Evaluating Students' Ability To Integrate Written and Visual Communication

Catherine M. Lockwood &
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Technical Report Series
No. 15 ♦ 1996

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Preface

As communication becomes more and more technologically advanced, "visual literacy" -the ability to create graphics and visuals and integrate them with text, becomes increasingly important. Anyone who has surfed the Net or designed a World Wide Web page has seen examples of sites that either fail to understand this link or make dynamic use of it. "Evaluating Students' Abilities to Integrate Written and Visual Communication" explores ways to teach students these crucial skills through improved class assignments. In addition to the main purpose of the study, Gersmehl and Lockwood's results will also be useful to faculty members who teach large sections with teaching assistants. Communication about assignments among the teaching team and between the team and students is critical in order to insure effective teaching.

Research such as this, together with ongoing Center projects, should result in improved undergraduate writing, the Center's primary goal. Along with colloquia, conferences, publications, and other outreach activities, the Center annually funds research projects by University of Minnesota faculty who study any of the following topics:

- characteristics of writing across the University's curriculum;
- status reports on students' writing ability and the University;
- the connections between writing and learning in all fields;
- the characteristics of writing beyond the academy;
- the effects of ethnicity, race, class, and gender on writing; and
- curricular reform through writing-intensive instruction.

We are pleased to present this technical report as part of the ongoing discussion about textual and visual literacy. One of the goals of all Center publications is to encourage conversations about writing; we invite you to contact the Center about this publication or other Center publications and activities.

Lillian Bridwell-Bowles, Series Editor
Holly Littlefield, Editor
June 1996

Forward

Lack of geographic knowledge and skills has been and continues to be a major concern of educators at all levels, especially within the last five years. Educators recognize the need for improved geographic skills among students within the United States. Several states now require a formal geography course in order to meet high school graduation requirements. The Minnesota State University System and the University of Minnesota, as of Fall 1994, require completion of at least one year of high school geography for entering freshman. A set of national guidelines (Geography for Life) has been designed for use by teachers, curriculum developers, parents, and business and policy leaders. These standards were developed through a consensus process by geographers, with funding from the US Department of Education and the National Endowment for the Humanities supervised by the National Council for Geographic Education (NCGE) and completed in 1994-95. Other national and international geographic educational projects also are being developed. ARGUS (Activities and Readings in the Geography of the United States), a National Science Foundation (NSF) funded project supervised by the Association of American Geographers (AAG), is a multi-disciplinary interactive series of lessons and readings. The intent is to exchange ARGUS Activities for similar materials from colleagues in Russia and Japan.

Acknowledgements

We appreciate the cooperation of winter and spring Quarters 1993 teaching assistants: Linda McCarthy, Udeshtra Pillay, Sheila Franco, Deborah Martin, and Stephen Smela. Margaret Rassmussen, departmental secretary, administered the funds. Carol A. Gersmehl's, Thematic maps: Visualizing Patterns (1989), prepared for the Tennessee Geographic Alliance, was the key source for mapping techniques and data transformation.

INTRODUCTION

A goal of educators is to improve students' ability to read and write. We also expect students to be able to deal with numbers and mathematics. In addition, geographers expand these expectations to include the ability to excel in graphic interpretation. Graphics are a powerful means of expressing ideas that text alone may not adequately convey. Graphics, in the context of geography, are more than simple illustrations. Geography combines written text with graphic text to explain spatial relationships. An effective way to portray spatial data is with maps (a graphic language with its own conventional symbols, grammatical rules, and syntactic overtones).

The ability to use graphics, like the ability to write, is a skill that is essential to geography and applicable to many disciplines. If information cannot be effectively expressed, it is useless. Geographic distributions lack interpretive value if not expressed graphically. This report is a summary of methods and results for developing criteria to assess students' ability to integrate written and visual communications, and for creating guidelines to help teaching assistants with this evaluation in an introductory level geography course (US & Canada, 3101).

The course is usually offered each quarter, alternating between two highly qualified professors, Philip Gersmehl and John Fraser Hart. This study, however, is limited to those classes taught by Professor Philip Gersmehl. Evaluation is for winter and spring quarters 1993, but comparisons are made to classes from the previous four years (1989-1993). Professor John Fraser Hart's classes are used only to show total enrollment (see Appendix A: Course Statistics, Table 1a). Geography 3101 is a general distribution

course, which also meets the University of Minnesota's cultural pluralism requirement. Because Geography of the United States and Canada usually has a large student enrollment and limited teaching assistant support, techniques that quickly and adequately assess student performance are necessary.

A secondary and surprising result of this project is the realization of the importance for clarity of instructions. We assumed that our instructions would be clear and concise and that students would have little difficulty understanding the instructions, especially since we were adapting previously used instructions and guidelines. The necessity of providing precise, clear directions almost overshadowed the importance of our results. While we devoted some energy to producing guidelines, course objectives, and grading criteria for teaching assistants, our initial policy was to allow teaching assistants to adopt course grading guidelines to their perspective teaching styles, while maintaining course objectives. We discovered that teaching assistants needed specific directions for grading procedures, student assessment, and coping with each other.

Project Goals and Objectives

Our primary goal is to design and test several alternative methods of providing instructions to students. Because students' learning strategies for perceiving and processing information differ, our focus is on three sensory modes of learning: touch/feelings or practical application; sight/visual or use of graphics for instruction; and hearing/listening or verbal instruction. Each of these learner strategies requires a different form of instruction. Our efforts will be directed toward equally addressing these learning

styles and developing a set of instructions that actively integrates learning style with project objectives.

Our project has two research components to accomplish these tasks. The first is to determine ways to present instructions so that students clearly understand how to incorporate spatial ideas and graphical methods into their written arguments. To achieve this goal, our focus is on three objectives:

- development of a set of criteria that will help us to assess student ability to integrate written and graphic material for effective communication;
- testing of the clarity of project instructions (written, verbal, and visual) so that students adequately complete assignments;
- assessment of the applicability of written assignments and students' success at integrating text and cartographic interpretation.

The second component is to determine and measure the degree to which students can integrate written and graphic text. We want students to be able to communicate ideas about the positions and relationship of things in three-dimensional space. To achieve this goal, we redesigned project instructions and developed evaluation forms. Our intent is that students, given a specific set of instructions, should be able to

- understand a vocabulary of graphic terms,
- support graphic analysis through written text,
- effectively communicate ideas by integrating text and cartographic interpretations.

Learning to interpret maps is similar to learning a language, one with its own set of conventional symbols, grammatical rules, and syntactic overtones. We expect students to develop a graphic vocabulary and a set of skills for use in other courses or applied fields of study. We also expect students to gain alternate perspectives on writing techniques (i.e., integration of graphic text with written text).

Teaching assistants have various levels of experience with geography content, instruction, and methods. Because teaching assistants are instrumental in the learning process, especially within the context of a large class, an ancillary goal was to develop grading criteria and guidelines to help Teaching Assistants with their grading and evaluation of students. By providing guidelines to aid teaching assistants in evaluating student performance and by improving instructions to students (and providing timely feedback on their efforts), our intent was to raise the standards of writing and communication, even in a large class. Therefore, given a set of guidelines and project grading criteria, we expected that teaching assistants would be able to measure student work, content knowledge, and ability to apply concepts, and that they would be able to evaluate students' ability to integrate graphic text with written text.

COURSE COMPOSITION

Course Description

Geography is a spatial science. Geographers look at why features, places, or people are in one place and not in another place, and why there are similarities between features, places, or people. The main objective of Geography 3101 is to introduce students to the diversity of people and places throughout the United States and Canada. Three concurrent

themes that are interwoven within lectures, projects, and short exercises accomplish this objective through

- images—visual impressions of place,
- analysis—explanation of what is where (concept-based science),
- interpretation—using acquired knowledge and skills to solve problems and draw conclusions.

Currently, this course requires three projects, each of which includes three to five pages of text and at least an equal number of maps or graphs. The projects integrate writing skills with graphic techniques, such as map design (construction, measurement, scale change), topic selection, choice of appropriate data, and data manipulation.

We use existing projects but modify the instructions to address the three concurrent themes and three major learning styles. Project 1, *Images: Interpreting Topographic and Soil Maps,* describes an area. Students explore reasons why a landscape looks the way it does. They describe the landscape, noting which features occur together, looking for possible relationships. Project 2, *Making and Interpreting Thematic Maps,* explains relationships. Students look at the geographic pattern of something to understand its distribution. Project 3, *Analyzing the Local Importance of Various Activities,* investigates the economic structure of an area by determining basic and non-basic activities. (See Appendix B for a detailed description of the three projects.)

Many students have had no previous course in geography and are unfamiliar with its terminology or how to integrate written text with maps. When students enter this class, they think "textually"; most of them can put words on paper, but they are not necessarily

able to incorporate spatial ideas or graphical methods of communication into their arguments. The course projects are intended to develop an ability to read, analyze, and then explain map patterns through clear, concise written language. Several less intense exercises using maps and analytical skills also are assigned throughout the quarter. These self-contained exercises (background information, technique instructions, maps, application assignment, and answer sheets) are selected ARGUS Activities chosen to supplement a particular topic or theme not already emphasized in the three projects.

Course Dynamics

An introductory questionnaire (similar to previous quarters) was given to students the first day of class Winter and Spring Quarters 1993. Students were asked to give specific information about themselves including class level, major, age, and sex, and to mark courses previously taken (Appendix A, Course Statistics). This information helped with evaluating student learning objectives and possible effectiveness of teaching strategies.

The average number of students in Geography of the United States and Canada is between 175 and 250. The majority of students (60%) are between the ages of 18 and 21; less than 10% are over the age of thirty (Appendix A, Table 4a). Approximately two-thirds of the enrollments are juniors or seniors, which is consistent with an upper division course (Appendix A, Table 5a). Because students are trying to finish general distribution requirements and to complete requirements for spring graduation, spring quarter usually has higher enrollment. Although this is an upper division course, Geography 3101 is an introductory level geography course. Few students are geography majors (less than 10% per quarter). Before taking Geography 3101, most students have taken fewer than two

formal geography courses, either in high school or college, whereas almost every student has some background in English grammar and technical or creative writing. This most likely is a reflection of English as a core subject at all levels of education and the emphasis placed on acquiring written communication skills (Appendix A, Table 6a).

Teaching Assistants

Teaching assistants have various levels of experience with geography content, instruction, and methods. Because teaching assistants strongly influence the learning process, an ancillary goal was to develop grading criteria and guidelines to help teaching assistants with their grading and evaluation of students. By providing guidelines to the TAs and by improving instructions to students, our intent was to raise the standards of writing and communication, even in a large class.

Geography of the United States and Canada usually has an enrollment of between 175-250 students (Appendix A, Table 1a). Depending upon enrollment, Geography 3101 usually has between three and five teaching assistants (TAs) with course responsibilities either divided equally among the TAs or specific areas of interest selected by the TAs. For example, Winter Quarter TAs chose to grade one project and one short exercise each. Spring Quarter TAs divided the class into three equal alphabetical sections, with each TA grading one third of the class for every project and exercise. Both Winter and Spring Quarter TAs divided general course responsibilities into three areas: classroom (daily handouts and audio visual equipment); grades (summing and recording); and map library (tours and supplemental topographic maps series that corresponds to each lecture). TAs then selected one area for which they were responsible.

Teaching assistants are essential to a course with large enrollments, especially one that requires competency in graphic and writing skills. One element of the projects is to promote proficiency in mapping techniques and excellence in writing. Students are encouraged to combine these two learned skills into an integrated, synthesized method for effective analysis of spatial data. Teaching Assistants spend 10 to 15 hours per week with open office hours in the Map Library, where they help students gather data, analyze it, and package their results. TAs spend their remaining 5 to10 hours carefully reading and providing detailed written responses to student assignments and the essay portion of mid-quarter and final tests.

Grading of almost eighteen hundred projects, exercises, and tests is a daunting task, even when divided among three and four TAs. We believe it is extremely important to elicit cooperation of the Teaching Assistants. So TAs received copies of the Professor's TA course expectations and requirements, projects, texts, and all materials that are necessary for them to guide students through assignments and the course. We gave the TAs a summary of the grant that included goals, objectives and potential results. We developed a set of grading guidelines, point distributions, summaries of projects, and helpful hints for helping students (Appendix D, Supplemental Materials). The main purpose of these materials was to aid Teaching Assistants with grading and evaluation of students' work. The materials were effective in most cases, but some difficulties arose because of communication problems between teaching assistants, which required retesting of several elements during Spring Quarter 1993.

METHODOLOGY

Research Design

Criteria for assessing writing skills of students were developed and implemented Winter Quarter 1993, with some retesting of specific elements during spring quarter 1993.

Several alternative instructions for student projects were prepared and tested winter quarter 1993. These course projects are intended to help students develop an understanding of graphic text, along with the ability to read, analyze, and finally explain map patterns through clear, concise written language.

Our first objective was to develop instructions that were compatible with three specific learning styles: auditory, visual, and writing. Based upon class composition and performance of previous classes, we used existing projects but modified the instructions to address these learning styles (Appendix B, Projects). The first project included two pages of instructions and no formal explanation of the assignment. Several lectures provided examples and references about project elements. The second project had a two-page handout and a supplemental poster exhibit. This display showed how to calculate and adjust data sets, design maps, use color, and integrate graphics with written text. The third project included two pages of written instructions plus a thirty-minute formal classroom explanation. By adjusting instruction format we could determine which single or combined form of instructions was most effective.

We compared current class project grades with previous class project grades. Our intent was to use the same grading procedures, in order to measure the effectiveness of our instructions on student improvement. We developed forms to assess student

performance in five specific areas: research, writing style, selection and description of analytical tools, integration of maps and other graphic texts, and bibliographic skills. Because of class size, we developed and tested a set of criteria and standards for uniform grading by teaching assistants. Based on clarification problems that arose from Winter Quarter 1993, we modified these criteria for Spring Quarter 1993.

Besides three projects, a set of short two-hour exercises was assigned. These exercises are from ARGUS (Activities and Readings for the Geography of United States), a National Science Foundation project. Written, self-explanatory, step-by-step procedures allow students to complete the exercises at their own rate.

Data Source

Before beginning research in Winter Quarter 1993, we compiled some preliminary data: previous enrollment figures, class composition, and student performance on projects and exams. The Appendices are detailed collection of course materials, statistics, and TA project evaluations and student course evaluations.

A questionnaire given the first day of class in Winter Quarter requested information on age, sex, class, level, and number and type of prior geography and writing courses. The results and tabulations of this questionnaire along with previous classes are Appendix A, Class Statistics. Student course assessment and project evaluations are Appendix C, Mid-Quarter Evaluations.

Teaching Assistants were a valuable source for additional evaluation of student progress and effectiveness of our instructions. Guidelines and grading criteria based on collective TA experiences and past student performance were given to TAs. The

guidelines also included project and activity objectives, student learning outcome, evaluation key, and hints for helping students. TAs were to keep track of repeat questions and overall problems students were experiencing with projects and exercises. The TAs provided positive feedback, both strengths and weaknesses, for improving assignments. Examples of related TA course materials are Appendix D.

Project grades and TA evaluations of student projects were the primary sources for this research. Previous averages serve as a base line for evaluating if our changes result in improved student performance.

Evaluation of Student Projects

Projects from previous quarters were graded using a standardized 15 point system, evenly distributed between five assessment areas. Employing the same system kept current student performance comparable with previous student performance. TAs used a standardized grading form, with five specific areas of evaluation, to grade student projects (Appendix B). The TAs were given latitude in point distribution within each category, but not for changing points of each category. Three exercises, worth five points each, were also evaluated, but to a lesser degree than the projects. These exercises are evaluated within the context of the current course and not with previous classes.

Problems

Two problems arose during this research. The first problem involved the Teaching Assistants. We expected TAs to need guidance with the materials. We did not expect the struggle between TAs with distribution of work assignments and grading duties. These issues occasionally arise with large classes and three or more teaching assistants. Given

the variation in grading, questions of students, and questions by TAs for clarification of materials, it appears that the TAs either did not thoroughly read the supplemental materials provided to them or were not familiar with the projects and exercises.

The second problem was modification of grading criteria and point distribution used to evaluate student performance for Project 1 by the grading TA, but without similar adjustments to the evaluation form that the students were using as a guideline. Rather than equal point distribution, points were reallocated for the five evaluation areas: Site and Map Selection, 2 points; Research, 5 points; Style, 3 points; Illustrations, 3 points; Bibliography, 2 points. Criterion for choice and selection of other maps under Illustrations was modified. The purpose of this section was to evaluate students' ability to choose appropriate sources and supporting material. Illustrations were for actual map construction following guidelines in topographic manual and text and integrating them into the written text. Changing point distribution altered the research design and was detrimental in two ways. First, changing the evaluation criteria negates having a base line from which to measure student performance. Second, students were given a copy of the TA grading evaluation form, with stated criteria and expectations for each project segment. These criteria were designed to elicit specific responses from the students and to allow the students a structured guideline for inclusion of correct materials in each five grading areas. Changing the criteria without changing the evaluation form resulted in a conflict between actual student performance, evaluation by TA, and intended learning response of the project.

<u>Modifications</u>

Changing point distribution did result in some minor difficulties comparing current projects (1993) with previous projects (1989-1992). To adjust for altering point distribution and in fairness to the students, we applied the revised grading procedure of Project 1 to Projects 2 and 3. We compared these three projects with each other rather than with the previous four years' projects. We retested Project 1 and 2 Spring Quarter, using the revised point distribution, to verify results. Other changes Spring Quarter were increasing project value from 15 to 20 points, with 4 points for each evaluation section and assigning a fourth ARGUS Activity in place of a third project. Both Project 3 and ARGUS Activity "I", *Boom Towns: Index of Local Importance,* cover similar economic principles applied from a geographic perspective. For Spring Quarter, we modified supplemental materials to reflect TA concerns and to clarify TA grading responsibilities. Spring Quarter TAs chose to divide grading equally with each TA grading a third of the class, which created some problems with grading consistency. Spring TAs also assumed more individual responsibilities.

DATA ANALYSIS AND INTERPRETATION

Our analysis is based on project grades, TA project evaluations, and student mid-quarter evaluations for Winter Quarter, with minimal analysis based on Spring Quarter data. The projects measure course content and ability to apply concepts within a geographic context. Appendix B contains project instructions and evaluation forms.

The three projects require an equal amount of effort while developing progressive skills. The first project is introductory. Students become familiar with descriptive geography by identifying features and their relative distributions, interpreting this

descriptive information, and ultimately expressing it in visual and written form. Therefore we believe that Project 1 is a good measure of written instructions. Project 2 builds on Project 1's ideas, but with more depth. Students gather data, transform raw numbers into understandable units for mapping, map the data, and then interpret the map patterns. Because this project is most taxing on students' ability to interpret written and graphic information and to produce a coherent report, we designed a visual display to help students with understanding project instructions and objectives. In Project 3 students use comparative statistics in a geographic context to apply economic ideas. Because statistics can be confusing, we believed a verbal explanation would help clarify theories.

Written Instructions—Project 1

Project 1, *Images: Interpreting Topographic and Soil Map*, received the most comments by TAs and seemed to cause the most stress for students. This was partly due to communication difficulties with the grading TA and inconsistencies in TA responses to student questions about project expectations and requirements. Some student frustration resulted from a lack of formal explanation. Visual examples for all projects also were shown during lectures, but the lectures did not try to provide a fully redundant treatment of what was available in written form.

Students chose appropriate SITES and MAPS, but were weak in explaining site selection and proving their suppositions. The grading TA commented that although a few students provided "excellent additional/supplemental materials, not too many students supplied such illustrative materials." While the necessity for supplemental maps is stated in Project 1's OBJECTIVES and repeated in SOURCES and PRODUCT, some confusion

may have occurred because PROCEDURE, Section 3 suggests that only the study area requires a map. PRODUCT, Section 3, however, clearly states "Maps," plural. Many students did not effectively integrate supplementary materials into their text. This suggests that students may not have read the supplemental manual on topographic maps or received additional help from the TAs.

The scores on this exercise were lower than previous years, and lower than the projects graded by the other two TAs (Table 4). Areas of ambiguous instructions were modified Spring Quarter, which helped students with understanding what was expected of them and helped the TAs when providing assistance to students. Despite minimal problems with instructions and lower grades for Project 1, three-fourths of the class scored well on all projects. The general assessment by the TAs for Project 1 was that "for the most part, instructions and guidelines were clear." Although students thought that Project 1 was "relevant, but difficult," more than half of the class commented that they enjoyed Project 1 because it was "fun" and "interesting."

Winter 1993				**Spring 1993**		
Total Points	Number of students Project 1	Project 2	Project 3	Total Points	Number of students Project 1	Project 2

15	2	3	2	20	2	3
14	3	18	10	19	3	6
13	9	21	16	18	13	15
12	20	28	21	17	29	25
11	42	19	14	16	14	24
10	31	17	21	15	29	29
9	30	15	18	14	27	16
8	16	13	16	13	19	21
7	9	5	10	12	25	16
6	4	3	6	11	18	12
5	2	1	2	10	10	7
4	-	1	3	9	9	6
3	-	1	3	8	8	2
2	-	-	-	7	3	5
1	-	-	1	6	2	2
0	-	-	1	5	-	1
Mean:	10.1	11	9.9	Mean:	13.6	13.9
Median	10	11	10	Median	14	15

Table 1: Project Grade Distributions

Visual Display—Project 2

Project 2, *Making and Interpreting Thematic Maps*, required students to merge written text with graphic interpretations and to produce a series of maps that adequately explained the geographic distribution of their chosen feature. Besides receiving two pages of instructions and procedures, visual examples were displayed in the Map Library (Plate 1). Each evaluation criteria section (Main Map, Construction, Research, Writing Style, Illustrations, and Bibliography) is represented on the poster display.

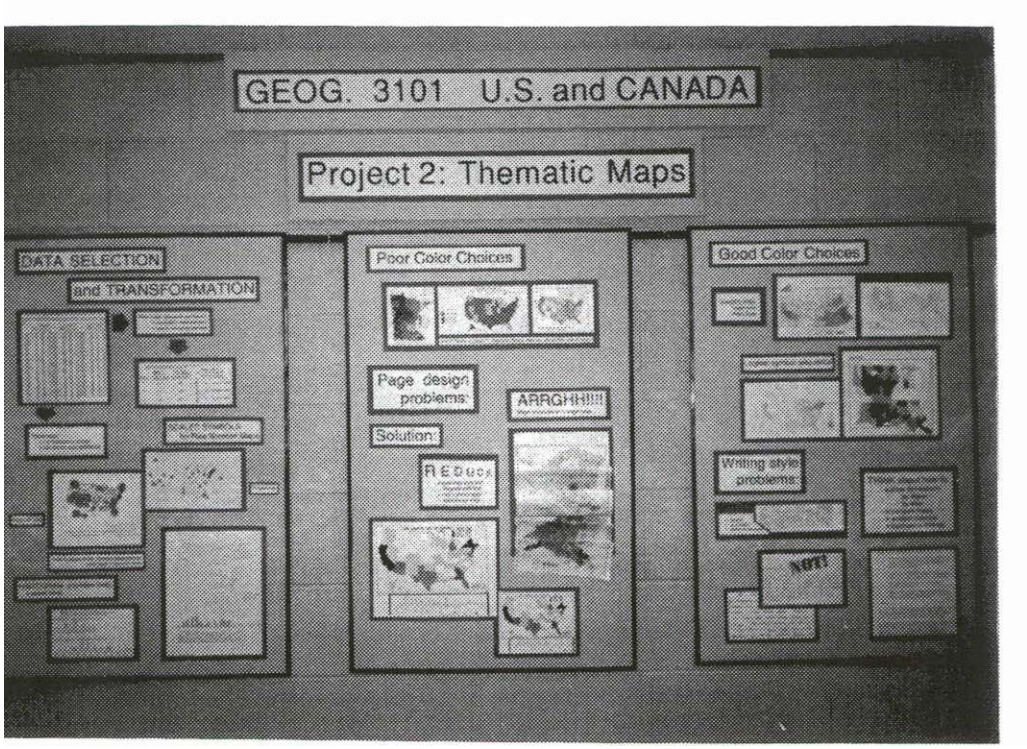

Plate 1. Poster Display. Examples of Data Selection and Transformation, Map Construction, and general project guidelines.

We offered students the opportunity to "see" portions of Project 2 by providing visual examples of data transformation, cartographic guidelines for color representation of data, differences between poor and good design choices, and proper and improper writing style using samples from previous class projects (Plates 2, 3, and 4). The display is reinforcement of written instructions, not a replacement for the written instructions. Most students found the poster helpful because it "showed exactly how to go about doing the project." Yet a few students either did not refer to the display or found it confusing. One student stated that the display was "inconsistent, although densely informative," while several students complained that it did not show a complete project. This was not an oversight on our part. The poster is a guide, not a model. With limited

space, we wanted to highlight problem areas along with corrections and proper procedures. Projects from previous quarters were available in the map library for review by students. Although a consensus on Midquarter evaluations was that Project 2 was "better than Project 1," there were areas of frustration. Students lost sight of the specific items listed on the two pages of instructions. Like Project 1, Project 2's PRODUCT lists point-by-point elements for inclusion in the student's report. Two sections on the grading evaluation form asks students if they included the appropriate materials or conducted the necessary research. In addition, the display walks students through procedures for compiling a synthesized report using a flow chart format. The final step is a bullet list of "deliverables."

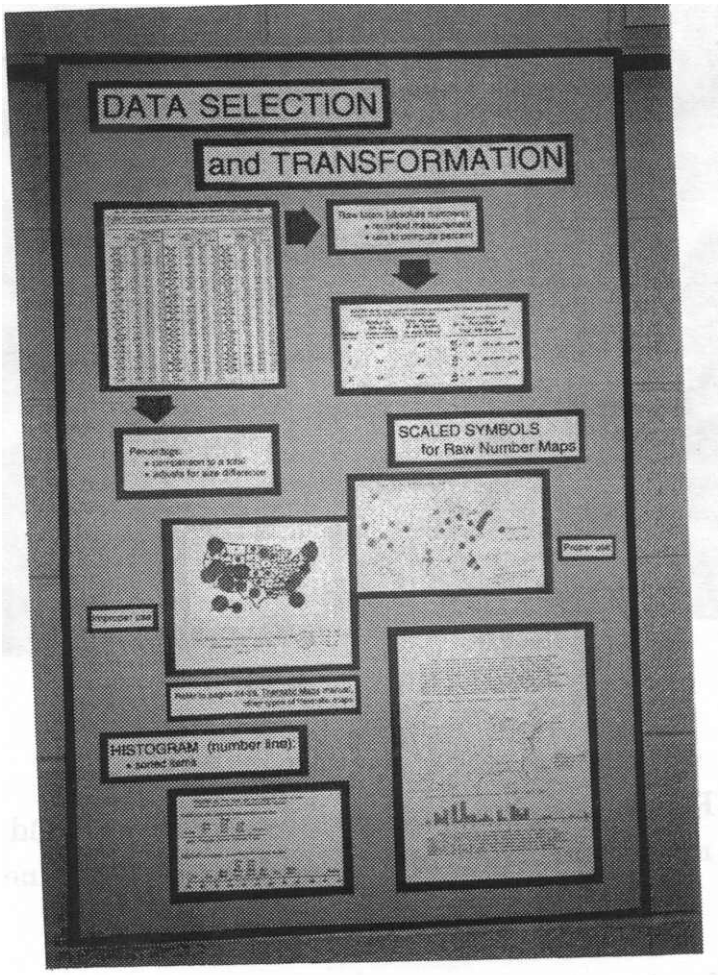

Plate 2. Data Selection and Transformation

Students' general reaction to Project 2 was positive. Most students improved their grade from Project 1 to Project 2, but some who improved also lost points for Project 3 (Table 5). This could be a result of several factors. First, the display helped clarify instructions and improve student performance. One student wrote on her midquarter evaluation that she "would not have understood how to do the project without it," while another student wrote "the project 2 display was the most helpful thing the TAs did for

me." Second, students were familiar with the thematic text or sought assistance from TAs. And third, students liked thematic mapping.

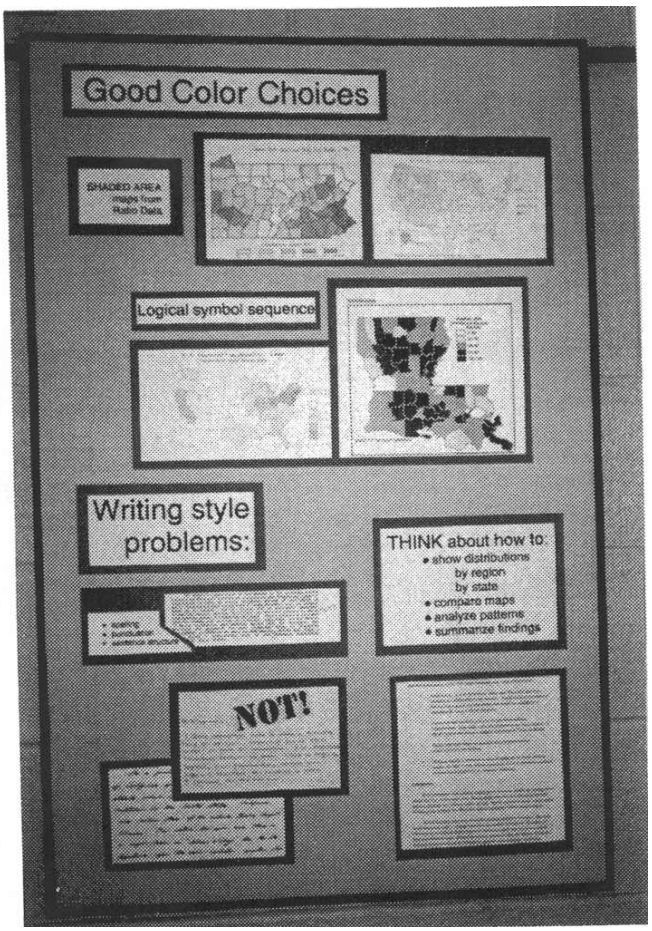

Plate 3: Good Choices. Examples of page design and writing style problems.

	Winter 1993		Spring 1993
	Project 1 to Project 2	Project 2 to Project 3	Project 1 to Project 2
Improved	45 %	32 %	47 %
Decreased	40 %	50 %	43 %
Same	15 %	18 %	11 %

Table 2:Project Grade Comparison. Percent of students improving or decreasing grade or remaining the same from Project 1 to Project 2 and Project 2 to Project 3.

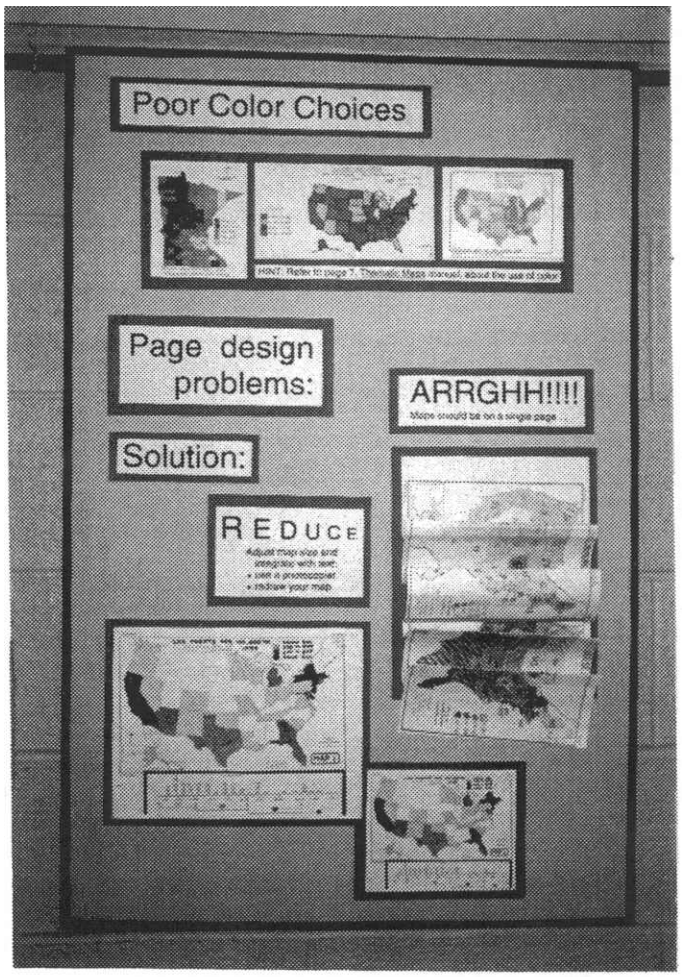

Plate 4: Poor Choices. Examples of page design and writing style problems.

Verbal Instructions—Project 3

Project 3, *Analyzing the Local Importance of Various Activities,* focuses on analysis of statistical data, rather than map interpretation. Mapping for this project is minimal, requiring a single locator map of a study area rather than a series of interpretative maps. We still expected students to merge summary charts, tables, and a histogram into their

written text. Most students could research and write a reasonable analysis of their study area, but they omitted key elements such as the histogram or index of local importance (ILI) chart from their text. Students lost points because they did not adequately explain correlations between economic principles and collected data.

Besides giving students a two-page handout of written instructions and a reminder that some steps necessary for Project 3 were also a part of Project 2's visual display, the grading TA for Project 3 gave a forty-minute lecture explaining the project. The TA presented explicit examples on how to calculate an index of local importance (ILI), how to make a histogram, and how to interpret the data. Students responded well to this verbal presentation by listening and asking questions afterwards. The examples given during the lecture followed the written instructions, but some students had difficulty merging the two sets of instructions. Despite detailed written and verbal instructions, TAs spent many office hours clarifying what students thought they heard with what they read in the instructions.

Because of the complexity of Project 3 and some difficulties by students understanding principles, an alternate exercise replaced Project 3 Spring Quarter. ARGUS *Activity "I," An Index of Local Importance,* using the same economic concepts as Project 3, places emphasis on students' ability to evaluate the ILI at two scales. *Activity "I"* has a standardized data set and students interpret the same information. By using a single data set, students could compare results, offer help to each other, and receive consistent help from the TAs. Again, a forty-minute lecture with visual examples explained ILI and how to apply principles to a data set. We graded Activity "I" because

this is the first exposure of the exercise to students. By our grading an untested exercise, we could assess problems, strengths, and weaknesses, and if necessary, adjust grades.

Although the TAs did not grade Activity "I," they were familiar with its format and flagged difficulties encountered by students. Inaccurate calculations of given percentages and ILI's in the data set caused some problems with students' calculations. These errors were corrected. The TAs commented that several students were unclear that an average ILI is a value of "one." Activity "I" is a seven-page exercise with five pages devoted to ILI concepts and procedures. Detailed activity instructions and examples, reinforced with visual examples during lecture, covered the concept that "one" is an average. Comments such as this suggest that students skipped to the calculations without carefully reading the instructions. Also, while students were present during lecture, some students were not listening. Project 3 and Activity "I" probably could use a visual display showing procedure, calculations, and data interpretation.

Comments

All project instructions and evaluation forms included an explicit statement that style and grammar would be evaluated. Despite that warning, many students lost points because of poor grammar (writing style, expression, spelling, punctuation, tense). The introductory questionnaires show that almost all students enter Geography 3101 with some English background. Yet, poor grammar suggests that students do not transfer those writing skills to other courses. Poorly constructed bibliographies, which were minimal and without annotation, are another area of concern; it appears that students have little experience in documenting sources. We included a bibliography guideline with projects

and recommended that TAs tell students during office hours about grammar and bibliography errors.

Students tended to underestimate the time necessary to complete these projects. On the average, projects take between 15 and 20 hours for research, writing, illustration drafting, and editing of work. The instructions do not include a section on time allocation, but we made an oral announcement to alert students that a project could take between 10 and 20 hours.

Students believed point allocation was minimal for their efforts. Projects, while time-consuming, are important measures of a student's ability to process, analyze, synthesize, and then present a series of information in geographic context. The three projects and three ARGUS activities are equal to 30% of the course grade. We agree that individual projects should have more point value, but the cumulative project and activity points should remain at 30% of the course grade. In essence, points are an absolute measure of student performance. Interestingly, there was little difference in student performance levels between winter and spring Project grades (and overall course grades), despite changes in point allocation (Appendix B).

Students were displeased about the grading procedures by the TAs for all projects. Several explicitly commented that the TA grading criteria were different from what was explained. Students complained about inconsistencies in TA responses to their questions about project expectations and requirements: "It's a bad idea to ask a question to a TA that's not the grader." The purpose of TA guidelines was to prevent this type of confusion. Graders also received several complaints about their comments on student

evaluation forms. Some of these grievances were justified due to the graders' inexperience with working with students and poor penmanship. Many graders' comments, though thorough in evaluating student assignments, were illegible, hence, students were frustrated with the graders' comments.

RESULTS

Findings

We found that written instructions simply do not convey enough information without some explanation. Students need verbal reinforcement of project requirements and expectations. Visual instructions are effective: students who used the display did better than those who did not. The display also reduced stress on the TAs. When repetitive questions were asked or examples needed, the TAs could direct students to the display. The poster does not replace written instructions, and TAs must be prepared to explain project elements. Verbal instructions must be precise because, while students listen, they may misinterpret instructions.

It may be unrealistic to expect that two hundred students will follow a single instruction format, especially when students have minimal background in geography and multiple learning styles. Students not only are trying to interpret instructions, they are trying to grasp unfamiliar concepts and apply them geographically. Although all projects have written instructions, better results are obtained with the addition of visual and verbal instructions. Therefore, a combination of instruction styles seems to be needed in order to achieve quality results and for students to effectively merge written and graphic text.

In a large class, cooperation among TAs is essential. TA group dynamics can affect student performance. Guidelines for TA classroom and grading responsibilities are imperative to maintain a congenial and effective learning environment for students. We discovered that TAs need meticulous grading criteria to avoid confusing students and to avoid conflict among themselves. Grading criteria evaluation forms benefit both the student and the TA. The student is aware of what is expected and can use the grading form as a guideline for completing all necessary elements of the project. TAs use the guideline for standardized and fair grading policy.

Summary

We are pleased with the results of our project. We expected students to develop the ability to incorporate spatial ideas and graphical methods into their written arguments. We were not disappointed. Student grades and performance on projects show that we met our objectives and goals. Geography 3101 students mastered basic geographic concepts and the ability to apply them within the context of this course. Students acquired a graphic vocabulary that allows them to visually interpret information and to complete assignments. Their success is due to a combination of varied instructions, good TA help, and conscious effort by the instructor to emphasis issues about projects during lecture.

Problems relating to geographic concepts, graphic techniques, and integration of material into the written text were minimal. Instead, problems centered on course mechanics and lack of grammar and research skills. Based on our findings we adjusted course procedures, modified project instructions, and reassessed TA duties and work

distribution for the spring term. We attribute progressive improvement of project grades and improved final grades from previous years to these changes.

Students can effectively integrate written and visual materials as long a they receive adequate instructions. They can support their cartographic interpretations with written text, but need additional supportive information and instructions. Perhaps the highest testament to the success of instructions and students' ability to integrate written and visual materials, especially when not familiar with such techniques is a comment on the midquarter evaluation: "I don't really like the projects, but I learned a lot and can now think and write critically."

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APPENDIX A—Course Statistics

Table 1a is a composite of Geography of the Unites States and Canada enrollment, which is alternately taught by Professor Hart and Professor Gersmehl. Table 2a is a summary of total enrollment and questionnaire respondents and Table 3a is a summary of geography classes prior to enrollment in Geography of the United States and Canada.

Table 1a: Total Enrollment Fall 1988 - Spring 1993
in Geography of the United States and Canada

Year	Quarter	Student Enrollment +	Year Total
1988	Fall *	233	
1989	Winter	251	
	Spring *	354	838
1989	Fall *	330	
1990	Winter	186	516
1990	Fall	246	
1991	Winter	369	615
1991	Fall *	308	
1992	Winter	228	
	Spring	227	763
1993	Winter	172	
	Spring	217	384
Total			3116

\+ From official University records (Final grade summary)
* Classes taught by Professor Hart

Due to large class size and University add/drop policy, it is difficult to determine actual numbers until end of quarter and final grade tabulation. Also, course enrollment varies by

quarter. Fall and spring usually have larger enrollment than winter. Compiling statistics for a large class can be problematic. Numbers may differ between statistical data sets because of enrollment, class attendance, or unwillingness by students to complete the forms or data sheets. Class size varies between 150 and 350 students, but usually fall within the 150 and 250 class range depending upon the quarter. Numbers also vary because of enrollment tabulation.

Table 2a: Geography of the United States and Canada
Total enrollment and number of respondents

Quarter	Total Enrollment	Total Respondents	Percent Response
W 1991	369	173	47 %
W 1992	228	160	70 %
S 1992	227	212	93 %
W 1993	172	149	87 %
S 1993	217	198	91 %

Table 3a: Geography of the United States and Canada Enrollment Winter1989-Spring 1993

Year	Quarter	Student Enrollment	Year Total
1989	Winter	251	251
1990	Winter	186	186
1990	Fall	246	
1991	Winter	369	615
1992	Winter	228	
	Spring	227	455
1993	Winter	172	
	Spring	217	384
Total			1891

Table 4a: Geography of the United States and Canada Age Structure by Quarter

AGE (in years)	Age Number by Quarter					Total of quarters	Percent of classes
	W 1991	W 1992	S 1992	W 1993	S 1993		
18 - 21	98	95	127	94	123	537	60.6
22 - 25	50	56	66	37	61	270	30.5
26 - 29	9	5	12	10	5	41	4.6
30 - 34	8	2	5	3	1	19	2.1
35 - 39	5	2	1	1	1	10	1.1
40 +	3	-	1	3	1	8	1.0
Sub total	173	160	212	148	193	886	

Subtotal is number of respondents to questionnaire given first day of class.

Table 5a: Geography of United States and Canada Class Composition by Quarter

Class level	Number enrolled by quarter					Total of quarters	Percent of classes
	W 1991	W 1992	S 1992	W 1993	S 1993		
Freshman	10	10	11	13	19	63	7.1
Sophomore	47	50	49	48	52	246	27.7
Junior	69	63	85	56	73	346	39.0
Senior	43	33	64	27	54	221	24.9
Graduate	1	1	1	1	-	4	0.45
Special	1	-	2	3	-	6	0.67
Sub total	171	157	212	148	198	886	

Subtotal is the number of respondents to questionnaire given first day of class.

Table 6a: Number of Geography Classes Prior to Enrollment in Geography of the United States and Canada Winter 1991 – Spring 1993

Number of Classes	Geography classes by quarter					Total of quarters	Percent of respondents
	W 1991	W 1992	S 1992	W 1993	S 1993		
0	55 *(32%)	51 (32%)	95 (45%)	33 (24%)	49 (26%)	283	32
1	45 (26%)	44 (28%)	56 (27%)	46 (34%)	65 (34%)	256	29
2	40 (23%)	31 (20%)	28 (13%)	24 (18%)	44 (23%)	167	19
3	13 (8%)	14 (9%)	13 (6%)	17 (12%)	15 (8%)	72	8
4	9 (5%)	10 (6%)	9 (4%)	11 (8%)	15 (8%)	54	6

5	2 (1%)	3 (2%)	1 (.4%)	4 (3%)	4 (2%)	14	2
6 ≥	8 (5%)	5 (3%)	9 (4%)	2 (1%)	-	24	3
+ Subtotal	172	158	211	137	192	870	
H. School	43 (25%)	35 (22%)	41 (19%)	32 (23%)	56 (29%)	207	24
College	50 (29%)	40 (25%)	55 (26%)	43 (31%)	59 (30%)	247	28
Both	25 (15%)	33 (20%)	23 (10%)	17 (12%)	27 (14%)	125	14
Geog. Majors	16 (8%)	8 (5%)	10 (5%)	11 (7%)	8 (4%)	53	6
Total enrollment	369	228	227	172	217	1213	

* Percentages for number of classes are computed using number of respondents (subtotals) to questionnaire given first day of class.

\+ Not every student responded in each category of the questionnaire.

APPENDIX B—Projects and Grade Summary

Table 1b: Final Grades, Quarter Summary

Number of students per grade per quarter
Winter 1989-Spring 1993

Grade	**W 1989**	**W 1990**	**F 1990**	**W 1991**	**W 1992**	**S 1992**	**W 1993**	**S 1993**
A	46	43	45	58	62	42	31	53
B ≥ B	91 (55%)	75 (63%)	93 (56%)	169 (62%)	87 (65%)	107 (66%)	56 (50%)	78 (60%)
C	61	34	62	72	41	33	48	58
S ≥ C	21 (87%)	15 (90%)	19 (89%)	28 (89%)	18 (91%)	26 (92%)	7 (83%)	19 (96%)
D	13	2	12	21	15	9	16	3
F	14	16	10	18	3	7	11	6
N	-	-	3	3	2	1	2	-
I ≤ D	5 (13%)	1 (10%)	2 (11%)	- (11%)	- (8%)	2 (8%)	1 (17%)	- (4%)
Total Students	251	186	246	369	228	227	172	217

S = pass; must have a letter grade of C or better
N = no pass; I = incomplete

Projects

Projects were given to students as a package of three the second week of the quarter. This packet included three evaluation forms, one for each project and a bibliography guideline. Students were to attach the evaluation form as the cover page of their project.

Graders commented on student performance, photocopied the evaluation forms and returned them to the students.

PROJECT 1 -- IMAGES: INTERPRETING TOPOGRAPHIC AND SOIL MAPS

OBJECTIVES: This project should show your ability to:

Skill: Find topographic maps, soil survey photomaps, and other maps of place(s) you want to know better.
Gather information from maps with different scales and projections.
Use maps to communicate ideas.

Content: Think about why particular things are found in a given place.
Look at the landscape from a geographic (space) perspective, rather than the more common historical (time) perspective.
Find relationships among "natural" and "artificial" landscape features.

Form: Present clear maps and sketches, either hand-drawn or carefully selected and highlighted copied maps.
Use written text to explain your maps to a reader (the grader), with language that is interesting and grammatically correct.
Cite maps and written source materials correctly in a bibliography, so that anybody could find them again.

BACKGROUND:

There usually are reasons why the landscape looks the way it does. The first step to find these reasons is to describe the landscape carefully, noting which features occur together, and looking for possible relationships. Geography is, in part, a study of spatial relationships. This means looking for connections between things.

Two features that occur next to each other may be completely independent. If they frequently occur together, however, it is worth investigating whether there is a direct or indirect relationship between them. Common sense and good use of data will help you discover these. A direct relationship may be a one-to-one correlation, for example, between hillslope elevation and a certain kind of tree. An indirect relationship may include any number of factors, and the causal links may not be immediately obvious.

For example, the climate affects human use of an area -- the number of people, the kinds of crops and buildings, and so forth. Slope and elevation also have an effect; some kinds of structures are hard to build on steep or swampy land. Of all the human actions in a place, the road network and property-division system often have the most striking map patterns. These systems also have a big influence on what people can do in an area. Some kinds of road arrangements allow easy travel, while others cause congestion and confusion. Look for these and other kinds of relationships among the features that you can see from your imaginary "viewpoint" on the map.

PROCEDURE:

1) **Choose a specific place** in the U.S. or Canada where you have not (NOT) been, and find a large scale topographic map of it. (Scale of 1:24:000 for most of the U.S.; slightly smaller scale for Alaska and Canada).

2) **Locate** a specific road intersection, hillside, building, or other site.

3) **Make a photocopy** (standard 8-1/2 x 11 is fine) of the area around your specific place, and clearly **mark** your place on your copy.

4) **Describe** the prominent features visible from that place and **suggest reasons** why they occur there. (Note: the grading favors projects about less well-known places, because there is less already written about them.) Write only about what you should be able to see from your chosen point -- probably only a few miles clearly, more if you are on a high point. Remember that you cannot see through trees, mountains, or buildings that are higher than your point -- your task is to read the topographic map in order to find out what would be visible.

RESOURCES: The manual on topographic maps (gold cover, in the bookstore packet) has short descriptions of landscape features shown by the point symbols, lines, and colored areas on topographic maps. This manual is your primary source of background information in doing this project. Other sources of information include (but are not limited to):

- your packet of class materials, which has maps that show the broad patterns of things like temperature, vegetation, soil, and landforms. These maps provide context for interpreting detailed information from other sources.
- thematic maps, such as those in encyclopedias, geography textbooks, government agency reports, and national, provincial, and state atlases. These also show the general patterns of vegetation, soils, and landforms, with varying amounts of detail.
- county soil surveys, where our government puts data on climate, geology, water supply, vegetation, land use, wildlife habitat, and natural hazards, as well as soils. As a bonus, surveys are based on large-scale aerial photographs, which show individual trees, buildings, roads, and other features. About 1500 US surveys are stored alphabetically by county name in the Government Documents Library (4th floor Wilson); Canadian and another set of US surveys are in the St. Paul Campus Library. Useful parts include the "General Nature of the County," a color map, and the detailed map that covers your area. Short letter-number soil codes (e.g., SnB2, 113C3) on those maps are the key you use to pick relevant information for your specific area out of the mass of tables and text.

Topographic maps are stored in the Map Library; ask a TA for help in finding the map you need. As stated above, one of the required "textbooks" for the course is a manual that describes how to interpret landforms, drainage features, forest cover, land-survey systems, urban and rural settlement, industrial districts, and other cultural features on topographic maps. *You are expected to have read this manual before asking questions that are answered in it.*

PRODUCT: A stapled report, three to five 8.5"X11" pages long, which should include:

1) **Cover Sheet:** Put your name, ID, and study site on the attached grading sheet. This is the first page of your project; it will be filled in and returned.

2) **Text:** Write a description of what you might see from your observation point. Your description should focus on the prominent hills, valleys, lakes, streams, forests, roads, buildings, survey lines, fences, and so forth. Explain why those particular features would occur in this place and how they might relate to each other. Use a few well-chosen examples rather than overwhelming your reader (the grader) with details. Organize your material around a theme that will help it make sense to your reader.

3) **Maps:** One map should clearly show your specific observation point. Make other maps or sketches of local features and patterns, such as slope and stream profiles or measurements of block size or street patterns. Generalized maps of a larger area may be useful to show things like rainfall, population density, or vegetation. NOTE: Placing maps and other illustrations near where you discuss them is more effective than simply attaching a bunch of diagrams at the end of your report. Usually, your own easy-to-read sketches will count more than copies of hard-to-read printed maps. Alternatively, you could copy parts of other maps and use colored pencils to highlight features you want to emphasize in your discussion.

4) **Bibliography:** Clearly cite and evaluate your sources in your bibliography (whether or not they were helpful; we give credit for blind alleys that looked promising but didn't prove useful). It helps to write evaluations of your sources as you use them, or you may confuse them later. Use the style sheet provided with the course materials.

Simply staple your report in the upper left corner; plastic covers, binders, and extra pages are not (NOT) desirable. Pay attention to the specifications on length and form (authors who write too much will be penalized, not rewarded). Finally, please treat all library maps and documents with great care -- many are not replaceable.

PROJECT 2 -- MAKING AND INTERPRETING THEMATIC MAPS

OBJECTIVES: Select a variable with a distinctive map pattern.
Transform raw data into meaningful ratios for display on a map.
Construct a technically acceptable thematic map from numerical data.
Analyze a map pattern by comparing it with other patterns.
Describe your results in an attractive and grammatically acceptable way.

BACKGROUND: Looking at the geographic pattern of something can help us understand why it occurs or what might be related to it. For example, few people caught malaria in cold or hilly areas. This was a clue that helped people identify the warm-weather mosquito that carries the disease. The connection between mosquitoes and malaria now seems logical and obvious, but the cause of the disease was a disturbing mystery for a long time.

A more modern and somewhat more controversial example would be the role of taxes in a state economy. Common sense might suggest that high taxes would make people in a region poorer, because they take money from household budgets. The map pattern of high-tax states, however, is similar to the pattern of states with comparatively high levels of education, research, corporation head offices, and above-average economic growth. The connections are not perfectly understood, and in fact the direction of the "causal arrow" can be debated. On one hand, high taxes may help build good roads, schools, and other things needed for economic growth. On the other hand, high taxes may be nothing more than an unwelcome side-effect of economic growth, and maybe even a factor in eventual decline. In any case, comparing map patterns makes it hard to argue that cutting taxes would automatically lead to more wealth. It may be trite to say it, but there is more than a one-letter difference between *casual* and *causal* connections. One might casually observe that more people die in hospitals than in bowling alleys, but that does not mean that hospitals *cause* people to die and bowling alleys don't.

PROCEDURE:

1) **Choose a set of data** with a distinctive geographic pattern in the United States or Canada. Possible sources of information include almanacs, government reports, magazines, and newspapers. As with other course projects, the grading scale will favor people who do a good job with less well-known topics. Start early, and watch for interesting data. The Map Library has copies of the County and City Data Book, the State and Metropolitan Area Data Book, and pages from the United States Statistical Abstract -- these have tables for more than 600 variables by state and about half that many by county.

2) **Make a simple map** by writing "raw" numbers into the states or regions (like some of the handout maps). The Map Library has basemaps for various states, in the Facts on File collection. The manual on thematic maps has a comparison of Tennessee and the United States that illustrates this option. The change in scale can help you interpret the maps.

3) **Transform the data.** If the data are expressed as total quantities (e.g., tons of tofu consumed), you can put them on a map as is, but the result may be misleading. The relevant information may be the amount eaten per person, per square mile of land, per dollar of total income, or as a proportion of all food consumed in the state. For hints on how to adjust your data to account for these variables, see the thematic map manual (blue cover). Try several variables to see which ones make your point clearer; a computer spreadsheet can help with this task, but it is not necessary. Remember that in any case you should use round numbers rather than calculating to several decimal places; a general map cannot express more than about two significant figures of accuracy, and real-world data are rarely that accurate anyway. For example, Las Vegas is a growing city, and "about 800,000 people" is a more honest statement about its population in 1992 than the 741,459 that were recorded as "the" population during the 1990 census, and shown as the "truth" in dozens of almanacs, atlases, and highway maps since then. In short, your map should be based on real data, but you should use the data thoughtfully.

4) **Make a line graph** (histogram) and map(s) of the data. Follow the cartographic conventions (generally accepted rules) outlined in the blue manual.

5) **Examine your map(s)** and try to describe the geographic pattern. Is what you mapped generally clustered in one part of the country, or is it split into several separate parts? Is it more in the south, east, center, mountains, etc? There may not be a pattern, and that's also worth noting. Your goal at this stage is simple description -- tell *where* the thing you have mapped is abundant or important, and where it is rare or absent.

6) **Compare the geographic pattern** on your map with other map patterns, whether from course handouts, the text, or atlases in the Map Library. Choose two or three other variables with map patterns that are either similar to or completely different from the one on your map (and may be plausibly related to it). As you examine the relationships among map patterns, look for possible connections. For example, if you notice that a particular kind of movie is especially popular in the Southwest, you might ask whether the story appeals to retirees, or whether the music strikes a resonant chord with Hispanic people. Things that can have an effect on a lot of geographic patterns include climate, population density, annual income, educational level, age, land-division systems, land-ownership, transportation connections, political affiliation, religious preference, soil fertility, or frequency of environmental hazards such as earthquakes or hurricanes. It is almost always better to err on the side of caution -- a case is usually more persuasive if it is based on obvious similarities among a whole bunch of maps rather than a few sweeping assertions made about a single pair of maps.

7) **Tell a coherent story** by arranging your maps in a logical sequence. The evaluation of your project will be based on the readability and interest of your first map, the plausibility of the causal connections you try to show, and the quality of logic you use in making your case. Your conclusion can be "wrong" and your project can still get a top grade, as long as the general approach, design of maps, and logical argument are reasonable. At the same time, a "correct" conclusion that is presented with inaccurate maps, questionable logic, and/or poor writing will not get a good grade, even if it took a long time.

PRODUCT: A stapled set of three to five 8.5"X11" pages, which should include:

1) **Cover Sheet:** Put your name, ID, and study site on the attached grading sheet. This is the first page of your project; it will be filled in by the grader and returned.

2) **Text:** Write 400-600 words of text. Explain your map pattern by comparing it with other patterns. Describe the geographic pattern of the subject you chose -- whether it appears to be uniform, clustered in particular areas, restricted to a small area, biased toward the northern half of your area, etc. Include a brief description of the source of your data and the methods you used to transform the raw data into the form you chose for the map (state whether your map shows total quantity, proportion of total output, amount per person or per unit of area, etc.). Cite your source(s) *on the map*, and include your histogram and a copy of your raw data either in the text or as an Appendix.

3) **Maps:** Include maps of the factors you think are related to the subject of your map. If possible, identify factors that appear to limit its extent in different directions. For example, a mountain range may limit a particular crop; an industrial area may limit the range of a particular house type. NOTE: Placing maps and illustrations near where you discuss them is more effective than simply attaching a bunch of diagrams at the end. Usually, your own easy-to-read sketches will count more than copies of hard-to-read printed maps. Alternatively, you could copy maps and use colored pencils to highlight features you want to emphasize. Each map should have a clear legend and a brief note about its data source.

4) **Bibliography:** Clearly cite and evaluate your maps and other sources in your bibliography (whether or not they were helpful; we give credit for blind alleys that looked promising but didn't prove useful). It helps to write evaluations of your sources as you use them. Use the style sheet provided.

Staple your project in the upper left corner. Pay attention to the specifications on length and form. Finally, please treat library maps and documents with care -- many are not replaceable.

PROJECT 3 -- ANALYZING THE LOCAL IMPORTANCE OF VARIOUS ACTIVITIES

OBJECTIVES:

Skill: Find appropriate census data to use as economic indicators of a place that you want to learn about.
Calculate an index of local importance to identify basic activities (bigjobs).

Content: Think about why particular economic activities are found in a given place and how a local economy "earns a living."
Use standard theories about resource development, industrial location, and service provision to explain the pattern of economic activity in your area.

Form: Use clear tables and graphics to communicate your data.
Write clearly, and cite sources correctly.

BACKGROUND: This project introduces a standard way of trying to separate the *basic* from the *non-basic* economic activities in an area:

1) *Basic activities* (bigjobs) are those that produce something to be sold to other regions in order to bring income into an area. Examples include farm products, manufactured goods, transportation services, college educations, investment advice, rock videos, and real estate.

2) *Non-basic activities* (other jobs) are those that serve only the people who are living within a region. Examples include farm products, manufactured goods, transportation services, college educations, investment advice, rock videos, and real estate.

Yes, the lists of examples are identical. The separation of economic activities into basic and non-basic depends largely on the market and the local economy, not the activity itself. For example, avocado growers in California are part of a basic activity, because they serve a national market and bring money from the rest of the country into California. Connecticut farmers who sell tomatoes to a local grocery store are non-basic. And a Wisconsin dairy farmer may send some milk to a bottler for local use (non-basic) and some to a cheese factory for sale through a national grocery chain (basic). It usually is necessary to evaluate how important a given activity is within a regional economy in order to decide whether it is a basic or non-basic activity.

One useful tool for the analysis of the economic structure of an area is the *index of local importance*. To compute one example of this index, take the percentage of working people employed in a given activity within an area (say 24), and divide it by the percentage of the national workforce employed in the same activity (say 5). The resulting number (4.8) suggests that the activity is nearly five times as important within the local economy as in the national one. That activity is probably a bigjob, serving people outside of the local area.

The biggest problem with this kind of analysis is that a number of activities can give you an index of local importance between 1 and 2, clearly larger than one but not really big enough to be completely convincing as a basic activity. This uncertainty is complicated by the fact that the index calculations depend on the size of the area. An activity with an index of 1.8 is much more likely to be basic in a large city than in a small town, where a factory or store that employs only a few people can make a big change in the numerical results for an industry. The choice of a reference area is also important. For example, farming in a northeastern Iowa county can have an index of 0.9 (apparently non-basic) when compared with the state of Iowa, but it has an index of 2.1 (clearly a bigjob) when compared to the nation as a whole. Finally, the definition of some activities can be debatable. For example, should a convenience store that sells gasoline be defined as part of the food sector or the transportation sector of an economy?

For all of those reasons, it is hard to make up a firm rule to separate basic from non-basic activities. Despite this difficulty, the ability to identify the basic economic activities in an area is essential to its long-term economic health -- a county or state that cannot do so is doomed to make bad investments or policy decisions and eventually to decline.

PROCEDURE: Choose a county in the U.S. or Canada that you have not (NOT) seen in person. Consult encyclopedias, almanacs, state yearbooks or statistical abstracts, national and/or state atlases to get some general background about the area. Then, look in the County and City Data Book or the County Business Patterns book for data about various population groups, economic activities, or whatever you want to compare -- single women, Spanish-speaking people, young children, farming, fishing, manufacturing, services, medicine, government, military officers, etc.. Calculate an index of local importance in order to compare the figures for your county with the state, or with the nation. Your analysis should include an attempt to evaluate the data in terms of age and/or minority group, in order to see whether conditions for a sub-population differ from those for the majority population in an area.

You may find that some census categories are too broad. A closer look may help to identify what is basic to the local area. For example, suppose an area has a high index for a category called "forestry, fishing, and mining." If the place is inland, with no big lakes or rivers, one might conclude that fishing is not important. If an atlas map shows the area covered by prairie grass, one may also rule out forestry. This leaves mining as the most likely employer. At this point, another search in an encyclopedia, atlas, or census report can help you narrow the range of possibilities even further. The same kind of logic (supported by appropriate research and communicated by good graphics) can help assess the importance of ethnic groups, age groups, or activities such as banking, real estate, medical services, or automobile assembly. Caution: when comparing various sources, remember that different kinds of data may have been gathered at different times, and things like the value of the dollar or the population of the area may have changed. This can make comparison tricky, but you don't need to worry about how to make that adjustment -- for this project, it is enough to indicate an awareness of the possible complication.

. Once you have identified what appear to be the bigjobs and major population groups in a local area, the next step is to look at the geographic conditions of the area in order to find out *why* those features are important. In some cases, the answer is obvious. For example, gold mining can be a basic activity only if the underlying rock has gold in it. Likewise, a number of industrial towns owe their origin to the presence of a waterfall, where a mill could get power in the era before steam engines, diesel motors, or electricity were invented.

Hidden inside of that last sentence is an important fact -- the reasons why something is in a particular place will not always be obvious at that place, or at this time, or at a particular scale of analysis. Most things have sound reasons for being where they are, but sometimes the reason is just historical accident, a political decision made somewhere else, the whim of an entrepreneur, or pure luck. To keep these chance factors from assuming too much importance in your grade, you will be evaluated on the basis of the accuracy of your research and the logic you use in trying to describe your area and to explain the features that you decide are basic to a local economy. In other words, your analysis can be "wrong" and still get full credit, if your logic is sound and your research methods are appropriate. At the same time, your grade can be low even if you have the "right" answer, if your research methods and data analysis are superficial or careless.

PRODUCT: A stapled set of four 8.5"X11" pages, to include:

1) **Cover Sheet:** with your name, ID, and study site.
2) **Index calculations table.** Include a filled-in copy of the attached data table, showing your raw data and calculations.
3) **Text and Graphics:** Write a one-page illustrated profile of the community, as if you were briefing a politician before a speech. Describe the population traits and bigjobs in the area. If a minority group has a different employment pattern, describe those differences. Most of your numerical data will be more clearly understood in graphic or chart form.
4) **Bibliography:** Clearly cite and evaluate your sources in your bibliography (whether or not they were helpful). Use the style sheet provided with the course materials.

Staple your packet in the upper left corner. Pay attention to the specifications on form and length; excess length will be penalized, not rewarded. Finally, please treat all library maps and documents with great care--many are not replaceable.

Review: In symbolic form, the index of local importance for employment in industry is:

$$\frac{\dfrac{\textit{number of people working in factories within the county being studied}}{\textit{total workforce within the county}}}{\dfrac{\textit{number of people working in factories within the reference area (state/nation)}}{\textit{total workforce in the state/nation}}}$$

You may find it convenient to set up a table such as the one below for your first analysis and then simplify it for your final report. Follow these steps for a comparison of a county with the state.

Column 1) Write the names of the economic activities or other features you are studying.

Column 2) Write the numbers that indicate the importance of those activities or features. In this discussion, "number" refers to the data you are comparing -- it may represent number of employees, dollars of income, tons of product, square footage of office space, percentage of elderly women, etc.

Column 3) Translate the numbers into percentages (if needed) by dividing the *number* in each activity (the individual figures in column 2) by the appropriate *total* in the county (the total population, in the case of an ethnic group, or the total number of employees, in the case of an occupational group). Write the *percentages* in column 3.

Column 4) Write the corresponding numbers for your reference area (the state or nation).

Column 5) Use the appropriate totals for the state or nation to figure percentages and list them in Column 5.

Column 6) Divide each percentage in column 3 by the corresponding percentage in column 5, and write the result in Column 6. This is what you are looking for: the *index of local importance* for the activity in the study area. If it is large (more than 2), the activity is probably basic; if it is less than one, the activity is almost surely non-basic.

1 Activity	2 number in county	3 percentage of county total	4 number in state	5 percentage of state total	6 Column 3 divided by Column 5

GUIDELINE and EXAMPLES FOR BIBLIOGRAPHY CITATION

Sources cited should be in a consistent style. Several good references for correct bibliography citation are: Chicago Manual of Style; Kate L. Turabian, Manual for Writers (Chicago: University of Chicago Press, 1983); William Strunk and E. B. White, The Elements of Style (New York: Macmillion Publishing Company, Inc., 1979).

How to cite a Book:
Borchert, John. 1987. America's Northern Heartland: An Economic and Historical Geography of the Upper Midwest. Minneapolis: University of Minnesota Press.

How to cite a Government Document:
US Bureau of the Census. 1980. New Hampshire: Educational characteristics for counties. Population Characteristics, Part C, Table 175, pp. 288.

Article or Chapter in a Book:
Whittlesey, Derwent. 1954. The regional concept and the regional method. In American Geography: Inventory and Prospect, eds., P. E. James and C.F. Jones, pp. 19-68. Syracuse: Syracuse University Press.

Article in a Journal:
Thrower, N.J.W. 1966 Original survey and land subdivision: A comparative study of the form and effect of contrasting cadastral surveys. Annals of the Association of American Geographers, Monograph n.4.

Jordan, T.G. and Kaups, M. 1987. Folk architecture in cultural and ecological context. Geographical Review 77:52-75.

Article in an Encyclopedia:
Encyclopedia Britannica. 1986 ed. "Wheat."

Map in an Atlas:
Thwaites, Reuben G., ed. 1969. Clark-Maximilian Sheet 11, September 13-23, 1804 in Original Journals of the Lewis and Clark Expedition, 1804-1806, Vol. 6. Arno Press: New York.

Oxford Regional Economic Atlas: The United States and Canada. 1986. Seasonal Temperature, p. 68-69. Oxford: Oxford University Press.

Map in a Text:
Jordan, Terry G. and Matti Kaups. 1989. Percentage of population reporting partial Indian ancestry, 1980, p. 89. The American Backwoods Frontier. Baltimore and London: The Hopkins University Press.

Topographic Map:
US Geological Survey 1:24000-7.5 minute series: San Francisco South, California, 1973.

A Good Annotation:
"Contained facts about climate and weather patterns of the U.S. I found temperature variations and rainfall charts helpful for understanding why wheat is grown in North Dakota. Even though some of the charts were confusing, this was a useful source for recognizing climatic differences between regions."

A Poor Annotation:
"Good source. Lots of information. I used this for most of my report."

Geography 3-101, Project 1
Interpreting topographic maps

Name _____
ID Number _____

Topographic map that shows your site _____
County of your site _____
State of your site _____

This form is the first page of your project; it will be separated and returned with comments and your grade. Attach a second copy of your project if you want critical comments about specific facts, graphics, and/or your writing style. The original project will not be returned; it may be re-examined if your total score for the course is within a few points of a higher grade.

Evaluation criteria for project 1 (to be filled in by grader):

1) **Site and map selection:** Did you find the appropriate topographic map, county soil survey, thematic maps, and/or other sources for a specific location? Does at least one of the illustrations in your project clearly show that location to the reader?

2) **Research:** Is your factual information accurate and reasonably complete? Did you focus on the major features that are typical of your chosen area, or did you fall into the "tourist trap" of commenting only on the exotic or unusual? Have you tried to explain *why* the features you describe are located where they are and how they may be related?

3) **Style:** Did you organize your description logically and present it in an attractive, interesting (minimal jargon), and grammatically correct way?

4) **Illustrations:** Did you prepare clear maps, tables, and diagrams to illustrate your points? Did you *integrate* these graphics with your text in an easy-to-follow way?

5) **Bibliography:** Did you cite sources properly? Did you make a brief evaluation of the content and usefulness of each source (even those you consulted but did not use)?

Geography 3-101, Project 2
Making and interpreting thematic maps

Name _____

ID Number _____

Topic of analysis _____

Evaluation criteria:

(Write your name, ID number, and the topic of your thematic map on the top of this page, and staple it to the front of your project; attach a second copy of your project if you want specific comments on it; the original will not be returned.)

1) **Main map construction:** Did you choose appropriate data to make a thematic map for analysis? Did you transform the data to show important points clearly? Does your map follow standard cartographic rules, as outlined in the blue manual?

2) **Research:** Did you choose a reasonable set of other maps or data for comparison, in order to help you interpret and explain the pattern shown on your map? Are your explanations logical and persuasive?

3) **Writing style:** Did you organize your description logically and present it in an attractive, interesting (jargon-free), and grammatically correct way?

4) **Illustrations:** Did you prepare clear illustrations to help make your points? Did you highlight important features on maps that you copied for comparison with your main map? Did you integrate illustrations with your text in an easy-to-follow way? Did you cite the data source for each map?

5) **Bibliography:** Did you cite sources properly? Did you make a brief evaluation of the content and usefulness of each source (even those you consulted but did not use)?

Geography 3-101, Project 3
Analyzing local importance

Name _____

ID Number _____

County of your profile _____

State of your profile _____

Evaluation criteria:

(Write your name, ID number, and the location (state and county) of your described site on the top of this page, and staple it to the front of your project; attach a second copy of the project if you want specific comments on it; the original will not be returned.)

1) **Site and data selection:** Did you choose an appropriate county or group of counties for your analysis? Did you choose appropriate data to use in comparing your study area with the state or the nation as a whole?

2) **Research:** Did you do the calculations accurately enough (and then round them off to reflect the inherent inaccuracies of census data and boundary divisions)? Are your explanations logical and persuasive? Did you consider how the pattern may be different for any significant minority population in the area?

3) **Style:** Did you organize your one-page profile logically and write your description in an interesting (jargon-free) and grammatically correct way?

4) **Illustrations:** Did you prepare clear graphs of your calculated index of local importance for various features, and/or other illustrations to help make your points? Did you position your graphics on your one-page profile in an easy-to-follow way?

5) **Bibliography:** Did you cite sources properly? Did you make a brief evaluation of the content and usefulness of each source (even those you consulted but did not use)?

TA GRADING CRITERIA

Grader's Evaluation Criteria, Winter Quarter 15 points

PROJECT 1 -- Images: Interpreting Topographic and Soil Maps

1. Site and Map selection: 2 points

1 point for appropriate topographic map
1 point for good site selection
-1 point if did not do one
-2 points if did neither

2. Research 5 points

3 points for description

+3 good, accurate description (major features typical of area)
+2 reasonable or adequate
+1 poor; information vague
0 irrelevant; guessing; not understanding of information

2 points for explanation

+1 plausible explanation, supported by supplemental material (maps,graphs, sketches)
+1 plausible, but speculative explanation, but without supporting materials, or irrelevant materials
0 guessed; irrelevant material

3. Style 3 points

+3 logical and systematic organization; interesting and grammatically correct
+2 adequate organization and presentation, with "fairly good" grammar
+1 poor organization and logic (haphazard, unsystematic, "uninteresting;" grammar fair to poor
0 disorganized and poor presentation

4. Illustrations 3 points

+3 clear maps, graphs, sketches, etc., following cartographic conventions; integrated illustrations into text (in explaining the presence of a particular phenomena)
+2 fair to good graphics; integrated material into text
+1 poor, unclear; partial integration of material with text
0 no appending of additional or supporting materials; nothing to integrate

5. Bibliography 2 points

+2 relevant sources, annotated; cited sources in text
+1 relevant sources, but no annotation; unsystematically cited in text
0 no bibliography

Grader's Evaluation Criteria, Winter Quarter 15 points

PROJECT 2 -- Making and Interpreting Thematic Maps

1. Main map construction 2 points

- ½ choose appropriate data, included map of raw #'s plus transformation/math and method of trans or math, of data if necessary
- ½ included raw data and brief description of source (in text, appendix, bibliography)
- ½ histogram
- ½ map showing pattern of chosen theme (following standard cartographic rules

2. Research 5 points

- 2 describe map pattern(s)
- 3 explain pattern/association/causal relationships by comparing them with 2 or 3 either map patterns, including factors to support suppositions (including appropriateness of comparison on variables), all maps about the same date.

3. Writing style 2 points

- 1 organized/logical sequence of presentation
- ½ grammar/spelling/punctuation/sentence structure, etc
- ½ length

4. Illustrations 4 points

- 2 ½ for 1 map or clear; student prepared maps/tables etc.
  - 1 for 2 maps that illustrate maps patterns (neat/clean)
  - 2 for 3 + maps graphics/follows standard cartographic rules, e.g. tones/colors, etc) important feature highlighted on photocopied maps
- 1 integration of text and illustrations/maps
- 1 citation of data; source/date on each map

5. Bibliography 2 points

- 1 properly cited necessary sources
- 1 brief evaluation of content /usefulness of each source

Grader's Evaluation Criteria, Winter Quarter 15 points

PROJECT 3 -- Analyzing the Local Importance of Various Activities

1. Site and Data Selection 2 points

½	county -stats or explained other choice	
1½	indices: at least 7	(-1)
	no more than 3 demo	(-½)
	spec categories justified in text	(-½)
	did not omit important categories	(-½)

2. Research 5 points

text:

1	general background	
2	findings (discussed big jobs, why no big jobs, demographics)	

data table:

1½	data -- provided all	-1 if could not check calculations
½	calculations	-½ if rounded data

3. Style 2 points

1	well-written and organized	
1	grammar/ spelling/ typos	-½ length

4. Illustration 4 points

2	graph	-½ if no legend; not clear
1	not integrated	
1	scores (graph and table)	

5. Bibliography 2 points

-½	incomplete data
-1	not annotated
-2	no bibliography

TA Evaluation Criteria, Spring Quarter 20 points

PROJECT 1 -- Images: Interpreting Topographic and Soil Maps

1. Site and Map selection 4 points

1 pt for appropriate topographic map U.S. or Canada; proper elevation point
1 pt for soil survey map (or explanation of why not included)
2 pts for other relevant maps / location indicated

2. Research 4 points

2 pts overall description of features on topographic map—should consider natural and manmade environments, elevation, place names - make sure at appropriate elevation for viewpoint
1 pt inclusion of supplementary information from other sources, especially the soil survey
1 pt discussion of observed phenomena/explanation for using information from all sources; relationships of feature

3. Style 4 points

2 pts well-organized and presented writing style
2 pts grammar, spelling, punctuation, typos (usually would not deduct more than 1 pt for each category)

4. Illustrations 4 points

2 pts maps clear, easy-to-read, for non tops/soil maps provide important info
1 pt maps integrated within text
1 pt sources, scale, legend (except topo) on maps

5. Bibliography 4 points

2 pts cited completely and in proper format
2 pts properly annotated

no bibliography	- 4 pts
not annotated	- 2 pts
poorly annotated	- 1 pt
poorly cited	- 1 pt

TA Evaluation Criteria, Spring Quarter 20 points

PROJECT 2 -- Making and Interpreting Thematic Maps

1. Main map construction 4 points

- 1 pt appropriate data
- 1 pt include raw numbers
- 1 pt transformed data (if necessary) and explained how and why date were transformed. If original data was already transformed, should still explain how and why
- 1 pt final map follows standard cartographic rules

2. Research 4 points

- 1 pt describe map patterns for all maps
- 1 pt compare map patterns
- 2 pts explain patterns and associations; discuss casual relationships

3. Writing style 4 points

- 2 pts well organized and presented; writing style
- 2 pts grammar, spelling, punctuation, typos

4. Illustrations 4 points

- 2 pts clear maps, show map patterns
- 1 pt integrated
- 1 pt source, legend, title

5. Bibliography 4 points

- 2 pts citations complete; proper format
- 2 pts properly annotated

Notes for TAs:

The maps do not have to be created by students if they can find maps already created

Students should choose a set of data either by state or province for the U.S. or Canada or by county, by state, or by province. It is best not to use metro data. Discourage the use of nominal data (e.g., NFL teams in major metro areas). Students should not compare maps at different levels -- for example a U.S. map by county to a U.S. map by state.

Students should turn in

1. copy of the original data table in an appendix
2. raw data map and histogram
3. map of transformed data
4. at least 2 maps of variables that can be compared to the student's map

Data Sources:
County and City Data Book
Statistical Abstracts

Text should be 1-2 pages.

APPENDIX C -- MIDQUARTER EVALUATIONS

Eighty-two percent of Winter and 70 percent of Spring Quarter students responded to the Midquarter questionnaire. Midquarter evaluations asked students to assess strengths and weakness of the courses and related materials. The areas used for this research were comments about the value of Project 1 and Project 2, the poster display for Project 2, and clarity of instructions. Project 3, Winter Quarter, was given to class after the midquarter evaluations. Based on student comments, minor changes were made to Project 3 Winter Quarter. Also, an ARGUS Activity was substituted for Project 3, Spring Quarter. Modifications to clarify TA responsibilities were made to instructions Spring Quarter.

Objective sections are tallied on the evaluation form. Subjective comments are summarized and incorporated within the text. Not every student commented on each aspect of the course. Although comments are individually tallied, some are multiple comments from a single student evaluation. In several instances, students responded negatively in all categories. Generally, most students responded that the course, projects, and related materials were beneficial to them.

Winter Quarter 1993 Summary of student comments:

Number of students	Number of Respondents: 141 (82% of class)
Project 1	Grading Procedure
7	harsh; picky; steep curve
2	projects graded different than explained
10	unclear what was expected by the grader
	Instructions
25	vague explanation; confusing; not enough instruction; poor TA help; inconsistent TA explanation
	Amount of work involved in completion of project
14	too much work; not enough points
7	time consuming
	General project comments
32	bad; not helpful; difficult
65	good; relevant; fun; interesting
Project 2	Grading procedure
4	unclear what was expected by the grader
	Instructions
18	vague explanations; confusing; not enough instruction; poor TA help
	Amount of work involved in completion of project
14	too much work; not enough points
7	time consuming
	General project comments
6	bad; not helpful; difficult
54	good; relevant; fun; interesting
13	better than Project 1

GEOGRAPHY COURSE MIDTERM EVALUATION FORM 3-101, W 1993

____ 1) How does this course fit into your academic program?
A) distribution requirement B) major requirement C) major elective D) free elective

____ 2) What is your standing in the university?
A) freshman B) sophomore C) junior D) senior E) graduate F) audit G) other

---

Compare how this course is being run with what you think is an ideal course of this kind:

N = 141	Too Much		About Right		Too Little	Comments
Required reading material	3	14	100	14	—	
Use of visual aids, slides	10	22	105	4	—	
Use of banjo, role-playing, etc.	11	21	83	18	8	
Use of individual projects	30	37	60	10	1	
Emphasis on theoretical as opposed to practical	4	25	90	11	1	
Class time spent on lecture	4	12	117	5	1	
Class time spent on questions	—	1	48	62	28	
Required student work	25	41	70	2	—	

Compare exercise JX and D with similar take-home exercises in other courses:

	Low 10%	20%	Middle 40%	20%	Top 10%	Comments
Clarity of instructions	11	30	33	37	21	
Relation to lecture	10	35	39	35	15	
Value in understanding principles of population and environment	5	18	42	50	16	

Additional comments or suggestions:

Compare this course with other courses you have taken at the same level:

	Low 10%	20%	Middle 40%	20%	Top 10%	Comments
Your prior interest in subject	12	18	42	39	23	
Your interest in subject now	5	12	35	45	39	
Presentation of lecture material	2	6	24	41	55	
Availability of help	13	16	39	35	14	
Organization of the text	16	27	37	39	14	
Readability/interest of the text	14	26	39	30	15	
Clarity of explanations in the text	10	21	40	50	11	

Comment about the value of:

the placenames quiz: _____

the topographic map display in the Map Library: _____

(have you used it? Y N) _____

project 1 on topographic maps: _____

project 2 on thematic maps: _____

the display for project 2: _____

What is your current opinion about the actual political orientation of the instructor?

Extremely conservative 4 5 25 40 32 5 Extremely liberal

Given probable university budget cuts and curriculum restructuring, this course may be redesigned (or perhaps even dropped) within the next few years. At one end of a range of options is a reading-and-lecture course with machine-graded tests. At the other end is a discussion seminar with individual projects. We have to try to find the best balance. To help us plan, please tell us which of the following aspects of the course you believe should be changed:

	More	Same	Less	Comment
# of lectures per week	10	123	6	
# of TA office hours	32	78	11	
# of short exercises	40	73	27	
# of map-library projects	6	8	76	
# of topics covered in library displays	27	87	13	
# of topics covered in daily handouts	26	92	19	
# of topics covered in reading	29	80	31	
# of topics covered in lecture	18	93	23	
# of points determined by computer grading	41	61	24	

Would you prefer if this course had formal recitation sections with small groups of students under the direction of a Teaching Assistant? Why or why not?

Please comment on the type, quantity, and quality of TA help that you received. Be as specific as possible about what kinds of help were useful or not.

Do you have any other suggestions for improvements in course quality or efficiency?

Spring Quarter 1993: **Summary of student comments:**
Number of Respondents: 152 (70 % of class)

Number of students	
Project 1	Grading Procedure
12	harsh; picky; steep curve
2	projects graded different than explained
11	unclear what was expected by the grader
	Instructions
24	vague explanation; confusing; not enough instruction; poor TA help; inconsistent TA explanation
	Amount of work involved in completion of project
7	too much work; not enough points
10	time consuming
	General project comments
5	bad; not helpful; difficult
61	good; relevant; fun; interesting
Project 2	Grading procedure
6	harsh; picky; steep curve
7	projects graded different than explained
6	unclear what was expected by the grader
	Instructions
9	vague explanations; confusing; not enough instruction; poor TA help; inconsistent TA explanation
	Amount of work involved in completion of project
5	too much work; hard; not enough points
10	time consuming
	General project comments
12	bad; not helpful; difficult
59	good; relevant; fun; interesting
5	better than Project 1

Again, most responses were positive. Some students were displeased with the mechanics but not with the content of the course.

GEOGRAPHY COURSE MIDTERM EVALUATION FORM 3-101. SPRING 1993

_____ 1) How does this course fit into your academic program?
A) distribution requirement B) major requirement C) major elective D) free elective

_____ 2) What is your standing in the university?
A) freshman B) sophomore C) junior D) senior E) graduate F) audit G) other

---

Compare how this course is being run with what you think is an ideal course of this kind:

N = 152

	Too Much		About Right		Too Little	Comments
Required reading material	3	5	115	6	6	
Use of visual aids, slides	6	27	113	2	1	
Use of banjo, role-playing, etc.	5	24	96	15	9	
Use of individual projects	17	40	97	2	1	
Emphasis on theoretical as opposed to practical	2	22	112	5	2	
Class time spent on lecture	2	16	119	2	1	
Class time spent on questions	-	10	80	51	18	
Required student work	16	41	90	2	-	

Compare exercise D and FX with similar take-home exercises in other courses:

	Low 10%	20%	Middle 40%	20%	Top 10%	Comments
Clarity of instructions	10	26	45	43	20	
Relation to lecture	2	32	50	40	18	
Value in understanding principles of population and environment	4	14	54	55	18	

Additional comments or suggestions:

Compare this course with other courses you have taken at the same level:

	Low 10%	20%	Middle 40%	20%	Top 10%	Comments
Your prior interest in subject	9	26	60	33	18	
Your interest in subject now	2	9	40	61	35	
Presentation of lecture material	-	7	35	41	64	
Availability of help	9	23	48	40	19	
Organization of the text	9	22	57	45	12	
Readability/interest of the text	7	21	55	48	16	
Clarity of explanations in the text	4	14	52	56	18	

Comment about the value of:

the placenames quiz: _____

the topographic map display in the Map Library: _____

(have you used it? Y N) _____

project 1 on topographic maps: _____

project 2 on thematic maps: _____

the display for project 2: _____

What is your current opinion about the actual political orientation of the instructor?

Extremely conservative 3 13 32 46 47 13 Extremely liberal

Given probable university budget cuts and curriculum restructuring, this course may be redesigned (or perhaps even dropped) within the next few years. At one end of a range of options is a reading-and-lecture course with machine-graded tests. At the other end is a discussion seminar with individual projects. We have to try to find the best balance. To help us plan, please tell us which of the following aspects of the course you believe should be changed:

	More	Same	Less	Comment
# of lectures per week	5	126	4	
# of TA office hours	32	83	18	
# of short exercises	23	82	30	
# of map-library projects	6	78	52	
# of topics covered in library displays	24	80	21	
# of topics covered in daily handouts	21	99	15	
# of topics covered in reading	34	96	14	
# of topics covered in lecture	17	104	16	
# of points determined by computer grading	31	74	24	

Would you prefer if this course had formal recitation sections with small groups of students under the direction of a Teaching Assistant? Why or why not?

Please comment on the type, quantity, and quality of TA help that you received. Be as specific as possible about what kinds of help were useful or not.

Do you have any other suggestions for improvements in course quality or efficiency?

Comments on Poster Display

Winter Quarter

Number of students n = 141	
67	excellent, very good, very helpful
10	fair
10	not useful, did not use
6	did not see display
4	confusing

Spring Quarter

Number of students n = 152	
48	excellent, very good, very helpful
2	fair
11	not useful; did not use
6	did not see display
6	confusing

APPENDIX D—Teaching Assistant Supplemental Material

TA responsibilities, GEOG 3-101

This course satisfies the CLA Group C and Cultural Pluralism requirements. With 200-400 students, bureaucracy must run smoothly, with minimal chance for students to play it's-OK-with-mommy-if-it's OK-with-you games between instructor and TAs. Moreover, grading must be efficient as well as equitable -- we do not have the luxury of allocating time in units of hours per student. As a starting point, here is a list of tasks and estimated amounts of time that they should require:

1) Attend lectures (22 hours per TA) -- set up projector and microphone, distribute handouts, collect and file spare handouts and make copies available in a convenient place, listen to lecture, reflect on it, observe and report student reaction, answer questions.
2) Consult in map library (60 hours per TA, 6 hours per week) -- handle questions from students, research negotiated topics when not occupied with students.
3) Set up grading spreadsheet (4 hours for one TA) -- leave spaces for place name quiz, midterm matching test, midterm essay test, four projects, final matching test, final essay test, total points, flag for those within range of higher grade, re-grade score, final grade.
4) Prepare place name quiz (4 hours for one TA) -- make 1 form/50 students by start of second week.
5) Administer place name quiz (1 hour for 3 TAs) -- have students write names on back (for easy returning); announce that if people find a question

ambiguous, they should put an asterisk by their answer and explain their assumptions on back of paper.

6) Grade place name quiz (3 hours per TA, 3 minutes per student) -- grade quiz within a week, tabulate results -- grading scale 18-20 correct, 20 points; 7 gets 15, 16 gets 10, 15 gets 5, less gets 0.
7) Prepare midterm exam (average 4 hours per TA) -- follow examples from previous year, have everyone start writing questions soon (SOON); assign one or two people to prepare multiple forms by rearranging foils and substituting "east" for "west," etc., make key immediately. Aim for 15 matching, 21 multiple-choice, and 6 short essay questions (2 pages of "choose 3 out of 4"); get forms for machine grading of objective part; aim to have masters ready a full week ahead of exam day, and print so essays can be separated easily for grading (have students put name on every page).
8) Administer midterm (1 hour per TA); same announce as for quiz.
9) Grade midterm essays (10 hours per TA, 12 minutes per student) -- grade essay questions on a three-point scale (3=above, 2=average, 1=below but tried, 0=hopeless, an occasional 4 or 5 for truly outstanding answers (say 8-10 fours per hundred students, maybe one or two fives).
10) Grade projects (50 hours per TA, 3 major and 3 minor projects per student at 12 minutes per project and 8 minutes per minor project) -- make comments on grading form, and in grade book for those where the project may have been plagiarized, misunderstood, or otherwise not a valid indicator of course performance.

11) Comment on projects (6 hours per TA, 1/5 of the students, 3 projects, 10 minutes per student) -- make written or oral comments for those who specifically request them and provide copies of their projects for comments.
12) Prepare final exam (5 hours per TA) -- about 60 matching and multiple choice and 8 short essay questions (out of 10); 70 percent of essays on material since midterm, matching and multiple choice questions should range across entire content.
13) Administer final exam (2 hours per TA).
14) Grade final exam (15 hours per TA, 18 minutes per student) -- note "unusual" performance.
15) Tabulate grades (4 hours per TA, 3 minutes per student) -- add and check addition.
16) Make master curve and note all students (except S/N) within five or so points of higher grades, recheck their projects and tests; fill in grade report (8 hours per TA).

190 hours total, which leaves about 13% for contingencies, class preparation, and other miscellanies. Some of that will be needed for extra Map Library hours around due dates for projects; some will be used for consultation in emergency cases; and some, if available, should go to the generation of materials (e.g. test questions, grading systems, displays, handouts) for this and future classes.

EVALUATING STUDENTS' ABILITY TO INTEGRATE WRITTEN AND VISUAL COMMUNICATION

Criteria will be developed for assessing the writing skills of students and the applicability of written assignments in an introductory level geography course. The course projects are intended to develop an understanding of graphic text, along with the ability to read, analyze, and then to explain map patterns through clear concise written language. This project has two elements of research. The first element is to determine ways to best present project instructions so that students clearly understand how to incorporate spatial ideas and graphical methods into their written arguments. The second element is to determine and measure the degree to which students are able to integrate written and graphic text.

We expect students to be able to recognize differences between places, explain why such differences exist, make comparisons between places, and to use their newly acquired knowledge and skills to solve problems and draw conclusions. Because of the spatial nature of geography, we expect students to use graphics to show patterns and spatial distribution of their data and interpretations.

Given a specific set of instructions, students should be able to understand a vocabulary of graphic terms, support graphic analysis through written text, and effectively communicate ideas by integrating text and cartographic interpretations.

A questionnaire will be given the first week of the quarter to collect data on class composition (age, sex, class level) and previous geography and writing courses. The tentative order of project instructions is:

Project 1. Written instructions only ("due on Friday").

This will be used as a base for evaluating the effects of changes.

Project 2. Graphic display: poster display showing examples of project along with specific instructions on how to integrate graphic and text (also samples of previous projects).

Project 3. Written instructions with formal classroom (verbal) explanation. This third project also will reflect modifications to instructions based on student performance on Projects 1 and 2

Three types of analysis will be used to appraise student performance.

1) An evaluation form used by the Teaching Assistants to assess individual student work in five specific areas: research, writing style, selection and description of analytical methods, integration of maps and other graphic devices with written text, and bibliographic skill. Students will receive a copy of the evaluation form for each of their projects.
2) Teaching Assistants will track a group of students throughout the quarter. These students will be randomly selected and their work will be monitored to see how their projects change in response to different methods of instructions.
3) As part of the midterm and final, students will be asked to respond to a few questions on each of the projects.

CLASSROOM PROCEDURES: Winter 1993

A. Subject to change and what works best for TA's

B. Past Procedures:

1. One person is responsible for specific tasks such as projector, microphone, slides, daily handouts (matched to lectures; photocopy and distribution) answering questions, general coordination, overall data grade recording and record keeping.
2. Check with Gersmehl 15-20 min. before class for last minute changes or for additional materials (props) to be carried to class.
3. Have reminders, announcements, or changes that pertain to projects, tests,, office hours, tours, bureaucracy, etc., ready for Gersmehl at the beginning of each lecture (any thing of major concern, talk with him prior to lecture).
4. Returning of projects and test scores
    i. TA's in classroom corner with alphabetical list
    ii. Previous method (placing papers in the front of class room) was chaotic.
5. Nit-picky, but important: Check doors (especially center)

MISCELLANEOUS

A Printing of materials, i.e., additional handouts, map quiz and tests, by office staff with minimum three days notice (if asked nicely, they might be able to do it sooner).

B. Office hours -- 6 hours per week per TA

some modification and additional hours when projects due, (e.g. Sat., gov.doc.; Sat., map lib)

C. Grading of tests and projects standard criteria for essays each project graded by

single TA.

D. Prepare lecture / explanation of a project, either for presentation in class or in ad hoc sessions.

F. Possible extra help or ad hoc session(s) for further project help / explanation (maybe one or two additional hours--scheduled a day or two after formal explanation or after project has been handed out).

G. Set out annotated topographic map series that corresponds to lectures.

H. Keep a record of specific problems, gains, questions of a tracked group of students; keep a record of their progress following provided guideline.

PROJECT SUMMARIES:

A. Three major projects (15 pts. ea.); three minor projects (5 pts. ea)

** projects are subject to change ** (testing of some ARGUS materials)

B. Set time frame for map quiz, mid-term, and projects

Suggestion: major project handed out on Friday, and due in two weeks; minor projects handed out every two weeks

C. Past Projects:

Project 1: Images: Interpreting Topographic and Soil Maps

Describe major landscape features, and explain why they occur in a particular area, and how they might be related to each other.

Resources: suggest that they do not check out soil surveys, census books, and other limited documents

Map library tour: groups of 20

Map librarians should have a copy of projects and due dates; TA office hours open schedule--not mandatory, but highly recommended.

Project 2: Making and Interpreting Thematic Maps, geographic patterns and explain geographic patterns, brief description of data source and data transformation map series of factors that are related to subject of (your) map.

Project 3: Analyzing the Local Importance of Various Activities

(LQ), distinguish between basic/non-basic economic activity, describe how people in a specific area make a living, compare with general pattern: county to state, or state to nation.

PROJECT GRADING CRITERIA AND GUIDELINES:

General grading procedure:

Use evaluation form and follow five step criteria: topic or site selection, research, style, illustrations, and bibliography. Some general criteria apply to all projects. Topic or map selection and illustrations have specific criteria for evaluation. The criteria are to be used as guidelines, not as the ultimate definition for grading. Individual TAs can and should modify some of these criteria depending upon the student, lecture explanation, and time constraints.

Each section is worth 3 points. The following are suggestions for evaluation:

General criteria:

points	
0	did not do the assigned task
1	poor choice; faulty logic; little effort
2	adequate to good; moderate effort; some errors ok.
3	good; logical argument and conclusion;

A few 4s can be given for outstanding effort; presentation of package (style); exceptional graphics or research.

Sections:

Research

0 did not use other sources to support premise
1 minimal research; weak argument; some illogical conclusions
2 adequate data; logical argument
3 strong data that support findings and conclusions

Style:

0 exceptionally disorganized; poor grammar, spelling
1 minimal organization; some grammar errors
2 adequate organization; adequate overall presentation; good grammar
3 well organized; good overall presentation of materials; good to exceptional grammar

Bibliography:

0 did not include a bibliography
1 not enough sources for topic and research; or not annotated
2 adequate sources, but not annotated
3 relevant sources with annotation

SPECIFIC GRADING CRITERIA FOR PROJECTS:

Project 1: Interpreting Topographic and Soil Maps

Topic selection
points
0 did not do the assigned task;
1 inappropriate selection;
2 fair to good topic identification and selection; adequate research
3 good to excellent; met criteria

Illustration
points
0 no graphics or illustrations
1 minimal graphics or illustrations; vague; misuse of color or pattern; improper graphs
2 several graphics or illustrations that adequately show data
3 effective graphics; followed cartographic conventions

Project 2: Making and Interpreting Thematic Maps

Topic selection
points
0 did not do the assigned task;
1 inappropriate data selection; no data transformation
2 fair to good selection; adequate research (data trans.)
3 good to excellent; series of maps that show pattern

Illustration
points
0 no graphics or illustrations
1 minimal graphics; vague maps; misuse of color or pattern; improper graphs
2 several graphics or illustrations that adequately show data
3 effective graphics; logical sequence; followed cartographic conventions

Project 3: Analyzing the Local Importance of Various Activities

Topic selection
points
0 did not do the assigned task;
1 less than 3 categories for analysis
2 more than 3 categories, identified basic activity(ies)
3 good to excellent; identified and explained basic activity(ies)

Illustration
points
0 no graphics or illustrations (LQ)
1 minimal graphics or illustrations; improper graphs
2 several graphics or illustrations that adequately show relationship of variables within chosen area
3 effective graphics that communicate community profile; one page text with graphics

EVALUATION CRITERIA

PROJECT 1: Images: Interpreting Topographic and Soil Maps

Site and map selection
- appropriate map(s) for visual interpretation
- include a photo copy of chosen map fragment (proximal map)
- use of color to enhance map
- additional maps (redrawn or enhanced photocopies) to support research

Research
- factual information, supported by maps and bibliography
- observation of what is actually "there"
- description of features
- explanation of why features are located where they are
- relationships between features
- rational conclusions from factual information

Style
- organized, logical sequence of presentation
- neat "package" (no loose leaf with tattered edges!)
- grammatically correct: sentence structure, spelling, etc
- transitions between sections
- clarity and level of interest
- page length of report

Illustrations (evaluate content and mechanics)
- clear maps, tables, and diagrams (interpretation)
- neat, clean illustrations
- use of accepted cartographic techniques (manuals)
- integrate illustrations with text
  - (ex: area description followed by a map of showing location; description of physical features followed by a topographic, elevation, or landform map)

Bibliography
- properly cited sources
- several sources with annotation
- annotation explains source content and usefulness

EVALUATION CRITERIA

PROJECT 2: Making and Interpreting Thematic Maps

Main map construction
- choose appropriate data for map analysis
- transform data (if necessary)
- follow standard cartographic rules
- map(s) show a pattern

Research
- explain patterns and associations
- compare other maps and data with similar patterns to support suppositions
- explain causal relationships

Writing style
- organized, logical sequences of maps
- neat "package" (no loose leaf with tattered edges!)
- grammatically correct: sentence structure, spelling, etc
- clarity of presentation

Illustrations (evaluate content and mechanics)
- clear maps, tables that illustrate map pattern(s)
- neat, clean graphics
- use of accepted cartographic techniques (manuals)
- integrate illustrations with text
- cite data source of each map (on map)

Bibliography
- properly cited sources
- several sources with annotation
- annotation explains source content and usefulness

EVALUATION CRITERIA

PROJECT 3: Analyzing the Local Importance of Various Activities (LQ)

Site and data selection
- appropriate county or groups of counties
- appropriate data for comparison
- adequate number of variables
- categories representative of chosen area (5 to 10, depending upon topic)

Research
- accurate calculations (LQ)
- identify basic activities
- interpret and explain index (extremes, stability, minority patterns)
- logical explanations using standard theories
- rational conclusions from index

Style
- organized, logical sequence of presentation
- neat "package" (no loose leaf with tattered edges!)
- grammatically correct: sentence structure, spelling, etc
- clarity and level of interest

Illustrations (evaluate content and mechanics)
- clear tables, charts, or graphs
- neat, clean illustrations
- effective integration of illustrations with text
- one page profile report

Bibliography
- properly cited sources
- several sources with annotation
- annotation explains source content and usefulness

HINTS TO HELP STUDENTS WITH PROJECTS:

1. Each TA should be familiar with all projects and their criteria so that he/she can answer questions.

2. Encourage students to:
   read manual on map interpretation
   read manual on thematic maps
   skim text and atlas for map examples
   read vignettes for example of graphic and text integration

3. Remind students about areas where most points are lost:
   a. Bibliography: did not provide or annotate sources
   b. No graphics or illustrations
   c. Graphics are sloppy and difficult to read
   d. Graphics do not follow standard conventions
   e. Poor grammar; misspelled words, etc.
   f. Overall package or presentation is disjointed and messy
   g. Text and graphics are not integrated (ex: text first, then maps as an appendix)
   h. Late projects: (policy: 2 pts off for every class day late)

TA PREPARATION FOR GRADING:

1. Read the project
   (be sure that you understand what is being asked and that you can explain information to students)
   Review previous projects; have examples available for students who are having great difficulty grasping assignment

2. Read the manuals on topographic map interpretation and thematic mapping. The students are expected to follow these guidelines; you are expected to know what the guidelines are so that you can better evaluate student performance.

3. Skim through the text; be familiar with pages that apply to the projects

4. Be familiar with resources associated with this course:
   Government documents -- various census material, soil surveys
   Map Library -- topographic map series, map selection, County and City Census
   General library -- different library sources appropriate to topic
   Other sources -- Data Resource Center, Humphrey Institute; CURA; Agriculture and Engineering library; etc.

Spring 1993

CLASSROOM PROCEDURES:

A. Subject to change and what works best for TA's

B. Past Procedures:
   1. One person is responsible for a specific task such as projector, microphone, slides, daily handouts (matched to lectures; photocopy and distribution) answering questions, general coordination, overall data grade recording and record keeping. (Note: TA's for Winter Quarter chose not to have a "Head TA." They rotated daily class responsibilities.)

   2. Joint compilation of mid-quarter and final, but one person responsible for final product (typing and multiple versions)

   3. Check with Gersmehl 15-20 min. before class for slides, last minute changes, or for additional materials (props) to be carried to class

   4. Have reminders, announcements, or changes that pertain to projects, tests, office hours, tours, bureaucracy, etc., ready for Gersmehl at the beginning of each lecture (anything of major concern, talk with him prior to lecture)

   6. Returning of projects and test scores (????)

   7. Nit-picky, but important: Check doors (especially center)

MISCELLANEOUS

A. Printing of materials, i.e., additional handouts, map quiz and tests, by office staff with minimum three days notice (if asked nicely, they might be able to do it sooner)

B. Set time frame for map quiz, mid-term, and projects

C. Schedule map library tours

D. Prepare place name quiz first week (ready to take second week); write two or three test questions after each lecture (this can include materials from text, activities, and annotated topographic maps)

E. Office hours -- 6 hours per week per TA -- (schedule hours for morning, afternoon, and evening; some modification and additional hours when projects are due, (e.g. Sat. gov.doc.; Sat. map lib.)

F. Grading of tests and projects
   standard criteria for essays
   each project graded by single TA

G. Prepare "mini-lecture" or project explanation for ad hoc sessions in Map Library

H. Set out annotated topographic map series that corresponds to lectures

I. Keep a record of specific problems, gains, questions of a tracked group of students; keep a record of their progress

PROJECTS: Two major projects (20 pts. ea.); Four minor projects (5 pts. ea)

Project 1: Images: Interpreting Topographic and Soil Maps
describe major landscape features
explain why they occur in a particular area
how they might be related to each other

Project 2: Making and Interpreting Thematic Maps
geographic patterns
describe and explain geographic patterns
brief description of data source and data transformation
map series of factors that are related to subject of map

EVALUATION CRITERIA GUIDELINES:

Use evaluation form and follow five step criteria. The criteria are to be used as guidelines, not as the ultimate definition for grading. Individual TAs can modify some of these criteria depending upon lecture explanation and time constraints, but please check with P. Gersmehl or C. Lockwood before making changes. Please do not change point distribution!!

PROJECT 1 Images: Interpreting Topographic and Soil Maps

Site and map selection (4 pts)
- appropriate site (adequate visual perspective)
- appropriate map(s) for visual interpretation
- a photocopy of chosen map fragment (proximal map)
- use of color to enhance map
- additional maps (redrawn or enhanced photocopies) to support research

Research (4 pts)
- factual information, supported by maps and bibliography
- observation of what is actually "there"
- description of features
- explanation of why features are located where they are
- relationships between features
- rational conclusions from factual information

Style (4 pts)
- organized, logical sequence of presentation
- neat "package" (no loose leaf with tattered edges!)
- grammatically correct: structure, spelling, etc.
- transitions between sections
- clarity and level of interest
- page length of report

Illustrations (4 pts) (evaluate content and mechanics)
- clear maps, tables, and diagrams (interpretation)
- neat, clean illustrations
- use of accepted cartographic techniques (manuals)
- integrate illustrations with text
- maps support explanations (relevant to topic)

Bibliography (4 pts)
- properly cited sources
- several sources with annotation
- annotation explains source content and usefulness

PROJECT 2: Making and Interpreting Thematic Maps

Main map construction (4 pts)
- choose appropriate data for map analysis
- transform data, (if necessary)
- source of information on map
- histogram
- follow standard cartographic rules
- map(s) show a pattern

Research (4 pts)
- describe map patterns
- explain patterns and associations
- compare other maps and data with similar patterns to support suppositions
- explain causal relationships

Writing style (4 pts)
- organized, logical sequence of presentation
- neat "package" (no loose leaf with tattered edges!)
- grammatically correct: structure, spelling, etc.
- transitions between sections
- clarity and level of interest
- page length of report

Illustrations (4 pts) (evaluate content and mechanics)
- clear maps, tables that illustrate map pattern(s)
- neat, clean graphics
- use of accepted cartographic techniques (manuals)
- integrate illustrations with text
- source(s) cited on graphics

Bibliography (4 pts)
- properly cited sources
- several sources with annotation
- annotation explains source content and usefulness content and usefulness

Guideline and Grading Criteria

ARGUS Activity "I" An Index of Local Importance (ILI) Substituted for Project 3

Activity principles
to appreciate the importance of and index for comparing dissimilar variables
to adjust raw numbers for comparison of places of dissimilar sizes

We expect students to:
1) adjust or transform numerical data into percentages or ratios;
2) construct a data table and calculate an index of local importance (ILI);
3) use an ILI to compare economic and social variables, the local to national level;
4) explain connections between the economy and migration;
5) understand that perceptions, culture traits, and ethnic differences influence migration and resource exploitation

Helpful hints for students:
1) remind students that the purpose of this activity is to find a way to compare places of different size in a way that is meaningful to individual people in each area,
2) focus on traits that are associated with community growth or decline,
3) the index is a comparison to a national average of "one."

Emphasis is on the students' ability to evaluate the ILI for places at two scales: select national cities with the national average, and regional cities to the national average. Give points for analysis of place or city chosen. Check for logic of argument and choice of viable programs for that city or place.

Grading criteria: Total: 5 points

Response Sheet 1: 2 points

½ pt. for percent change
½ pt. for ILI energy-towns
1 pt. for short essay on population change

Response Sheet 2: 3 points

½ pt. for ILI Cal Cities
¼ pt. for cities—day care:
Compton; Lynwood = Ethnicity
Fontana; Victorville = pop increase
¼ pt. for cities - older
1 pt. for short essay—house value
1 pt. summary statement
Palm Springs; Beverly Hills