows *handler(s)* (acquire necessary materials, manipulate equipment, etc…). I have chosen these roles as I believe they parallel the ones previously mentioned in terms of the specificity of the task; that is the science laboratory activity. As my largest class, divided into five groups (we have five equipment setups available), yields four to five students per group – this seems like an appropriate division of labor and talent.

The ideal of perfect role alignment is seldom realized however   as the group work mentality is often subverted by social standings of group members. Mitchell (2004) points out "These rigid pecking orders become pitfalls whose hindrances far outweigh the benefits of group self selection. As well, high achievers often dominate and assume control in learning groups. When students were allowed to choose their own teams, they tended to choose others whom they knew and who were like themselves". (p.22) I have observed this in the group selections, as captains have routinely picked their friends or social equivalents *over* higher achieving students. Within gender equality, "Women, for example, are more likely to drop out of a group if they are the only female, especially in nontraditional setting". (p.21) I saw little to no evidence of that aspect, as mentioned in the above section. I attempted to be acutely aware of any gender impacts. But, try as I did, I did not discover any significant patterns of gender imbalance.

This brings me to the issue of *how* to group. In my study, teacher appointed captains discretely select their teams from a roster of other students in the class – until all are selected. I

had initially thought this satisfied Johnson's (1984) recommendation that "teachers emphasize heterogeneity" (p. 27). Along this course, I selected captains for the first activity based on a sociogram where I followed Johnson's advice: "Ask students to select three peers with whom they would like to work".

However, what happened over the next two activities reinforced Cohen's (1995) findings, that "small groups will also develop status orders based on perceived differences in academic status: high status students will interact more frequently than low status students" (p. 100). Additionally, "The higher the status of an individual, the greater is the likelihood of that individual becoming a source of important evaluations and thus influencing one person's self evaluations relative to another" (p. 102). This was pervasive in how I observed the interactions within the groups. Often, even though 'lower status' students were appointed into leadership roles, they were socially 'ousted' by more socially dominant peers.

Minor interventions on my part, in the form of verbal re directing instruction (i.e. "hey captain Jenny, what role did you assign to Jonathan?") seemed helpful. This seemed helpful to 'reset' the group to a more socially equal status, a reinforcement of their subordination to my assessment. That, in turn, often reminds them of the requested task of role delegation and trying to have an inclusive element for all in the group.

This becomes especially relevant with special education students. In one study, O'Connor (1996) asks: "Is cooperative learning as effective an accommodation for students with disabilities as it is widely perceived to be?" O'Connor observes "the lowest achieving students (e.g., those with disabilities and those from different linguistic backgrounds) cannot on their

own perform some of the more challenging classroom assignments". (p.30) From my

observations, SPED students who were more socially adept (in direct correlation with

sociogram status) did benefit from the cooperative learning groups. This is evidenced by

behavior monitoring charts, field notes, and student performance. However, SPED students

with reduced social status often got excluded or "demoted" (socially) when in the captain role.

As such, this was an *ineffective* accommodation.

I confirmed this in my class groups, observationally, as I often saw special education and

socially awkward students being *INvalidated* by their groups. O'Connor (1996) offers that a

'treatment' by the teacher socially interacting with the group "that included a cooperative

learning component surpassed non cooperative learning control conditions in raising reading

and language scores of students with disabilities".(p.31) O'Connor's (1996) treatment involves a

specification on the type of language expected within a group – on how members should

respectfully interact with each other, leading to validation of contributions, not minimization of

individuals. I have tried to use some of these ideas in how I will approach a group and ensure

that those select students are getting involved, being part of the team, and play vital roles. In

turn, their groups tend to involve them more, increasing the cooperative element of the group.

What all of that suggested to me is that HOW the groups socially interact would dictate

if this teacher appointed captain strategy could be effective. O'Connor (1996) similarly noted in

his case study "Cooperative learning as unsuccessful…did not provide a supportive or a

satisfactory learning environment, her peers were often dismissive of requests for help, and

they did not provide an equal opportunity to participate in the learning activities". (p.39) This

applies to my study in that when socially awkward students get cast off or minimized (in their roles) by their group, it tends to reinforce the existing hierarchy and will then negatively affect both their mastery of material and (likely) their self esteem.

Gillies (2008) argues that students should be "taught the interpersonal and small group skills that are required to help students communicate effectively with their peers, manage conflict, allocate resources fairly and make decisions democratically". (p.332) This is an area I foresee that I should get myself trained in: to be an effective coordinator of these groups by promoting appropriate social interactions. This may extend into areas of identifying *what* is appropriate speech, accountability of groups to include all members, and various other facets that I will have to learn about.

The content itself will need some modification. Many of the pre written/produced laboratory activities occasionally operate lower on Bloom's taxonomy; though I often make modifications and additions. Gillies (2008) recommends "Evaluative talk in groups contributes to more product related talk which is a significant predictor of learning and achievement of group members. When students engage in critical and constructive talk with each other, it serves as an effective tool in enhancing their problem solving skills, both collectively and individually". (p. 343) I've considered rewording many questions to require two to three opinions (from the group) to fully answer questions.

While I did not find any research on leader appointed cooperative groups wherein there was an incentive for that role, several methodological tidbits were very useful to my study. Johnson (1984) recommends how to structure positive goal interdependence. He says to

"communicate to students that they have a group goal and must work collaboratively….sink or swim together". One can do this by: "Producing a single product, report, or paper. Each group members should sign the paper to indicate that he or she agrees with the answers and can explain why the answers are appropriate", and "Group rewards A group grade is one way to emphasize the necessity for collaboration." And/or, "Take a test individually, receive an individual score, but are given bonus points on the basis of how many group members reach a preset level of excellence". (p. 31 33)

I plan on co opting these points by introducing the following changes in my next lab activity. On the first point, for second semester, I will shift to a model where a single lab report per group is being produced, and utilize the recommended sign off. I will follow this up by a peer grading model, where the lab report grade earned will be (potentially) unequally divided among the group members based on group contributions

For the remainder of this semester, I will introduce a bonus grade to motivate students toward group achievement, wherein a 'captain' will earn a five point bonus if their 'crew' achieves an average of 70% or higher, and the 'crew' will earn a three point bonus if their captain achieves a grade of 75% or better.

The next direction I would also like to explore is the effectiveness of *penalties* within the cooperative group complex. There are some students, despite my best efforts, who are unwilling (or incapable) of operating effectively with others. A "vote them off the island" approach was suggested by one colleague. I would be interested to see relevant research on the subject, if it exists.

Conclusion

Summarizing the Discussion

I was pleasantly surprised that gender roles were not overt obstacles for the female captains. While some female captains were shy by their own nature, none exhibited any signs that they were uncomfortable directing, or being directed, by male counterparts. This may be reflective of any number of things; from their socioeconomic status, the ethnic and gender composition of the school, or a fairly liberal upbringing in terms of gender equality.

I am also pleased with the apparent success of the captain strategy, as far as motivating more effective lab experiences. This included the aspects I quantified (in the behavior management charts, group selection sheets, post lab surveys, and sociograms), the aspects I qualified (in my field notes, interviews, and reviewing relevant literature), and other less tangible aspects as well. These include, but are not limited to, the intangible sense of *urgency* that was present with this system, but absent without it and the serious tone adopted by the captains.

Lastly, what I also found from this research was that the expectation that captains would pick crew to successfully steer their groups was based on a faulty assumption. I dismissed, downplayed the importance of, or outright neglected the importance of pre established social ties between students when I asked them to pick students to help them succeed. Rather than view that as a defeat, restructure selection again and again, and likely see the same result; I wish to turn the model around to make this an advantage, rather than a disadvantage.

Where I want to go from here

While not an 'emerging theme' a question that I have raised for myself from all of this touches on the driving motivational nature of student picked selection. What I have largely claimed above is that student picked groups are flawed in that students will not pick the group members that are in their best academic interests – social cliques win out. That claim has the advantage of lining up nicely with most of the literature that I had reviewed. But in my model, a captain may be better off 'sticking' with his or her clique to tap into an altruistic motivation: Who better to help you do well at a task (putting aside the members' actual ability), than someone who *cares about you* and thus should care how well you do? As my primary purpose in most activities is achieving academic objectives, heterogeneity can be encouraged, but a socially based motivator such as this can be *effective* if effective groups are formed.

This last question had me reflecting on my own group work endeavors in my professional life. In the pursuit of realizing how to construct an *effective* group, I reflect back on one workshop I went to a number of years ago as part of a class on educational leadership in environmental science (Plymouth State University, summer of 2005) which focused on group roles. The "Team Dimensions Profile" (Fahden, 1995) divided people into five essential roles in a group: the creator, advancer, refiner, executor, and 'flexor' (who had equal attributes of the previous four). This profile asked a series of questions to help define which category each person fit into, and provided a good description of each.

My plan, moving forward from this research, is to incorporate this into the group selection process. In the last lab (Lab 20B), I incorporated "draft rounds". If I can have each student 'profiled' as to which role they most successfully take in a team setting, I can structure

each round to coincide with their talents. An example might look like this: Round one selection five different 'creators', round two – five different 'refiners', and so on; with 'flexors' filling in the gaps numerically.

I hypothesize that the combination of the methods I have explored, with the addition of the team dimensions profile as a guide for group selection, should enhance the productivity, success, and social cohesion of cooperative learning groups for laboratory activities in the science classroom. One point of emphasis that the presenter in the PSU workshop made was to stress to students that they "play up to their strength" (i.e.: creators often feel guilty they aren't executing tasks, and executors often feel guilty that they don't come up with any of the ideas). If crew strengths are known overtly, and the social altruism component (mentioned above) are tapped into, groups can be reasonably expected to function at a higher level. I look forward with anticipation to discovering if this is true.

Another concept I would like to experiment with is peer grading. One model that I have discussed with colleagues that is intriguing is a 'group divide'. An example of this might run as follows. A hypothetical group of four students earns an 80% on their common lab report (which they will have to individually sign off on). Students would be told to get back in that group for five minutes and discuss how to equitably split 320 points (80 x four students). Theoretically, those who contributed to a greater extent should be awarded more (perhaps 90 points); leaving ten fewer for a lower contributing member. After five minutes of discussion (where arguments could be presented), they could discretely fill out an evaluation sheet on how they would divide the 320 total amongst the group.

I believe that variety of grading could accomplish two tasks that my research did not address. First, students (like 'Tim' – identified by the second sociogram) would be rewarded for their tactile participation; rather than their ability to generate a paper report. Secondly, this could spur higher engagement levels from students who might otherwise withdraw from taking active roles.

Together, these two innovations should improve my captain method. I recognize that there are likely flaws in both of these new techniques, that I will probably only discover upon implementation. However, I find it intriguing to experiment with these ideas, and look forward to the results.

References

Cohen, E. G., Lotan, R. A.. (1995) Producing Equal Status Interaction in the

Heterogeneous Classroom *American Educational Research Journal.* Spring

1995, Vol. 32, No. 1, pp. 99 120

Fahden, A., Namakkal, S. (1995) Team Dimensional Profile. Version 3.0.1 Inscape Publishing Inc.

Minneapolis, MN

Gillies, R. (2008) The Effects of Cooperative Learning on Junior High School Students'

Behaviors, Discourse and Learning During a Science Based Learning Activity

School Psychology International 2008 29: 328

Hubbard, R., Power, B. (2003). *The art of classroom inquiry: a handbook for teacher*

researchers. Portsmouth, NH: Reed Elsevier Inc.

Johnson, D., Johnson, R., Holubee, E., & Roy, P. (1984). Circles of Learning.

Alexandria, VA Association for Supervision of Curriculum

O'Connor, R. & Jenkins, J. (1996) Cooperative Learning as an Inclusion Strategy: A

Closer Look. *Execeptionality* 6(1), 29 51

Mitchell, S. N., Reilly, R., Bramwell, F.G., and Solnosky, A.,(2004) Friendship and

Choosing Groupmates: Preferences for Teacher Selected vs. Student Selected

Groupings in High School Science Classes *Journal of Instructional Psychology*

vol. 31, No. 1

Parsons, E. R. C. , Tran, L. U. & Gomillion, C.T. (2008) An Investigation of Student

    Roles within Small, Racially Mixed Science Groups: A racial perspective

    International Journal of Science Education Vol. 30, No. 11, 3 September 2008,

    pp. 1469–1489

SED 551

Final Research Paper

Cooperative Learning Groups and the Captain Method