The Pinellas County Project
Project-Based GeoScience & Public Speaking

Dr. James Brey
Professor of Geography and Geology

Ms. Kristin Runge
Lecturer in Communication Arts

University of Wisconsin Fox Valley

Abstract:

This paper will describe a project-based science activity in which students use GIS to explore data and then create a scenario for future land use. This capstone small group project is the culmination of a unique interdisciplinary course in environmental geology and public speaking developed as a learning community at the UW Fox Valley. Competent use of GIS to explore data, answer geographical questions, vision the future and create presentation quality maps are skills developed. This project culminates with formal group presentations featuring the results of the research and geographic exploration and cartographic skills acquired. Students are excited by the prospect of visioning the future and developing their plan. This motivates the acquisition of GIS and public presentation skills needed to succeed with the project. Focusing on a particular place helps the students focus on real needs and allows the various group plans to be compared.

Communication Arts 103 – Introduction to Public Speaking

Course Profile: Introduction to Public Speaking is a 100-level survey designed to produce skillful and confident speakers. The class is designed to meet the needs of the general student population, and as such does not discuss classic rhetorical theory in depth. The three credit class meets for 150 minutes each week over a 15-semester week. Class activities involve writing and performing speeches as well as providing peer-to-peer feedback. A variety of speech types are analyzed and delivered including a personal, informative, persuasive and small group speech. The proficiencies assessed for the course include 1) developing a degree of skill in clear and logical thinking, 2) learning to effectively communicate, and 3) engaging in aesthetic response, defined as the ability creatively express complex ideas and opinions.

A majority of students at the University of Wisconsin-Fox Valley will take Communication Arts 103 prior to transferring to a baccalaureate institution. Approximately 17% of the full-time student population is enrolled in Communication Arts during a typical fall semester. Individual class size is limited to a maximum of 22 students. Roughly half of all students enrolling in a typical fall semester are first-semester freshman with little or no experience conducting secondary research.

The management of Communication Arts 103 is centralized but collegial. The Communication & Theater Arts department recognizes this course as one of its staples. In support of this the department regularly discusses course-related issues in its bi-annual meetings. Performance standards, assignments, texts and assessment methods are shared openly and freely with the goal of standardizing student outcomes across courses and campuses while retaining freedom to teach the course in the manner best suited to individual style and student needs. Successful and innovative assignments are received enthusiastically and tend to disseminate quickly.

Geology 169 – Earth Science and the Human Environment

Course Profile: Earth Science and the Human Environment is a 100-level survey course that focuses on understanding human interaction with the earth environment. The class is designed to meet the needs of the general student population, and as such usually does not discuss any single topic in depth. The course is not mathematically oriented though some quantitative capability is expected. The four credit lab science class meets for 270 minutes each week over a 15-semester week divided into two lecture discussion sessions and a two hour lab. During the semester students will take three major exams, six quizzes and complete the major group lab project. Extra credit points may be earned by attending scientific talks, doing service learning projects or other learning activities. Earth Science and the Human Environment is content heavy, with processes to be understood and terms to be learned. In lab there are hands-on activities that require the use of certain tools and the ability to identify and analyze earth materials. The focus on earth processes and materials is balanced by consideration of how geology affects people. Thus natural hazards, geologic resource development and management, and water and air pollution issues are the major topics. The main proficiencies assessed for GLG 169 include 1) developing a large and varied vocabulary, 2) improving ones ability to analyze, synthesize, evaluate and interpret information and 3) being able to select and apply scientific and other appropriate methodologies. Other proficiencies, mainly associated with the lab part of the course, involve being able to interpret graphs, tables, diagrams, maps, and remotely sensed images and being able to work as a team.

The management of Geology 169 is left to the instructor of record. The Geography and Geology department members offer this course frequently. It is a popular introduction to the discipline and is well enrolled. In support of this course and those who teach it the department regularly discusses course-related issues in its bi-annual meetings. As with Com Arts 103, performance standards, assignments, texts and assessment methods are shared openly and freely with the goal of standardizing student outcomes across courses and campuses while retaining freedom to teach the course in the manner best suited to individual style and student needs.

Goals and Outcomes for Introduction to Public Speaking

The primary communication arts related goal of the Pinellas County Project is to teach students to use public speaking as a tool to achieve social change as it is described in Benchmarks for Science Literacy (American Association for the Advancement of Science). In order to achieve that goal, students must also learn to:

1. recognize and successfully navigate values-based issues
2. negotiate compromises to satisfy stakeholders with conflicting as well as complementary value sets
3. create effective persuasive arguments
4. develop an emerging set of interpersonal communication skills
5. develop confidence expressing opinions and lobbying an audience for acceptance of those opinions
7. develop critical thinking skills
8. develop a degree of skill in recognizing the role of culture in public rhetoric specific to science and land-use planning issues.

A large-scale, researched group speech has been a staple of Communication Arts 103 taught by author Runge for several years. Student achievement and success in completing a group speech has varied greatly from semester-to-semester and is affected by a number of factors. Communication Arts 103 classes with high degrees of cohesiveness and interconnectedness typically experience greater success when working in small groups. Groups that select projects in which one or more students have a degree of knowledge or expertise typically achieve more than similar groups exploring new problems or topics. Groups that approach problems or topics in a well-planned, methodical manner with distinct team structures typically experience greater success than similar groups with haphazard organization. Groups that choose controversial topics typically experience greater learning than those that choose neutral or purely informative topics. Based on these observations, three communication arts related factors for success were identified:

1) Create a highly cohesive and interconnected classroom that encourages students to actively voice opinions during class and group discussions.
2) Train students to approach problem solving in a planned manner using the Reflective Thinking Method (Lucas 2001) or another formal methodology.
3) Achieve a degree of knowledge and/or expertise regarding the topic prior to beginning small group work.

Identifying the underlying factors for success in group projects was critical to creating an effective outcome for Communication Arts 103. Traditional stand-alone Communication Arts 103 classes do not provide sufficient social support or instructional time to successfully meet all three underlying factors for success. Students can be trained and required to follow a specific problem-solving methodology. Planned in-class activities can mitigate lack of cohesion but will not produce the degree of interconnectedness typically experienced by a learning community. Even if cohesion and uniform adoption of a methodology occur, the absent degree of knowledge and/or expertise regarding a topic can inhibit success. Therefore, it was critical that any project attempted allow for the inclusion of all three factors for success.

Goals and Outcomes for Environmental Geology

The primary goal of the environmental geology course is to train students to think critically about public policy issues related to the natural environment. As such the course takes a broader view than the typical geology course. Still, the students must master general information about geologic processes and comprehend how people affect and are influenced by the geologic environment. Proficiency in the use of tools that lead to this greater understanding and which provide the basis for critically choosing from among options is necessary. How to bring together the rather diverse mix of elements typically included in this course has always been a challenge. The main problem has been having sufficient class time to explore and learn the content elements, train the students in the use of the tools, and effectively integrate the content with the tools. Steering that integration in ways that would lead to higher level thinking, the ultimate goal, often proved elusive because of the time factor. There simply wasn't sufficient time to deeply investigate the sum of the parts. Based on that experience, four factors for more successful integration of the parts and increased critical thinking as a process and outcome were identified.

1) Provide sufficient time, in cohesive blocks, to allow students to integrate the learning of information and the use of it to solve problems.
2) Use collaborative student groups to create a setting where more ideas and view points can be explored and where students can assist each other in the acquisition of knowledge and skills.
3) Use a variety of methods to encourage critical thinking including techniques that take advantage of the efficiency and power of technology to visualize problems and conceptualize solutions.
4) Use problem-based science projects that have relevance to students and society. Assign lengthy projects which allow the students to explore topics in depth, gain notable proficiency with tools and allow the students to reach beyond the typical class content to become an "expert" on a particular issue.

The identification of these factors was the easy part. Implementation was more challenging. Meeting this challenge was viewed as a critical element of being a good teacher. A pedagogically competent teacher is one who, in addition to being competent in the subject matter, is also aware of alternative methods and strategies for teaching and then selects and implements the methods of instruction that are most effective in helping students achieve the course objectives (Porter 2005). Bringing these strategies together required fundamental changes in the way the environmental geology and speech courses were structured and conducted. A whole new approach to the courses, their content and structural elements such as scheduling, instructional space and even equipment was required. This shift was not easy. It required a variety of changes that had to be made through the university bureaucracy and a change in outlook on the part of the instructors. It did provide the changes needed to accomplish our goals for the classes.

The Learning Community: Learning and Speaking About the Environment

While the Geology and Communication Arts courses have been offered successfully individually many times over the years, it is believed that offering them together has solved certain problems and helped achieve certain goals that have been identified by us prior to considering the joint offering. For example, Geology 169 as previously delivered had an emphasis on covering factual material. Most of the chapters were "covered" by lectures, student discussion and appropriate evaluation. The geology portion of the proposed merged course focuses on fewer topics with more depth and includes the student group project of significant length that requires considerable knowledge, effort and initiative. Sufficient time is available to allow students to work on such problem-based GeoScience projects and allow them to show what they have learned through explanatory and persuasive speeches. With the presentation element (and perhaps a bit of group-to-group competition) the incentive to work hard and produce quality results is strengthened. This kind of project based science culminating in these presentations, has proven to be a powerful learning tool to get students to analyze issues, evaluate arguments, and interpret and critically assess information presented. This is the major proficiency for the Geology 169 course and this merged class approach provides a mechanism for achieving it. Other earth science courses using this project based science approach have met with great success. (Brey, 1988; Brey and Campbell, 1987)

In Communication Arts 103 the focus is on proficiency in the different speaking formats by researching, writing and performing individual and/or group speeches. Individual success is dependent almost solely on each student's ability to skillfully transmit complex information through speech communication. Ideally students use the communication arts part of the class as a forum to synthesize and interpret complex topics discovered within the geology course content. Student audience members are, ideally, conversant enough in peer speech subjects to actively engage and challenge the speaker's ideas. Complex, content-heavy speeches drive students to greater and more creative achievement while providing an outlet for exercising newly-learned critical thinking skills. Problems associated with differences in audience subject knowledge and the absence of a readily available science mentor for the speech instructor and a knowledgeable speech professional to help the science instructor, are eliminated.

The Pinellas County Land Use Planning Project and the use of GIS

A result of the first national content standards in Earth Science and Geography educators have been looking for more effective ways to teach these subjects. While initially a K-12 effort, colleges and universities have been experimenting with new techniques as well. One technique that research has suggested is highly effective is "inquiry-based" instruction that is a hands-on and research focused. (Kerski 2003) Such constructivist learning experiences seem to have the most value when they are long term, student relevant group activities that emphasize critical thinking and decision-action outcomes.

The purpose of the Pinellas County long-term problem based science project is to incorporate as much information from the course as possible into a hands-on planning exercise dealing with a specific place. Students address most issues that are on our agenda for the course as a whole. Some items are incorporated in great detail; others only peripherally. Hazard mitigation and responsible use of resources are major themes. Students learn how to use some of the tools used by geographers, soil scientists, geologists, demographers, sociologists and planners; tools which have very wide and practical application. A particular emphasis is placed on learning to use Geographical Information System software to visualize and then geographically analyze planning elements in order to make choices about what will be recommended in the land use plans created by the student groups. Students analyze and map data and finally to make difficult decisions about how best to utilize the resources of a specific place and then present the results, including their cartography, in a formal, group presentation. We also make learning how to work as a group a major goal to be practiced and hopefully appreciated by the students as this is the way effective environmental and societal decision-making is made.

Rationale for choosing Pinellas County, Florida

We chose Pinellas County first because it is a new place for most of the students and this will allow them to become familiar with different sets of environmental resources and problems than they usually deal with. They learn about a new climate, different soils, unique natural hazards and a different economic and sociological setting. By "starting from scratch" they have to learn more, be more creative, and bring fewer preconceived ideas to the exercise. Second, Pinellas Count has a lot of problems ranging from ecological and resource use difficulties to unique economic and social problems. We hope the students will solve some of these problems within their project plans. Third, Pinellas County has a very great natural hazard risk from hurricanes. Many students have expressed interest in this and it suits our scenario very well. Fourth, Pinellas County is a beautiful place that has in many ways been hurt by selfish use and non-planning. It could have been (and perhaps still could be) a much better place for people to live, work, retire or vacation in—perhaps the ideal place. We want to see what creative minds, up to date information, the best analytical tools and hard work can make of it. Fifth, while this county may have more problems than many other places in America, the types of strategies students devise to solve these problems are applicable, with modifications for local variation, everywhere. It has been said that "if you can straighten out Pinellas County you can handle anything." Sixth, for practical reasons this is a good study area because there is a great deal of information on it, much of it in a GIS planning data model created for the course. Much is also available on the World Wide Web.

Rationale for GIS use

The use of GIS within the project is also a realistic element of land use planning and decision making. Planners use GIS daily. It is safe to say that no planning occurs in this country without GIS. Beyond that, GIS is a skill area that has value in its own right. Geospatial skills have been given the rank of third in President's High-Growth Industry Initiative. (U.S. Department of Labor 2004). GIS use also fits well with the other goals of the course. As early as 1991 the U.S. Labor Secretary's Commission on Achieving Necessary Skills (SCANS) stated that the most effective way to teach skills is in the context of the subject matter. The SCANS report identifies competencies which include identifying and using resources, collaborating with others, finding and using information and understanding complex relationships (Hill 1995). GIS is the ultimate interdisciplinary tool and implementing this project with GIS encourages students to look at data from a variety of fields. (Furner and Ramirez 1999; Sarnoff 2000). Further it has been found that implementing GIS tools fundamentally alters the manner of teaching in the classroom and alters the manner of learning. (Kerski 2003). This has seemed to be the case in our course. To be used effectively in the project it is necessary to introduce the GIS tool early in the course. There must be enough time for students to learn the tool by using it on various lab tasks early in the semester. It is also important that the tool be learned in the context of its use. After doing a few rather generic activities which allow the students to become familiar with the interface and tool bars, we begin analyzing data with the GIS that is specifically relevant to that week's course content with GIS tools that require rigorous thinking and provide useful answers. Students find this brings a sort of instant gratification that can encourage further exploration with the tools and higher level questions about the topic under analysis. By the time the project is introduced the students posses a reasonable skill level with both ArcView 3.3 and the less challenging parts of ArcInfo 9. They also have used web mapping tools, including the one run by the "real" Pinellas County and have examined paper maps and air photos on the place. Students then transition to a series of lab dealing with specific elements of the project and finally utilize the lab and other course time for group work on the projects. Students are expected to work on their individual contributions to the group effort out of class. In most cases, group activities also occur out side of class time.

Introductory GIS skills are taught using several instructor-created and off-the-shelf tutorials and publications. Among the most useful have been sections from Mapping Our World: GIS Lessons for Educators (Malone, Palmer and Voigt 2002) and GIS Investigations for the Earth Sciences: Exploring Tropical Cyclones (Hall-Wallace 2003).

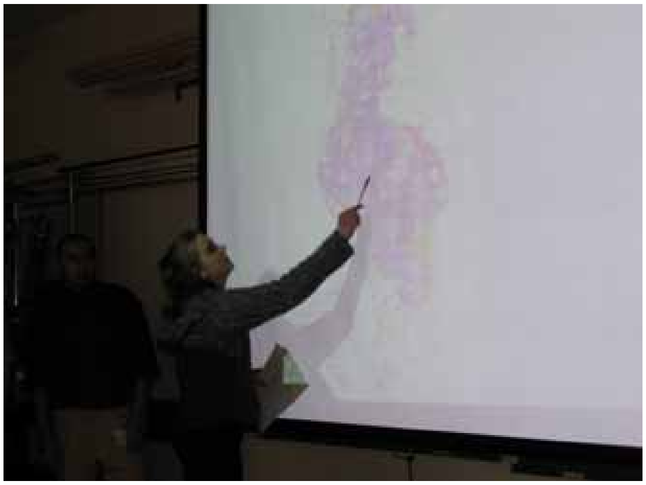
Students are encouraged to explore the software and move freely between web mapping tools, ArcView 3.3 and ArcInfo 9. The message is that the individual GIS platforms work pretty much the same way but that some have greater capabilities than others.

Since the goals of the GIS work is to critically analyze various spatial components and to visualize problems and solutions in the county, little emphasis is placed on the GIS tools themselves. Students are constantly encouraged to view GIS as a sequential process rather than software. They are told the process can be done with paper maps but is easier and more effective with the software. They are encouraged to ask a geographic question about Pinellas County or about a topic related to the county. They then use the software to make a map and explore and discuss the patterns that are displayed. They are encouraged to think about how they might enhance the data, change the analysis or display to obtain a better map with better answers. Then they are instructed to go back and ask a new question. This process mirrors the Reflective Thinking Method (to be discussed in further detail below) they have used in their group exercises for the speech portion of the class and allows them to practice a variety of critical thinking skills. Of course before they can do this they need to be taught some GIS operations and need to know what Pinellas county layers are available to them.

Students are taught the basic tool bars and the tools they contain. They are shown the extensive tool box in ArcInfo 9 but cautioned not to get too bogged down exploring its capabilities. They are encouraged to ask questions of the instructor about tools and ask what tool or operations might be the best to answer a specific question about some data. Students are taught how to open, sort and analyze attribute tables, how to do simple queries. They also learn how to do simple table joins but often end up getting extensive help with this. They are taught how to identify and label features, do on-screen measurements and simple on map drawing. They are coached in using several geoprocessing techniques including buffering. Simple raster analysis is taught with ArcGIS Spatial Analyst.

Vector layers in the data model include various levels of political boundaries, streets and highways, evacuation routes, landmarks and special features, railroads, building footprints, zoning designations, parcels, hydrology, soils, geology,   Rasters include Digital Elevation Models, Digital OrthoQuads and Digital Raster Graphics coverage of the county. Some near shore coastal features are also included. The data sets are put together using a common coordinate system so they will work well with each other and display well. Students are not faced with the typically difficult GIS tasks of converting and projecting data layers. While this might be criticized as avoiding a key GIS aspect it is the approach used in most other educational uses of GIS which mean to teach content and analysis with GIS rather than GIS itself. It is frequently the case, however, that students manage to acquire layers on their own that require conversion. When this occurs they get instructor assistance.

Another aspect that would have major emphasis in a GIS course that is not given significant time is cartographic presentation. We do go over the elements of a good map and emphasize that every good map must answer a geographic question. The students are encouraged to state the question and how the map answers it in the metadata they prepare for their maps. They are taught how to do simple layouts. They are also coached on exporting maps into graphics format so they can be further edited, incorporated into PowerPoint or printed on a large format printer. Some groups still produce some hand-drawn maps for their presentations.



Most students become quite proficient displaying layers and asking geographic questions about them. They usually are quite proficient in identifying the data layer or table that has the information they need. They become quite sophisticated in asking questions about how to get the software to provide the answers they need. Some of the work is done by some students with paper maps and air photos but most groups take advantage of the software because there is more data available to them digitally. While most of the GIS use is for visualization some students do become capable with the geoprocessing tools available. Every class seems to develop in group experts who learn to become fairly sophisticated users. Early lab exercises help hone skills and establish interest for many who never had heard the term GIS but who the GIS "technicians" for their groups become. Some of these end up developing such an interest that they seek out more GIS instruction by enrolling in various workshops and the GIS course offered on campus. Several of these have declared majors in geography, land use planning or related fields.

While the syllabus indicates a specific number of lab periods to be used for this project, we are inclined to be somewhat flexible about extending this lab if all groups are working hard, making progress toward a conclusion and learning as a result. We think this project has the potential for being the highlight of the course both in terms of learning, being creative and having fun. We would rather see a few labs accomplish a lot than many labs accomplishing little.

Creativity in creating the group plans is strongly encouraged. While we discuss some practical assumptions about what is to be and we ask the students to follow environmental standards in their plans, the choice of what the student planning teams want for Pinellas County is the group's choice to make. Groups are being given an unpopulated, natural environment to do with as they see fit, within relatively few parameters. A scenario is provided to set the stage. If students have ever dreamed of a utopia, here's their chance. If they ever wanted to undo past wrongs to the environment or to society they can start making things better. The planning groups are the decision-makers. They approach this project as if it is a real task. While the actual premise behind the exercise scenario is fictional in our world you never know when decisions such as those made within the Pinellas Project will be required in real life. We encourage students to make the most of the practice!

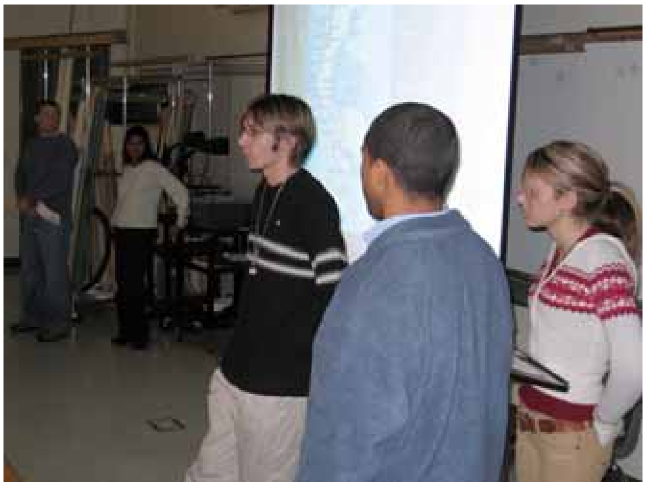
Rationale for choosing a team-based approach

Real land use planning is done in groups. From the conceptualization of recommendations by a planning and zoning group, to the hearing, where public input is folded in to the final approval by an elected body, planning is a group activity. We start out the course with exercises that get the students to work effectively in small groups. The learning community also facilitated the group focus. The Pinellas Project starts out with a series of skill building labs focused on the fundamentals of geologic process, GIS tools, remote sensing, and use of topographic maps and soil surveys. Group skills are taught in the speech portion of the class and practiced throughout. The Pinellas County Project is begun in earnest with small groups having randomly chosen membership. Group size is from four to six students. This is necessary because we need to have a small enough setting to allow everyone to share their talents and ideas yet large enough to divide up the considerable work involved. The group members need to cooperate and help one another in order to complete the project in a timely fashion and to gain the maximum learning from it. Teams also have to devise effective ways to decide what needs to be done, who will specialize in what aspects of the project, what the goals of the groups plan will be and how these goals will be met. Each group needs effective leadership; persons who can untangle the many loose threads an exercise of this nature is bound to produce; persons who can effectively work with many types of people and who can bring out the best in individuals and channel this into a coordinated group effort.

In the group work students are expected to use the Reflective Thinking Method (Lucas 2001). The Reflective Thinking Method provides a framework for critical thinking in a problem-solving setting. Following all five steps will reduce the likelihood of choosing an inappropriate or unsophisticated solution while simultaneously mitigating the likelihood that groups will under-research a problem or jump to conclusions based on initial data or impressions. This five-step process is introduced during the Communication Arts portion of the course using several group problem solving activities described in The Art of Public Speaking (Lucas 2001), Games Trainers Play (Scannell 1980) and Even More Games Trainers Play (Scannell & Newstrom 1994). The method involves the following steps:

1. Define the problem
2. Analyze the problem
3. Establish criteria for solution
4. Generate potential solutions
5. Select the best solution

Students must use this method explicitly every step of the project.



Participation by everyone in the group is mandatory. Just sitting in the circle listening is not tolerated. We tell the students that we believe everyone has much to share that is of value and much to learn from the views of others. With a project of such depth and breadth there is bound to be a particular topic or facet that an individual will know more about (or can find out more about) than the others in the group. We encourage this division of labor and the satisfaction that comes from contributing uniquely to a group effort. A certain division of labor is also needed for practical reasons as there is a great deal of work to be done. There are also some limitations on hard copy materials needed for the project. With this last item in mind groups are encouraged to be flexible in scheduling the tasks to be accomplished. Not every group need begin with the topographic maps or the soil surveys, etc. Cooperation between groups is essential so that everyone gets a chance to make full use of the materials. Groups are encouraged to supplement the materials provided with information gained from the library or on the World Wide Web. There are many resource materials dealing with the issues groups must cover to be found there. Inter-group materials' sharing is encouraged.

Conclusions

This paper has described a work in progress. The Learning Community, the courses which are included, and the use of specialized techniques, such as group activities and GIS, which set the stage for the large group project will continue to evolve as we learn more about what is most effective in creating learning. We are in the process of formally assessing various elements of the course and are encouraged by the preliminary results. More importantly, we see growth in students that heretofore eluded us when we offered the courses in a stand alone mode. We are seeing students at the end of the course who are proficient speakers, capable users of technology to answer questions and present results and who can ask and answer sophisticated questions. As instructors, we enjoy the excitement and satisfaction of having guided the students to this end. If there is any moral to this story it is to examine each and every course one teaches to discover what is and is not working. Then seek to find solutions in new and different ways of teaching, including some which may be experimental or at first glance seem unorthodox. Prepare to learn new things along the way!

Appendix

Team Building Skills Acquisition

Acquiring the skills necessary to work in small groups is a crucial factor in successfully completing a group project (Benda 2002). Experience has taught us that simply organizing students into small groups isn't sufficient preparation for working effectively as a team. Experience working with others varies greatly among students from those who have significant group work experience to the unusually naive student who believes the term 'meeting minutes' refers solely to the length of time the team met. Our charge as teachers is to level the field and then provide the students with a framework from which to build. When teaching group skills we focus first on creating a culture of academic achievement by fostering community based on discipline-related activities. After we achieve the proper climate, we begin introducing group skills that build in difficulty and move from single-solution problems to multiple solution problems that are somewhat ambiguous.

Step One: Building Relationships
Activity: In-Class Ice Breakers
Preliminary research by University of Wisconsin Colleges Associate Professor Susan Rabideau suggests that regularly utilizing ice breaker and team building activities results in greater student participation and achievement. We use a series of in-class ice breakers to allow students to get to know one another. Activities begin as low risk and increase in

difficulty, or amount of interpersonal communication required, as the semester progresses. These activities are conducted during the Communication Arts portion of the course and start on the first day of class.

Activity: Get-to-Know-You Dinner
Three weeks into the semester students attend a dinner at one of our homes. This underscores the collaborative nature of the learning community and creates a foundation for student/professor collegiality outside of the classroom.

Activity: Field Trips
Two dawn-to-dusk field GeoScience field trips are incorporated into the semester. We take students to several popular state parks and natural areas featuring various geologic and geographic phenomena. Students spend two full twelve hour days touring and hiking the state while learning the histories of the areas we visit. These events cement the budding class cohesion achieved with the in-class ice breakers and get-to-know-you dinner. Generally speaking, the overall tone of the class changes significantly after the first field trip which typically takes place six to seven weeks into the semester.

Step Two: Learning to Work as a Team

Activity One: Lost on the Moon (NASA) (Lucas 2001)
'Lost on the Moon' is a problem-solving group activity created by NASA. It was chosen as the first small group problem solving activity because it is a single solution problem. Groups are either right or wrong. Students are required to use their collective knowledge and problem-solving skills to complete the timed activity. The group with the closest ranking to that described by NASA wins the activity. Groups must use the reflective thinking method to guide their discussion. At this stage, final group member assignment has not yet been made.

Activity Two: Hostages (Lucas 2001)
'Hostages' is a values-based problem solving activity with no actual solution. A plane has been hijacked and students must decide which passengers will be released to safety by the hijackers. The description of each passenger is intended to provoke a value-judgment from the reader. Using the reflective thinking method, students must come to a consensus regarding which passengers will be released by the hijackers and which passengers will remain on the plane. This exercise forces students to recognize their own system of values and its role in the decision making process. We use this exercise as a basis for discussing the role of values in land use planning. Preliminary group assignments have been made prior to this exercise. We monitor group dynamics during the exercise to assess the likelihood of group success.

Activity Three: Toxic Popcorn (Scannell 1980)
'Toxic Popcorn' is a simple timed engineering problem that challenges students to work efficiently and effectively as a small group. Students are required to use the reflective thinking method to find a way to transfer popcorn seeds from an 'unsafe' container to a 'safe' container using only one bicycle tire tube, one small plastic bucket and several lengths of rope while remaining a safe distance from the toxic popcorn. Any group

member violating the rules of the game, or breaching the safe distance, is removed from play by the referee. We use this exercise to discuss both the essential role of leadership, the vital importance of each team member, and the damage when a member drops out of a project.

The Pinellas County Project Scenario

In our scenario, two months have passed since Pinellas County was devastated by a major Category 5 hurricane. With barometric pressure bottoming out at 26, wind speeds of over 200 mph, and a storm surge of 20 feet above mean sea level this phenomena of nature literally wiped all traces of human occupation from much of the Pinellas peninsula. Just as amazing as its destructive force was its mercy toward the inhabitants of this county; the storm stalled in the Gulf of Mexico for three full days allowing for the orderly evacuation of most of the residents. Also surprising was the local nature of the storm's fury. Little damage was done to urbanized portions of the surrounding areas. The storm stalled at sea, raged with a vengeance while stalled over the county and looped back out to sea where it never regained strength. The refugees of the storm have for the most part been residing in shelters and private homes in surrounding counties.

The County itself is no longer a peninsula but a virtual island. A large lake, interspersed with marshy land straddles the county's former northern boundary. The county's homes and businesses from the richest to the poorest are gone. The fury of the storm coupled with lax building standards and deep unconsolidated sands allowed for almost a clean sweep. What structures were not washed away by the storm surge were undermined by the tremendous run-off from the storm's three days of torrential rains. In some cases entire structures were buried by sands lifted and then placed back by wind and water; a phenomena up until now only theorized from the complex deposits of earlier ages.

Damages, largely insured by the Federal Government flood insurance program, will run into the hundreds of billions. There is also the question of who will pay for rebuilding the roads, sewers and other public utilities. The most pressing question remains what would prevent the same kind of careless, haphazard development that allowed the catastrophe to attain the dimensions it did from recurring if funds were provided to individuals to repay the damages? Questions about potential damage, the lack of attention to building codes, the disregard for common environmental sense have been debated in Pinellas County for years just as the landfall of a major hurricane has been predicted for this place. Years of avoiding these issues have prevented existing hazards from being minimized and future ones from being prevented.

Faced with the task of paying at least a major portion of the insured value of private ownership in the county, the director of the near bankrupt Federal Flood Insurance Program met with state and local leaders to map strategy shortly after the storm. Several facts became apparent.

1. No one was willing to allow a disaster to this magnitude to happen again. Hazard mitigation would have to be a major part of Pinellas Counties future.

No clearance for reconstruction would be given until assurances were provided that plans for reconstruction involve protection of the majority of structures from a Category V storm.

2. No clearance for reconstruction would be given until assurances were provided that the plans for reconstruction included strict adherence to various environmental, building standards and other public policy laws.

3. The cost of replacing every insured structure in the county would somehow have to be met by the federal and private insurers involved. Issues of cash flight, infrastructure replacement and improvement and the future economic well being of the residents would have to be dealt with.

4. The process of determining the future of Pinellas County would have to be a democratic one. Several citizen panels would be appointed to create plans which would include environmentally sound recommendations, for future land use and reconstruction within the county. A referendum will then be held on the plans to determine which of them is to be adopted.

With this scenario as the setup, the students begin the process of exploring Pinellas County as it exists today and begin the process of planning for its future. They use what they have learned and what they can discover. They put forth the hard questions, use Web resources and modern GIS computer analysis to explore the data and their own critical thinking skills to provide the answers. Group works with the goal of a superior plan well presented at the end of the semester but have intellectual “room” to explore and learn along the way.

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Author contact information

Dr. James Brey

Professor of Geography and Geology
University of Wisconsin Fox Valley
1478 Midway Road
Menasha, WI 54952
Phone 920 832-2659
Fax 920 832-2674
e-mail jbrey@uwc.edu

Ms. Kristin Runge
Lecturer in Communication Arts
University of Wisconsin Fox Valley
1478 Midway Road
Menasha, WI 54952
Phone 920 832-0106
Fax 920 832-2674
e-mail krunge@uwc.edu