EXPLORATIONS INTO DESIGN AND CONTENT FOR A NEW PROVINCIAL ATLAS OF BRITISH COLUMBIA INCORPORATING DIGITAL TECHNOLOGY AND A USER SURVEY

by

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ABSTRACT

Canada has a high reputation for its publication of quality provincial atlases. To date, all have been independently produced, with little reference to the ultimate user. In addition, recent advances in cartographic knowledge and techniques, resulting from the application of computer technology to the discipline, permit a far wider range of options for atlas content and design than previously available.

Detailed study of the thematic content and organisation of existing Canadian provincial atlases showed that most follow traditional formats. Contents tend to mirror the national atlas rather than to complement it, but with tendency towards greater dominance of primary industrial topics.

The application of content analysis methodology to reviews of provincial atlases revealed considerable agreement between reviewers on acceptable content and design parameters. Reviewers admire an atlas which reflects the unique character of the province, but find poor organisation of content a major cause for concern.

An atlas user survey showed a solid base of atlas ownership within the general population, with higher interest among specialised groups with a background in geography. General world atlases were found to be the most popular type, used most often for their topographic component in locating places, being far more rarely consulted for their thematic contents. The survey also revealed the degree of interest in general and specific topics for an atlas of British Columbia, with tourism, physical, and transportation themes dominating.

An innovative aspect of the survey gave the first indications of user opinion of the application of computer technology to the production and use of atlases. Most users were enthusiastic, despite reservations about the graphic quality of output presently available. However, only a minority are willing to relinquish the proven beauty of an atlas in traditional printed bound format.

A literature review revealed aspects of the rapidly expanding field of computer mapping software products which could be valuable in future production of a digital thematic atlas for British Columbia. The entire study should provide useful background material when planning a new provincial atlas, whether in traditional analog or digital format.

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CHAPTER ONE

INTRODUCTION

1.1 GENERAL INTRODUCTION

Research summarized in this thesis concerns the content and design of an atlas. All atlases can be classified into "world" or "regional", according to areal coverage, and "general" or "specific", according to range of topical coverage (Balchin, 1960). This study focuses in particular on general regional atlases, using as the definition of a region the political unit of a province (Canada) or state (U.S.A., Australia), and hereafter referred to as a "provincial atlas".

The lineage of the provincial atlas can be traced back to Ortelius' Theatrum Orbis Terrarum of 1570, the first independently published world reference atlas, which set the standard for atlas style, format and content for centuries (Alonso, 1968; Skelton, 1960). This world reference atlas was followed within a decade by the first regional atlases, in the form of national atlases. Nicholson (1952) notes that Saxton's atlas of England and Wales was one of the first of these (Nicholson, 1952), followed by Mercator's atlases published for a number of European countries (Skelton, 1960). World and regional atlases produced throughout the following 300 years maintained location of topographic features as their primary concern. During the 19th century, in parallel with tremendous scientific advances and accompanying accumulation of thematic data, special atlases of limited thematic content began to appear. However, it was only at the end of that century, with the publication of the first Atlas of Finland in 1899 and the first Atlas of Canada in 1906, that thematic information began to dominate in general atlases, ushering in the era of the modern national atlas.

General recommendations for specifications for modern national atlas content and design did not appear until 1960 with the publication of Atlas Nationaux, edited by K.A. Salichtchev under the auspices of the International Geographical Union (I.G.U.) (originally published in French but later made available in English (Fremlin and Sebert, 1972)). Detailed recommendations for format, structure and map content for national atlases were presented, based on 29 national atlases in existence at the time (these recommendations are examined in some detail in Chapter Two of this study).

Salichtchev stressed the atlas's important educational and cultural role, both to the country's citizens, and as a "cultural ambassador". He stated that "a national atlas should have as broad and complete a content as possible, contain maps of a high scientific value, be capable of serving practical purposes and be accessible to any educated reader" (Fremlin and Sebert, 1972; p.30).

The recommendations can apply equally to atlases at the provincial scale, where the province can be perceived as a nation within a nation. Nicholson (1970) has noted this connection, while at the same time agreeing with Castner (1976) that content of a provincial atlas should be designed to complement rather than to duplicate its national counterpart.

Two issues merit a re-examination of traditional procedures for atlas production. They are: first, the impact of the digital revolution in cartography; and second, the increasing trend of including the consumer's view in marketing strategies.

The rapid development of computer-based mapping technologies in the 1980s has radically altered methods of cartographic information storage, production and reproduction. Digital mapping has now advanced to the point where cartographers are no longer constrained by the limitations of the traditional paper map format. The potential now exists for digital maps to be displayed not only in paper and static computer screen format but also in dynamic and interactive formats, using a variety of electronic distribution media. As yet, there has been relatively little published interest in applying the new technologies to the production of atlases.

To date, content and design decisions for provincial and other atlases have been made exclusively by their editors, usually geographers and cartographers, in conjunction with the publisher. There has been little or no direct consultation with potential users. This implies that atlases may be produced that do not meet the expectations of the user. For instance, despite the fact that the Rand McNally Road Atlas is the best selling annual paperback published in the U.S. (McNally, 1987), research by Petchenik (1985; p.48) has shown that this format does not represent the user's preferred information source: Over half the drivers surveyed would prefer written instructions or itineraries to maps.

Atlas editors and cartographers thus have failed in general to research and critically evaluate the needs and expectations of atlas users. Personal communications have revealed that atlas editors themselves agree with this criticism. In addition,

although general principles have been established for design and content specifications for national atlases, they are not always followed, and no equivalent guidelines exist for general atlases of smaller political units such as provinces.

1.2 OVERALL RESEARCH OBJECTIVES

With the current rapid changes in society and its spatial structure, and with vast potential in the use of digital data bases presently being assembled by both federal and provincial governments, the aim of the research presented here is to study atlas content and design in an attempt to make informed recommendations for a new provincial atlas.

The province of British Columbia is used as a case study, for the following reasons. First, the province has already produced two well respected atlases, the 1956 Atlas of Resources for British Columbia, and the 1979 Atlas of British Columbia: People, Environment and Resource Use. Updating of data is in order, as well as reconsideration of themes to be included. Second, atlas production need no longer be restricted to the paper book format. The research presented here could thus yield valuable initial findings to aid in an initiative towards selection of a new publication format for a new atlas for British Columbia. Third, the research has been undertaken at the University of Victoria which is located in British Columbia, making this province a logical choice.

The research aims to address a number of issues. First, it tries to ascertain the criteria used in producing previously published provincial atlases, and to discover what atlas critics look for when evaluating the merits of a published atlas. Second, it aims to identify the concerns and interests of atlas users. Third, the study seeks to conduct a preliminary conceptual investigation of what new atlas production and reproduction technologies are available. The ultimate goal of the research is to use the knowledge obtained to assist in decision-making regarding content, design and publication of a new provincial atlas for British Columbia.

The research conducted, therefore, seeks answers to the following four questions:

1. Is it possible to identify consensus concerning general parameters for content and design of provincial atlases from existing atlases and from expert reviews of them?

2. What are atlas users' awareness and understanding of atlases in general, and what are their expectations of a provincial atlas, given changes in publication and distribution technologies?
3. What new media are available to publish and distribute such an atlas?
4. How can the knowledge obtained from Questions 1 to 3 help in the design of a new provincial atlas for British Columbia?

To answer these questions, contents of existing provincial atlases were examined in detail and reviews of provincial and state atlases analyzed. An extensive atlas user survey was undertaken to establish user expectations, and a literature search conducted to discover new production and distribution possibilities.

1.3 CHAPTER CONTENTS

The remainder of this thesis is structured as follows. Chapter Two outlines the conceptual background for the research. Using Salichtchev's recommendations for national atlases as a basis (Fremlin and Sebert, 1972), traditional regional atlases are discussed. To answer Question Three above, existing digital atlas initiatives are investigated. The dearth of existing atlas user surveys is noted.

To answer Question One above, fifteen existing provincial atlases are examined in Chapter Three for aspects of content and design. Specific topical coverage is examined in detail, as well as parameters which indicate the overall scope, such as numbers of maps and topics. Comparisons are made with an early study of Canadian provincial and American state atlases, and a recent study of American state atlases. Seventy-eight reviews of provincial and state atlases in cartographic and geographic journals from North America, Britain, and Australia are analyzed in Chapter Four, in an effort to identify what factors reviewers find most important to critique, and how satisfied experts are with the atlases they review.

To answer Question Two, an atlas user survey was undertaken during 1990. Chapter Five explains the survey design. Chapter Six gives results, including discussions of the general themes of current atlas use, opinions of content and design, and attitudes towards possible new publication and distribution systems. Analysis of users' ideas for

potential topics for inclusion in a provincial atlas for British Columbia is given in Chapter Seven.

Chapter Eight summarizes and integrates the findings of the different surveys in an attempt to answer the questions posed in Section 1.2 above.

CHAPTER TWO

CONCEPTUAL BACKGROUND TO THE RESEARCH: ANALOG AND DIGITAL ATLASES, AND USER SURVEYS

2.1 INTRODUCTION

Since the research here reported has connections to traditional and modern atlas cartography, it is important to review the literature both on traditional atlas content and design, and on current materials regarding potential new systems for storing, manipulating and delivering atlas data in digital form.

This chapter, therefore, first considers the concept of the national atlas, and the well-respected 1960 International Geographical Union (I.G.U.) recommendations for them. Traditional provincial atlases are discussed, in light of these recommendations, although detailed analysis of the content of existing provincial atlases is reserved for Chapter Three. Digital atlas initiatives are considered both in general and with specific examples. The chapter concludes with a summary of the literature which shows how atlas user surveys have been used in the past.

2.2 THE TRADITIONAL GENERAL ATLAS

2.2.1 Introduction

The traditional atlas has long been a popular tool to allow both layman and expert to quickly grasp a broad picture of the larger spatial context outside his or her own expertise, with over 5000 atlases having been produced worldwide between 1950 and 1970 alone (Alexander, 1971). Within this wide field, atlases of single political units have been a respected subset since the 16th century. While the modern national atlas is generally acknowledged to date from the 1899 Atlas of Finland, the slightly earlier 1895 Atlas of Scotland developed by J.G. Bartholomew is recognised by many as the "classical prototype of modern general regional atlases", based on Humboldt's contention that "cartographically precise statistical information" could aid research (Dean, 1970, p.49).

Forty years ago, single-country atlases were clearly acknowledged to be valuable sources of specialised information for geographers, historians, and economists (Nicholson, 1952). They continue to be recognized as scientific repositories for researchers and

decision makers, as well as a source of material for school and public atlas products (Groot, 1979), although they are not often used directly in schools (Symons, 1979). There is also a broader goal, to "further a better knowledge of the country by its inhabitants, and develop a sense of national pride, while abroad they stimulate an interest in the country's history, culture and national characteristics" (Fremlin and Sebert, 1972, p.70).

General atlases of smaller political units such as provinces often have the same broad goals as national atlases, but with opposite emphases, pedagogical use now predominating over research (Nicholson, 1970). Acknowledging their common origin, therefore, it is useful to investigate the I.G.U. recommendations for national atlas content and design in some detail.

2.2.2 The I.G.U. Recommendations on National Atlas Content and Design

The National Atlases Commission was set up under K.A. Salichtchev in 1956 to make recommendations to aid in production and improvement of national atlases, and to help to standardize design and content specifications to allow comparative use to be made of them (Fremlin and Sebert, 1972).

Within the design criteria, specific symbol types are recommended for showing point, linear, or areal data, in sparse or continuous distributions. Overall physical proportions of the atlas should be clearly rectangular, preferably falling within the 3:4 to 4:5 range. A simple rounded base scale such as 1:1,000,000 is advised but several easily related scales should be used to avoid having many poorly balanced maps. A single projection should be employed. Equidistant projections are preferred over equivalent because users frequently measure distances; equidistant right conic projections are recommended for Canada. A graticule is needed on base maps and for locational comparison with other maps, but is superfluous on choropleths, small scale insets, or most maps of "social topics". Many atlases were criticized for poor generalization and symbolization, errors in selection of scales and projections, and printing problems.

Standards were also set by the I.G.U. for the organization and content of subject matter to be covered by national atlases (Fremlin and Sebert, 1972, ch. 3). Very specific ordering is recommended, from maps of the Physical Environment, to Population, Economic, and Cultural themes.

Salichtchev summarizes errors of existing national atlases largely as sins of omission, causing imbalance of subject material, noting for example the 56 plates of agriculture versus "only a few" for manufacturing in the 1955 Atlas of U.S.A.. The first true national atlas, produced by Finland in 1899, was praised for its presentation of the physical geography and economics of the country, but criticised for its uneven treatment of subjects and the overabundance of diagrams. Despite praise from many quarters, the second multi-subject national atlas, the 1906 Atlas of Canada, fails to meet Salichtchev's criteria as a national atlas for omitting "agriculture, industry, transport, business and cultural problems" (Fremlin and Sebert, 1972, p.5).

2.2.3 Canadian Provincial Atlases

Canada has a strong tradition of producing provincial atlases of high quality (fifteen of these are included in the analysis in Chapter Three). The early 1956 Atlas of Resources for British Columbia was singled out in a worldwide contemporary review of atlases as "magnificent...an excellent example of a general regional atlas" (Balchin 1960), and several produced in the late 1960s were equally highly praised.

With one notable exception, the I.G.U. recommendations for national atlases had a strong influence on all of these atlases. Nicholson (1970) noted that the content of his own 3rd edition of the Atlas of Canada (published in 1957) correctly had a topical rather than a regional perspective, expecting that the various provinces of Canada would produce their own atlases to complement it by concentrating on aspects of major importance to the local economy. Perhaps only the Economic Atlas of Ontario (see Section 2.2.4) has adhered to this edict.

The editors of the vast majority of provincial and American state atlases have preferred to attempt to present the total picture of their region, often in an encyclopedic form as a general reference volume, of which the 1969 Atlas of Alberta is a prime example. Loy (1980), with reference to his 1976 Atlas of Oregon, writes that its primary rationale should be to "depict the geography of the state" and to "provide a basic reference book for decision-makers and citizens". It must not be an economic propaganda tool which plays down negative aspects. There must also be compelling reasons for its creation beyond those of a sponsor, publisher, and waiting market.

The pedagogical component is often a primary purpose for a provincial atlas, but, making the link with national atlas objectives, Nicholson (1970) notes that a good provincial atlas should have "promotional and scholarly purposes", with contents transcending specific curricula.

Ormeling (1979) cautions that, contrary to many atlas editors' hopes for their use by decision-makers, the mapping needs of regional planners far exceed atlases' potential, since they deal with future uncertainties, not past certainties. He also notes that national atlases are only slowly deviating from the Salichtchev concept of content, thus giving "an incomplete, distorted, almost hypocritical image of present-day society"; problem-oriented topics such as criminality, pollution, vandalism, and traffic accidents are rarely included.

2.2.4 The Economic Atlas of Ontario

The exception noted in Section 2.2.3 above is the 1969 Economic Atlas Of Ontario, which deviated from the classical route not only in presenting largely newly researched material not found in the national atlas, but also in using totally novel techniques of analysis and presentation (Dean, 1970, 1972).

William Dean, the editor of the Economic Atlas of Ontario, likened the generous government support the project received to the royal favour of Tudor England, giving him freedom to experiment. He rejected the conventional regional atlas pattern because "...it stems from nineteenth century causalist thinking and implies a degree of environmental determinism no longer held to be true" (Dean, 1972; p.152). Stating that "the art of atlas-making is still in its formative years", he followed an innovative logic in designing the Ontario atlas as a specialized tool for economic and geographical research. The atlas structure was based on Distribution, Analysis and Synthesis of each of the nine socio-economic aspects defined for the province: Aggregate Economy, Population, Manufacturing and Resource Industries, Trade, Agriculture, Recreation, Transport and Administration, ranked in descending order of monetary return to the province. Distributions and analyses within each section were synthesised onto a single map, so that relationships between elements could become apparent. This synthesis of topics was achieved by factor analysis and "other statistical massaging of variables" (Dean, 1970; p.56). Dean himself was sceptical of some of the results, but strongly defended the

mapping of relative rather than absolute data values, which would be relevant over a far longer period.

Certainly his atlas was well received. Gold medals for "the most beautiful book in the world" at the Leipzig International Book Fair (Symons, 1979) reflected both the cartographers' skill and the financial backing. But the complex structure was not vigorously supported by others. Castner (1976) pointed out that the reader must share the atlas maker's perspective in order to understand the significance of the structure of the atlas, but the atlas maker will never be sure that the reader does. Farley (1990) considered the data so "over-massaged" that the message was often obscured.

2.2.5 Limitations to Traditional Analog Atlas Production

Atlas editors are almost always obliged to make compromises between their preferences and limitations imposed upon them by external forces. Chief of these restraints are funding, time, and the rigid structure of the table of contents. Access to information can also be a major control on content, especially if either of the other constraints is also in place. Such constraints are commonly referred to by atlas editors following publication (e.g. Head et al., 1977; Loy, 1980; McQuilton, 1987).

FUNDING

As noted above with reference to the Economic Atlas of Ontario, government largesse can play a major role in an atlas's development. But Symons (1979) warns that cartographers must not allow the source of funding to bias content selection, even though the extent of funding necessarily affects coverage; scholarship must not be confused with patriotism. Stephenson and Galneder (1969) were particularly scathing in their criticism of the 1961 Economic Atlas of Arkansas in this regard.

Extensive government financial and moral support must be in place from the beginning (Ormeling, 1979), either monetarily or as scientific and technical manpower. Financing was no problem for the 1969 Atlas of Alberta, for example, since both the University and the Government of Alberta were persuaded to take it on as a Centennial project (Wonders, 1990). The 1979 Atlas of British Columbia, on the other hand, received far less aid, and thus was restricted to a more modest scope (Farley, 1990). More recently, the Historical Atlas of Canada, initially funded in 1979, was originally scheduled

for completion in 1988. Two volumes have been released, but, largely as a result of cost over-runs, Volume II almost failed and now will not be completed until late 1993, (Measner, 1991).

TIME

The length of time taken to produce an atlas frequently exceeds expectations. Alberta's centennial project was three years late, and the Atlas of the Netherlands took fourteen years, instead of the projected ten (Ormeling, 1979). One serious result of such delays is the loss of timeliness in data, already of serious concern twenty years ago (Klawe, 1970), a factor which digital atlases aim to address. Our user survey investigates the importance of this factor to the user.

RIGID STRUCTURE

A traditional printed atlas necessarily is restricted to a pre-determined overall physical format, page layout, and table of contents. However innovative its method of preparation, and however many experts and user groups are consulted over however long a period, the basic atlas structure, once set, is fixed. The use of looseleaf format rather than a bound volume does permit more than one page size and the possibility of updating of individual plates, but this introduces other problems. The use of wide ranging digital data bases is an attractive proposition: it permits the generation of atlas maps free from any pre-determined constraints.

2.2.6 Conclusions - The Future for Analog Atlases

The rapid accumulation of spatial data allows for an increasingly wide range of thematic atlases to be produced. However, at the same time, costs of atlas production are also rising, and the question can be posed whether investment in atlases of such inflexible format for limited use is still justifiable. Petchenik (1985) noted that many queries of a spatial nature, such as "How far is it to X?", or "What is the best route to Y?" may not require maps at all; a data base may be queried directly and written directions garnered. A printed map can only deliver one message, and thus often fails to reflect the sum of accumulated data. But electronic data bases remain application-neutral until

queried, when they can produce application-specific "unique, customized responses to individual demands" (Petchenik, 1985).

A decade before these comments were made, Taylor (1974) noted that even sheet maps could most correctly be considered historical documents rather than planning tools because of the slow speed of production of maps without the use of computers. The advantages of digital technology for accessing spatial data bases to generate maps cheaply and quickly for specific user needs are discussed by many writers, for example, Rhind (1977), Taylor (1985) and Burrough (1986).

Wonders (1990) considers that the time for production of costly encyclopedic tomes such as his 1969 Atlas of Alberta is probably past. In reviewing the magnificent 1986 Atlas of Georgia, Müller (1987) concurs. The highly volatile nature of rapidly accumulating statistical data makes the production of such "luxurious, expensive, hardcopy displays tightly bound in a single volume" of dubious validity. Müller calls for education of the public and funding authorities to convince them of the need for financial support for the more easily maintained and updated "virtual, electronic version of the same information".

2.3 DIGITAL INITIATIVES

2.3.1 Introduction

Developments in the use of computer technology for mapping have paralleled those of the computing industry overall. The cumbersome and expensive mainframe computers of the 1970s have largely been supplanted by smaller, cheaper and more efficient systems. Detailed geographic computer analysis formerly possible only on mainframe computers, at costs of around $100,000, can now be done for less than $1,000 in one of the many "desk-top mapping" systems (Steinberg, 1991). The development of vast data storage potential using optical disk systems such as CD-ROM (Compact Disk, Read Only Memory) and WORM (Write Once, Read Many times), and the introduction of high resolution laser display technologies, have opened the field for new approaches to all aspects of atlas design and production. These new approaches range from digital data storage and static display to potential for dynamic interaction and analysis.

Of the Geographic Information Systems developed in the early 1970s, DIDS, the Domestic Information Display System, came closest to the concept of a digital atlas. It

showed the United States by county, incorporating dynamic scale change capabilities, but ran on a government mainframe system not available to others, and was discontinued in 1982 (Slocum and Egbert, 1991; Smith and Mitchell, 1990).

The following will examine some of the novel atlas delivery systems developed in recent years. Following an overview of the use of microcomputers for atlas production and reproduction, three examples will be discussed in more detail. The Atlas of Arkansas represents the most basic example, mimicking the traditional book by simply displaying data which have been preprocessed into map form. The Canadian National Atlas Information System and the British Domesday Project represent more complex systems, which include varying degrees of map query and spatial analysis.

2.3.2 Microcomputer Atlases

There has been an enormous surge in development of software mapping packages for microcomputers in the last few years, as is well documented by Keller and Waters (1991). Such systems can be classified according to the systems under which they operate, and according to functionality. Most are designed to run on either IBM or Macintosh microcomputers, though there is some move towards software that can run on more than one system (Mandel, 1990), and there is even a possibility that the IBM and Apple companies will soon reach agreement on the standardization of software (Associated Press, 1991).

A distinction must be made between software used to design maps, and that used to organise the map data for retrieval and subsequent display, which is the category within which "electronic atlases" are most frequently classed.

Map design can be handled with varying success by packages primarily designed for other purposes. "Paint" packages, such as MacPaint and PC-DRAW, allow freehand sketching and shading of areal units. Computer Assisted Design (CAD) packages are more useful in that they permit visual overlays; however, they were designed for engineering use and as a result are often unnecessarily difficult to learn and use for mapping (Keller and Waters, 1991). Microcomputer graphic design packages proving most popular with cartographers are Adobe Illustrator for the Macintosh and CorelDraw for the IBM, though neither was designed with mapping as a primary goal. Illustrator is Rand McNally's choice for its extensive atlas production (Dobson, 1991), and is also

used by Time magazine, where maps must be completed from original idea to printed version in three days (Pugliese, 1991). CorelDraw, first released in 1989, already has 60% of the illustration market worldwide (Lacasse, 1991).

Of software which could be classified as atlases, Waters and de Leeuw (1987) discuss MacAtlas, which allows the patient, trained user to access maps of the United States, and Atlas, perhaps the first true electronic atlas for the microcomputer. It concentrates on location and information about world cities, also allowing for calculation of distances between them. With the freedom of information laws, United States census material is readily available for low priced menu-driven mapping programs to be developed such as Electronic Atlas: United States (Hinze 1990). By 1990 there were fully 24 microcomputer software packages which are effectively world atlases (Mandel, 1990). Rated highest is Electromap (1990), discussed below with its predecessor, the Atlas of Arkansas. PCGlobe (1989) is also highly praised, for clear maps and add-ons, though Mandel finds its database is less logical. HyperAtlas, for the Macintosh, has an easily used series of HyperCard stacks of modifiable maps and information, but detail is poor.

The range of atlases which could be produced using this technology is illustrated in the following sections.

2.3.3 The Atlas of Arkansas

The simplest digital atlases use digital memory (floppy disks or hard drive) to store data which can be accessed and displayed in a manner not unlike the traditional book format.

The Atlas of Arkansas was the first electronic state atlas, and one of the first atlases to be microcomputer based (Smith, 1987). It was produced at the University of Arkansas for US$118,000, a quarter the cost of a traditional atlas, over a mere two year time span. It sells for about US$100. A deliberate decision was made to allow users to access only completed cartographer-designed maps, rather than to create their own from a library of data sets, in the perhaps erroneous assumption that an interactive format was not appropriate for student, business, or general public use. This simplified the computing requirements and allowed for fast, relatively effortless and quickly understood retrieval of information.

Content was based on existing traditional state atlas models, notably Loy's 1976 Atlas of Oregon (Smith, 1990), and a printed book version produced in addition to the electronic version, since the public was not perceived to be ready to handle information solely via floppy disk format.

A major advantage of the electronic format noted by Smith is the ease of updating of maps, in both time and cost. It simply involves editing of the attribute or spatial data base as new statistics become available.

Smith also developed Electromap, later renamed Software Toolworks World Atlas, which used the same "off the shelf" IBM hardware with EGA or VGA graphics and a hard disk or CD-ROM (Electromap, 1990; Smith and Mitchell, 1990). Graphics are more sophisticated than in the Atlas of Arkansas, the atlas is very easy to use, and maps and text can be printed out. Mandel (1990) rates it a "winner" for its logical organisation and the user's freedom to analyze and edit the database.

2.3.4 Atlases Using Hypercard

Researchers at Laval University (Raveneau et al., 1991) have used HyperCard software for the Macintosh computer to develop two electronic atlases which include all the features of the Atlas of Arkansas as well as pictures and sounds. La Francophonie nord-americaine a la carte and Mines et mineraux a la carte employ a matrix of topics against variables within which a user may navigate randomly with ease, establishing multiple relationships between several images. Equivalent software is being developed for other computer systems, such as GUIDE for IBM microcomputers, and KMS for Sun and Apollo minicomputers (Raveneau et al., 1991), opening yet more potential for multimedia user friendly electronic atlases.

2.3.5 CD-ROMs and the Domesday Project

Microcomputer atlas potential has also been vastly expanded by the development of compact optical storage discs which allow massive amounts of data to be efficiently stored on robust plastic coated discs which permit quick retrieval. Whereas today's IBM floppy discs can store from 0.4 to 1.4 megabytes (Mb) of information, a single CD-ROM optical disc may store over 500 Mb. Taylor (1987) reports enthusiastically on one of the first atlases to use this system, DeLorme's Digital Atlas of the World, in which the CD-

ROM disc is used to store base map data onto which a user could overlay his own data interactively.

A second project, the Digital Chart of the World, is currently assembling world land surface data at a scale of 1:1,000,000 onto CD-ROM discs for use with IBM PCs (Taylor, 1991; Federal Geomatics Bulletin, 1990, 1991). The United States Defense Mapping Agency, in cooperation with Australia, Canada, and the United Kingdom, has let a $10 million contract to ESRI (Environmental Systems Research Institute) of California to develop prototypes. Its release, now scheduled for 1992, is expected to generate many more atlas initiatives.

The Australian Bureau of Statistics and the New Zealand Department of Statistics are using CD-ROM technology for their user-friendly CDATA86 and SUPERMAP products (Masterton, 1991). Individual users with high capacity microcomputers can access national census data and base maps to create their own tables and colour choropleth maps. Compact disc players and data discs are rented on an annual basis to customers, currently including about twenty New Zealand municipalities, banks and universities, and an expected widening range of planners, retailers, and consultants.

Britain's Domesday Project is another CD-ROM atlas initiative which has received considerable attention (Rhind, 1985; Openshaw and Mounsey, 1987; Openshaw and Rhind, 1986; Openshaw, Wymer and Charlton, 1986). Its release was scheduled for the 900th anniversary of the 1086 survey of England, with the goal of providing a modern "portrait" of the United Kingdom. One of the two data discs contains Ordnance Survey topographic maps, and "local" information in the form of photographs and text assembled largely by a million school pupils. The other "national" disc contains "probably the largest and most accessible geographic data base for the United Kingdom which is available for interactive use" (Openshaw and Mounsey, 1987, p.174), assembled despite severe government restrictions on information access. Its scope is massive, with a $5 million development cost and a database which would take seven years to examine (Armstrong and Tibbetts, 1987, p.17).

The system allows for interactive measurement of distances and areas from the Ordnance Survey maps as well as some limited manipulations of statistical data to generate correctly registered overlays, giving user-defined thematic maps of high quality. But its spatial analysis potential is limited by the speed of the processor memory

available in the BBC "Master" microcomputer, which was already "ageing" technology at the time of release (Openshaw, 1986; Owen et al., 1986).

In addition, the "Read Only" aspect of current video disc technology means that Domesday Project data cannot be updated (Goddard and Armstrong, 1986). Librarians in Mansfield, England, in the summer of 1990, were very scathing about this aspect. Potential users complain of the "out of date" (1985!) information and often consult year books in preference. Plans for every school and every public library to have a system installed have not materialized as budgets were slashed while cost estimates rose from the initial $3000 to $10,000 (the Mansfield system was the only system in a public library in the county).

2.3.6 The National Atlas Information System (NAIS)

Over the past few years, several nations have been working towards establishment of national electronic atlases. Representatives of the national atlases of the United States, Finland, India, and Canada discussed the goals for their various digital initiatives and progress towards them in 1986 (Bickmore, 1986). Cartographic expert systems (i.e. computer programs to duplicate relevant cartographic expertise) for the Economic Atlas of China and an interactive system for the production of the National Atlas of Spain were discussed in China in 1990 (Trainor, 1990). Canada's National Atlas Information System is thus but one recent initiative.

Canada has been involved for several years in research towards establishing a "user-oriented geographic information system that permits on-line retrieval and analysis of information which is stored in a database" (Siekierska and Palko, 1986). The NAIS had its origins in 1981 with an in house experimental Graphic Work Station on which was built a database using data from the 5th edition of the National Atlas of Canada for energy, agriculture and population (Siekierska, 1984), but was not formally set up until 1987 (Thompson, 1989). Currently, data collection and storage is undertaken using ESRI's ARC/INFO on Sun minicomputer workstations. Attribute data for the National Toponymic Data Base component, already including half a million place names, is being accumulated in ORACLE, a relational database management system with a flexible, user-friendly Structured Query Language interface (Bowler, 1990). Compatible with the loose leaf 5th Edition of the National Atlas, data capture and display for the National Atlas

Data Base is restricted to the 1:7,500,000 and 1:2,000,000 scales, thus avoiding many of the generalization problems of other geographical information systems. However, research is ongoing in Ottawa to incorporate scale independence (Keller, 1991).

The University of Alberta was involved in the development of an expert system to improve and standardize the quality of output for the Electronic Atlas of Canada (Mackaness et al., 1986). This initiative was apparently purely experimental, and to date no expert system has been incorporated (Madaglio, 1991a). The whole complex issue of development of expert systems for incorporation into electronic atlases to permit high quality, cartographically correct maps to be generated for any data set is only beginning to be addressed (Buttenfield and Mark, 1991).

Experimentation with the NAIS is continuing, with plans to develop many interactive options, including the use of multi-media technologies. As yet, only time sequence animation is available, but future development should permit hypothesis-testing and modelling for decision-making at the national scale (Madaglio, 1991b). The extensive data base being gradually accumulated at scales which could well be attractive to a British Columbia atlas initiative, as well as the development of software to display it, should not be overlooked.

2.3.7 Conclusions

Clearly, electronic atlases are here to stay. Exciting developments are under way to make use of computer technology, from storage of massive amounts of spatial and attribute data, to multimedia methods for access to it. Guay (1990) has explained how the Electronic Atlas of Canada is experimentally incorporating multimedia systems whereby textual, video and sound media can be accessed interactively using Hypertext technology. A multi-media atlas could thus involve "visualization of information, schematization, comparative analysis, ordering, animation, dynamic modelling, projection, random navigation, Hypertext, data bases, and capacity for processing and interactivity" (Guay 1990, p.2).

The possibilities for electronic atlases, it seems, are limited only by the imagination. But in the development of such sophisticated, futuristic products, it is important not to lose touch with the reasons for their production. Who is going to use these new atlases, and what do they (the users) want to see? Before becoming committed

to any particular system, it is important to be aware of at least some of the ultimate objectives and desires of the users.

2.4 ATLAS USER SURVEYS

2.4.1 Introduction

It is extremely difficult for authors to anticipate all possible ways in which an atlas may be used. In selection of both content and organization, atlas editors must be aware, for example, that "map users ... cannot study maps that are omitted, or easily correlate maps on opposite sides of the same sheet of paper" (Monmonier, 1981, p.189). Even before the "digital revolution", the idea of consulting the user before deciding on final contents and design for an atlas was a controversial concept among cartographers. At the same time as Bartz (1971) was consulting children concerning their perceptions of maps, before designing a thousand maps for the World Book Encyclopedia, several prominent cartographers were debating whether the whole principle of surveying map users had validity. In discussion, Klawe expressed a clear preference for specialists to "come up with some theory as to what we should show and how we should show it" (Robinson, 1971, p.47), agreeing with Robinson's contention that expert opinion should always be followed, rather than the user's. Experts are certainly needed to synthesize user requirements, to develop cartographically correct maps, and to ensure coverage is thorough; but it would be arrogant to assume that their opinion alone is of value.

2.4.2 Previous Atlas User Surveys

Only rarely have the views of atlas users been sought. In Britain, the Ordnance Survey retains seven consultative user committees of sheet map users (Marles, 1984), but the only known atlas survey in Britain was undertaken after production solely to determine holdings and usage (Kirby, 1970 and 1990). A rare pre-publication user survey was made in the U.S.S.R. in 1985, which uncovered some valuable aspects of design problems, such as "inordinate detail, small lettering and symbols, excessive brightness...", resulting in improvements for standards (Vedeneyeva, 1986). Loy (1980) suggested that content can be developed innovatively by involving "discriminating geographers" in all decision-making stages, and by circulation of a tentative content list among potential users with requests for advice, "for months if not years" before final decisions are made.

Recently, Clarke (1988) came to the frustrated conclusion, following a map user survey in Sherwood Forest, that the ideal map would be uniquely designed for the individual user. This is an obviously impractical solution for the printed map or atlas, but implies a further possible niche for a user-defined digital print-out.

Few map user surveys have been published in Canada. McGrath and Kirby (1969) explained the British and a Jamaican survey, Anderson (1977) undertook the first road map user survey, and McGrath (1986) made a "first attempt to measure" the supply side of cartographic products. Farley (1979, p.vi) included potential users in evaluating layout possibilities for his 1979 Atlas of British Columbia, concluding that simplicity was vital. But extensive involvement of users before contemplating publication of an atlas has been rare indeed. To the best of our knowledge, no survey has been conducted to approach atlas users about innovative publication and distribution media.

2.4.3 Conclusions

Despite the shortage of existing atlas user surveys in the past, there does exist a perception of need for this type of research. Atlas authors with whom the proposed research was discussed unanimously expressed considerable interest in surveying users as a novel way of establishing the level of user satisfaction with their products (Wonders, 1990, re his 1970 Atlas of Alberta; Farley, 1990, re his 1979 Atlas of British Columbia; Skoda, 1990, re his 1988 Atlas of the Gitsan-Wet'suwet'en; and Kirby, 1990).

Clearly, there is a gap in cartographic knowledge. It is fair to say that cartographers to date have not spent sufficient effort evaluating the needs and expectations of atlas users.

2.5 CONCLUSIONS

This chapter has summarized the background for provincial atlas development, beginning with national atlases and their specifications in the mid 20th century. Funding, time, and the rigid structural constraints of the traditional bound atlas have encouraged potential producers to consider applying digital techniques to cartographic production and storage, some of which have been investigated here. However, the need has been noted to refer back to the user to discover how atlases are currently being used, and what interest there may be in alternative formats.

Subsequent chapters will investigate the content and format of existing provincial atlases, and how the experts view them, by analysis of atlas reviews. Later chapters present the results of an atlas user survey.

CHAPTER THREE

THEMATIC CONTENT AND ORGANISATION OF CANADIAN PROVINCIAL ATLASES

3.1 INTRODUCTION

It behoves those contemplating any new project to first investigate efforts and successes of the past. Canada has a justifiably proud record of provincial atlas production, dating from the 1956 British Columbia Atlas of Resources, which can serve as a major source of guidance.

Nicholson applied this principle to atlas content when planning for the 3rd edition of the National Atlas of Canada (Nicholson, 1952). He also took a retrospective look at patterns, trends and principles discernable from his and five provincial atlases available to him by 1970, at about the same time as a general study of provincial and state atlases was made by Stephenson and Galneder (1969). The thematic content of American state atlases has also been examined recently by Kent and Tobias (1990), which allows for comparisons to be made between Canadian and American regional atlases.

This chapter examines and summarizes aspects of format, organisation and thematic content of fifteen Canadian provincial atlases now available, and compares the findings to the three earlier studies. It should be noted that the major content of this chapter has been recently published in Cartographica (Hocking, Keller, and Peterson, 1991).

Original data from which the substantive Tables 3.2 and 3.4 were compiled were collected by a research assistant, Ms. Cheryl Peterson, using funds made available from a SSHRC grant.

3.2 THE FIFTEEN ATLASES (Table 3.1)

Table 3.1 lists the fifteen atlases examined. All purport by their title or introduction to represent a general overview of a single province. Examination of the fifteen atlases reveals that they represent a vast range in quality of design, financial backing, and intended market. The five atlases for Alberta, British Columbia, Manitoba, Ontario, and Saskatchewan evaluated by Nicholson in 1970, and two more recent updates

Table 3.1: The Fifteen Provincial Atlases

Full Title	*Year Published*	*Abbreviation Used*	*Notes*
Atlas of Alberta*	1969	Alta69	
Atlas of Alberta (Alberta Report)	1984	Alta84	Hardcover commercial product, a special project of the *Alberta Report* magazine
Alberta in Maps	1980	Alta80	Looseleaf file, limited edition, prepared for a conference
British Columbia Atlas of Resources*	1956	BC56	
Atlas of British Columbia*	1979	BC79	
Economic Atlas of Manitoba*	1960	Man60	
Manitoba Atlas*	1983	Man83	
Census Atlas of Newfoundland	1977	Nfld77	Looseleaf file, chiefly of SYMAP single colour maps, produced at Memorial Univ.
Newfoundland Resource Atlas	1974	Nfld74	Softcover, full colour, government funded.
Atlas of the Northwest Territories	1966	NWT66	Black and white, compiled as working paper for Advisory Committee on Development of Government.
Nova Scotia Resource Atlas*	1986	NS86	Spiral bound, soft cover.
Ontario Resource Atlas	1963	Ont63	Small limited colour project of Ontario Department of Lands and Forests.
Economic Atlas of Ontario*	1969	Ont69	
Atlas du Quebec	1977	Que77	Boxed hardcover volume chiefly of single colour maps, plus one full colour 1m x 1.5m road map with economic insets
Atlas of Saskatchewan*	1969	Sask69	

* Full colour major projects, largely government and/or university funded.

for Manitoba and British Columbia, stand well above the others in terms of overall quality. However, other commercial and lower budget atlases are included to give a broader perspective on the overall range of products available. No comparisons are made on the basis of budget or retail price, given that publication of the fifteen atlases ranges over a thirty year period, during which accessibility to funding sources, production budgets and retail costs have varied considerably.

Eight of Canada's ten provinces are represented by at least one atlas, New Brunswick and Prince Edward Island being the exceptions. In a deliberate effort to restrict the study to general atlases of individual provinces, clearly single theme atlases such as the Nova Scotia Fisheries Atlas and the British Columbia Recreation Atlas were excluded from the study, as were those covering more than one province (such as the 1971 Atlas of the Prairie Provinces, and the 1988 Maritime Provinces Atlas), road atlases, topographic atlases, historical atlases, and school atlases. Thus, although the general Atlas of the North West Territories is included, the Yukon Land Resource and Inventory Atlas is not. The latter was excluded since its three volumes consist solely of National Topographic Series maps published in full size, overprinted with reference information regarding areas of research studies. Quebec is represented solely by the 1977 Atlas du Quebec, despite its strong bias towards "municipal maps". It was tempting to include the recent l'Interatlas: Les Ressources du Quebec et du Canada, but its geographic scope is broader than a single province, and its principal declared market is secondary school students. Newfoundland is represented by Memorial University's Census Atlas of Newfoundland, an atlas which is totally concerned with socio-cultural themes, and by the slim, oversized Newfoundland Resource Atlas which serves to complement it in some measure, although it excludes coverage of Labrador. The planned comprehensive atlas of Newfoundland, to be published in the summer of 1991, promises to be a valuable addition to this list.

Three of the atlases were previously included in Stephenson and Galneder's 1969 survey. First dates of publication for the fifteen atlases compared here range from the 1956 British Columbia Atlas of Resources to the 1986 Nova Scotia Atlas of Resources. Tables 3.2 and 3.4 summarize overall specifications and thematic content of the fifteen atlases respectively. Findings are discussed below.

3.3 SIZE AND CONTENT ORGANISATION (Table 3.2)

In order to determine the overall scale and organization of the fifteen atlases, outside dimensions of each atlas were measured, and total numbers of pages and maps, as well as their ratio, were tallied. Maps were examined for size and topic complexity. Results are shown in Table 3.2.

With respect to general format, ten of the fifteen atlases follow the vertical rectangle or portrait format, thereby adhering to the more conventional shape of books, but also comfortably reflecting the overall dimensions of many provinces. The remaining five opt for the landscape format, a logical choice for Nova Scotia, the Northwest Territories, and perhaps Ontario, but less obvious for British Columbia's elongate shape.

The outside dimension of the smallest atlases are around 20 cm x 30 cm. The Newfoundland Resource Atlas is not only dimensionally the largest, at 43 cm x 68 cm, but each of its map sheets folds out to double this size, boosting the average map sheet to an area of 5,800 square cm, compared to a median value for all atlases of 1,100 square cm. The large format of the Newfoundland Resource Atlas, in conjunction with the fold out option, allows for considerable detail to be shown (all maps are at 1:1,000,000 scale), but the atlas was found to be very awkward to handle.

The number of pages ranges from the 14 page Newfoundland Resource Atlas to the 352 page Atlas du Quebec. Map content ranges from the 14 map Newfoundland Resource Atlas to the 654 map Atlas of Saskatchewan. Individual map size ranged from less than 3 x 5 cm (maps depicting insect pests in the Atlas of Saskatchewan) to 85 x 68 cm (all maps in the Newfoundland Resource Atlas). The average provincial atlas contains 143 pages, of which 103 are map sheets, the remainder consisting mainly of text and gazetteer lists. The Atlas of the Northwest Territories has an entire separate volume for map legends and notes. There is considerable variation in the amount of text used. Some atlases advocate extensive textual information to supplement or explain spatial distributions (e.g. 1979 Atlas of British Columbia), whereas others believe that maps should speak for themselves (e.g. 1969 Atlas of Alberta).

On average, the atlases were found to contain 198 maps on 103 pages, about two per map sheet. However, median values of 116 maps on 87 pages may be a more useful measure, as the very large numbers of maps in the Atlas of Alberta (563) and the Atlas of Saskatchewan (654) skew the distribution sharply. Half the atlases show one map per

Table 3.2: Size, Format and Content Organization

Name	*Size W x H cms*	*Total # Pgs.*	*# Map Sheets*	*# Maps*	*# of Topics*	*Maps/ Sheet*	*Topics/ Sheet*	*Topics/ Map*
Alta69	33 x 43	164	148	563	793	3.8	5.4	1.4
Alta80	23 x 28	87	87	91	122	1.0	1.4	1.3
Alta84	25 x 34	162	116	120	105	1.0	0.9	0.9
BC56	55 x 44	95	48	96	221	2.0	4.6	2.3
BC79	35 x 28	136	61	117	217	1.9	3.6	1.9
Man60	43 x 56	81	38	102	199	2.7	5.2	2.0
Man83	29 x 39	157	149	327	429	2.2	2.9	1.3
Nfld74	43 x 68	14	14	14	30	1.0	2.1	2.1
Nfld77	23 x 28	126	118	118	52	1.0	0.4	0.4
NWT66	33 x 28	202	47	47	83	1.0	1.8	1.8
NS86	35 x 28	77	31	34	160	1.1	5.2	4.7
Ont63	28 x 23	33	33	33	59	1.0	1.7	1.7
Ont69	33 x 45	226*	223	386	601	1.7	2.7	1.6
Que77	23 x 30	352	281	278	47	1.1	0.2	0.2
Sask69	25 x 34	236	145	654	1129	4.5	7.8	1.7
Mean	**32 x 38**	**143**	**103**	**198**	**283**	**1.8**	**3.1**	**1.7**
Median	**33 x 34**	**136**	**87**	**117**	**160**	**1.1**	**2.7**	**1.7**

* 113 double plates. Backs of plates are not tallied, although they may include short notes on the maps following.

sheet, generally using a single base map, thus simplifying cartography and allowing for comparison between pages. However, some atlases invite comparisons of distributions by containing numerous maps per page. The aforementioned atlases of Alberta and Saskatchewan also switch between several map scales, which boosts their average number of maps per sheet to 3.8 and 4.5 respectively, double the overall average.

A simple comparison of numbers, and ratios of maps to pages, does not give anywhere near the complete picture of the variation in scope and complexity of the different atlases. Perhaps more revealing is an index of atlas and map complexity measured by the number of topics covered per atlas compared to the average number of topics displayed per map, and to the number of topics covered on each page of an atlas. To achieve this, rules for counting themes had to be compiled.

Where the same topic was mapped on a number of maps for several time periods, it was tallied as several topics. This is justified since each map will communicate a different spatial distribution. However, if the same topic was shown at several scales for the same time period, such as with many maps of small subprovincial areas, it was tallied only once, since no new distribution is communicated. Given the above, those atlases consisting largely of street plans, for example, have a large number of maps in the "Reference" category, but a remarkably small number of topics.

The Atlas of Saskatchewan and the Atlas of Alberta cover the largest number of topics (1129 and 793 respectively) and the Newfoundland Resource Atlas covers the least (30 topics). Based on the average number of topics displayed, by far the most complex atlas is the Nova Scotia Resources Atlas, with an average of 4.7 topics per map. This is the only provincial atlas to exceed the 4.3 topics per map of the 1974 National Atlas of Canada. The Atlas of Saskatchewan, the Atlas of Alberta, the Nova Scotia Resources Atlas, and the Economic Atlas of Manitoba contain the largest average number of topics per atlas page at 7.8, 5.4 5.2 and 5.2 respectively. However, unlike the Nova Scotia Resources Atlas, the latter three western Canadian atlases have relatively low values for average topics per map (1.7, 1.4 and 2.0 respectively). Therefore, whereas the Nova Scotia Resources Atlas has up to seven topics displayed on a single map, the editors of the above three western atlases have opted instead to display on each page a number of individual topics on very small scale maps.

The number of topics per map index highlights the lack of sophistication of several atlases. The extremely low value for the Atlas du Quebec (0.2) can be explained by the fact that, despite its title, it consists mainly of one sheet municipal maps, each displaying the same information. The Census Atlas of Newfoundland (0.4) shows the same topic at several scales. Neither of these can be classified as "general" atlases.

3.4 THEMATIC CONTENT

3.4.1 Canadian Provincial Atlases (Tables 3.3, 3.4; Figure 3.1)

In order to make comparisons between individual atlases and with previous studies, it was necessary to make use of a clear and unambiguous system of classification of thematic content categories. No one previous system would entirely fit the data, so categories were derived and adapted from previous authors' suggestions, notably Stephenson and Galneder (1969) and Nicholson (1952), as well as by reference to the table of contents of the fifteen atlases themselves. Table 3.3 shows the categories adopted for this study, as well as the categories used by the studies noted above, and those used by the Kent and Tobias (1990) study of American state atlases.

Some disagreement exists between authors and atlas editors concerning categorization of some themes. For example, "Big Game Animals" were classified under "Resource Use" in the 1960 Economic Atlas of Manitoba, but under "Physical and Biological Environment" in the later 1983 Manitoba Atlas, although the two atlases have the same editor. This perhaps reflects a changing societal attitude towards the value of big game. In this study, all "Wildlife" is classified as "Physical", leaving only maps dealing clearly with trapping activity in the "Primary Industry" division. Stephenson and Galneder's (1969) "Economic Activity" division was thought to be too broad for meaningful comparisons between atlases, and was divided therefore into "Primary and Resource-based" including Energy, and "Secondary and Tertiary (service) Economy". "Employment" was classified with "Socio-Cultural" unless related to specific industries.

Each topic listed in Table 3.3 was tallied separately, to allow for subsequent re-combining for comparison with other authors' work (See Section 3.4.2). Conversion to percentages allowed for comparison between atlases of vastly differing size. Results are shown in Table 3.4.

Table 3.3: Thematic Content Categories

This Study	Stephenson and Galneder (1969)	Nicholson (1952)	Kent and Tobias (1990)
Physical	**General**	**General**	**Introductory**
Climate	**Physical Environment**	Cartography	**Physical**
Geology	Climate	Space Relationships	**Economic**
Hydrology	Physical	Historical	Extractive
Physiography	Water	**Physical**	Agricultural
Soils	**Economic**	Topography	Indusrial
Vegetation	Agriculture	Geology	Interaction/Commercial
Wildlife	Communications	Temperature	**Population**
Economic	Energy Resources, Mines & Minerals	Precipitation	**Cultural**
Primary:	Finance, Business & Services	Sunshine, Winds & Pressure	**Miscellaneous**
Agriculture	Fishing	Geomorphology	
Energy	Forestry	Soils	
Fishing	Income	Hydrography & Hydrology	
Forestry	Labour Force & Employment	Biogeography	
Mining	Land Use	Geophysics	
Trapping	Manufacturing	Other Physical	
Water Resources	Recreation	**Economic**	
Secondary and Tertiary:	Transportation	Agriculture	
Manufacturing	Wildlife	Forestry	
Recreation	Other	Fishing	
Sales & Service	**Socio-Cultural**	Mining	
Transportation & Communications	Administrative	Power Development	
Socio-Cultural	Education	Industry	
Education	Health & Vital Statistics	Transportation & Communications	
Employment	History	Trade	
Migration	Housing	Other Economic	
Population	Politics	Social	
Public Services	Population	Population Distribution	
Settlements	Other	Population Origin & Migration	
Reference & Government		Anthropology, Religions & Languages	
Administrative Regions		Public Health	
City Plans		Recreation	
Index to Coverage		Education	
Location Maps		Urban Settlement	
		Administration	
		Other	

Table 3.4: Thematic Content

		Physical			Economic: *Primary*			Economic: *Secondary & Tertiary*			Socio-Cultural			Reference and Administration		
Name		Sheets	Maps	Topics	Sheets	Maps	Topics	Sheets	Maps	Topics	Sheets	Maps	Topics	Sheets	Maps	Topics
Alta69	#	37	141	266	38	108	190	23	76	121	46	225	200	4	13	16
	%	*25*	*25*	*34*	*26*	*19*	*24*	*16*	*13*	*15*	*31*	*40*	*25*	*3*	*2*	*2*
Alta80	#	11	14	14	49	50	73	10	10	16	12	12	13	5	5	6
	%	*13*	*15*	*11*	*56*	*55*	*60*	*11*	*11*	*13*	*14*	*13*	*11*	*6*	*6*	*5*
Alta84	#	3	12	15	5	21	40	5	8	9	13	23	27	92	56	14
	%	*3*	*10*	*14*	*4*	*18*	*38*	*4*	*7*	*9*	*11*	*19*	*26*	*79*	*47*	*13*
BC56	#	16	37	51	13	17	70	6	11	32	7	19	44	6	12	24
	%	*33*	*39*	*23*	*27*	*18*	*32*	*13*	*11*	*14*	*15*	*20*	*20*	*13*	*13*	*11*
BC79	#	15	29	62	22	43	65	12	20	59	10	23	29	2	2	2
	%	*25*	*25*	*29*	*36*	*37*	*30*	*20*	*17*	*27*	*16*	*19*	*13*	*3*	*2*	*1*
Man60	#	13	31	57	13	43	71	4	6	19	7	18	47	2	4	5
	%	*34*	*30*	*29*	*34*	*42*	*36*	*11*	*6*	*10*	*18*	*18*	*24*	*5*	*4*	*3*
Man83	#	23	67	79	53	136	161	14	24	32	55	95	154	4	3	2
	%	*15*	*21*	*18*	*36*	*42*	*38*	*9*	*7*	*7*	*37*	*29*	*36*	*3*	*1*	*1*
Nfld74	#	4	4	5	8	8	19	2	2	6	-	-	-	-	-	-
	%	*29*	*29*	*17*	*57*	*57*	*63*	*14*	*14*	*20*	-	-	-	-	-	-
Nfld77	#	-	-	-	7	7	5	12	12	5	96	96	34	3	3	8
	%	-	-	-	*6*	*6*	*10*	*10*	*10*	*10*	*81*	*81*	*65*	*3*	*3*	*15*
NWT66	#	23	23	38	3	3	9	5	5	13	8	8	13	8	8	10
	%	*49*	*49*	*46*	*6*	*6*	*11*	*11*	*11*	*16*	*17*	*17*	*16*	*17*	*17*	*12*
NS86	#	6	6	27	17	18	88	5	5	28	2	2	11	1	3	6
	%	*19*	*18*	*17*	*55*	*53*	*55*	*16*	*15*	*18*	*6*	*6*	*7*	*3*	*9*	*4*
Ont63	#	11	11	18	15	15	24	2	2	8	2	2	2	3	3	7
	%	*33*	*33*	*18*	*45*	*45*	*59*	*6*	*6*	*10*	*6*	*6*	*5*	*9*	*9*	*8*
Ont69	#	6	8	11	39	85	124	101	145	273	57	127	156	20	21	37
	%	*3*	*2*	*2*	*17*	*22*	*21*	*45*	*38*	*45*	*26*	*33*	*26*	*9*	*5*	*6*
Que77	#	-	-	-	4	4	15	1	1	6	-	-	-	276	273	26
	%	-	-	-	*1*	*1*	*32*	*<1*	*<1*	*13*	-	-	-	*98*	*98*	*55*
Sask69	#	34	191	288	43	296	548	18	38	93	34	73	144	16	56	56
	%	*23*	*29*	*26*	*30*	*45*	*49*	*12*	*6*	*8*	*23*	*11*	*13*	*11*	*9*	*5*
Total		**202**	**574**	**931**	**327**	**852**	**1502**	**222**	**367**	**720**	**349**	**712**	**874**	**443**	**463**	**219**
Mean	#	**13**	**38**	**62**	**22**	**57**	**100**	**15**	**25**	**48**	**23**	**47**	**58**	**30**	**31**	**15**
	%	*20*	*21*	*22*	*28*	*31*	*35*	*14*	*12*	*17*	*20*	*21*	*21*	*18*	*15*	*5*
Median	#	11	14	27	15	21	70	6	10	19	10	19	29	4	5	8
Maps/sheet				2.8			2.6			1.7			2.0			1.0
Topics/map				1.6			1.8			2.0			1.2			0.5
Topics/sheet				4.6			4.6			3.2			2.5			0.5

Figure 3.1 Thematic Content of Canadian Provincial Atlases by Percentage of Maps

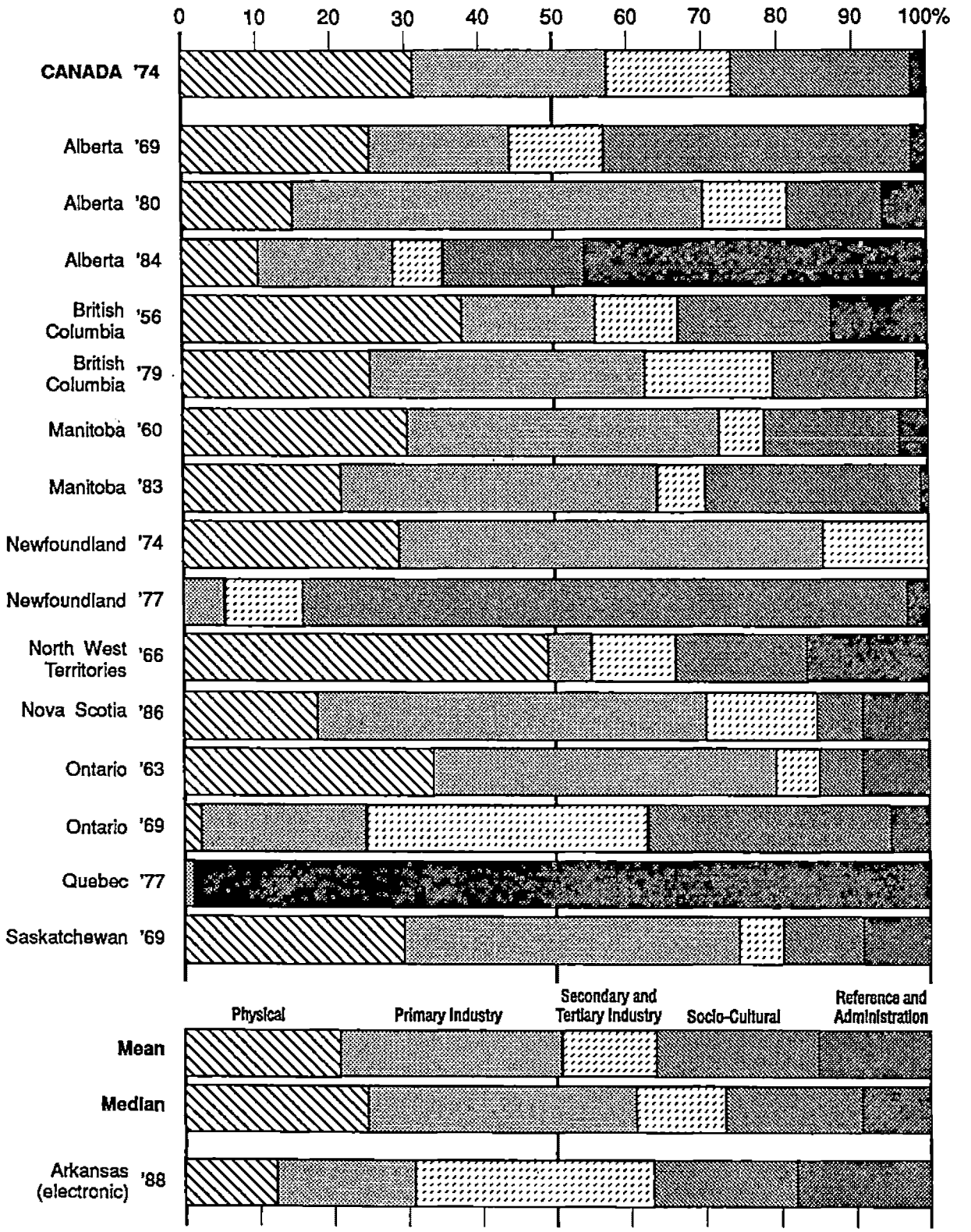


Table 3.4 and Figure 3.1 show the considerable diversity in emphases between major themes for the fifteen atlases. Overall, about a third of the maps and topics are concerned with resources and primary industry, with physical and socio-cultural themes slightly ahead of the remaining categories (each about a fifth of the total). The proportion devoted to physical themes ranges from a low of zero sheets in the Atlas du Quebec and the Census Atlas of Newfoundland to a high of 49% for the Atlas of the Northwest Territories. Half the latter's physical maps cover wildlife topics, which also boost the physical theme content for the Atlas of Alberta, the Atlas of Saskatchewan, and the atlases of British Columbia and Manitoba. The 1960 Economic Atlas of Manitoba contains a higher than average proportion of climate maps.

The overall dominance of primary industry reflects Canada's resource-based economy. Atlases tend to indicate this bias in their titles, although some with general titles, such as the 1983 Manitoba Atlas and the 1979 Atlas of British Columbia: People, Environment and Resource Use, also have a high proportion of primary industry maps. Indeed, the latter outstrips the earlier British Columbia Atlas of Resources in numbers in this category, titles notwithstanding. A surprisingly wide discrepancy appears in coverage of "Agriculture" amongst provinces where agricultural production plays a key role in the economy. Proportions range from 12% for the Atlas of Alberta to 38% for the Manitoba Atlas.

Some of the larger works reflect analogous situations which cannot be interpreted in any general analysis. Extraordinarily high values in the primary category for the Atlas of Saskatchewan (548 topics on 296 maps), for example, can be explained by the inclusion of a series of 322 3 cm x 5 cm maps of forest insect infestations, which could be argued to represent an unusual information bias.

The Economic Atlas of Ontario stands out in that its proportion of maps of secondary and tertiary economy is twice that of its nearest rival. The editor of this atlas was determined to establish a new structure for regional atlases, emphasizing secondary and tertiary activities (Dean, 1970), as has already been noted in Section 2.2.4 above. The Atlas of Alberta contains the greatest number of maps and the greatest range of topics in the socio-cultural class. Maps here include a unique and fascinating series of maps of settlement patterns in the province. The 1983 Manitoba Atlas also includes a notably wide range of topics under the heading "People". At the other end of the scale, it may

not come as a surprise that socio-cultural themes are ignored by the Newfoundland Resource Atlas, but their total absence from the Atlas du Quebec, despite its dominant human theme, is something of a mystery.

The 271 municipal maps give the Atlas du Quebec total dominance in the final theme category in Table 3.4. Another atlas which places heavy emphasis on urban places is the Alberta Report's Atlas of Alberta. This atlas, clearly a commercial product from the Alberta Report Magazine, emphasizes locational city plans, plans which are more topographic than thematic in character. The Economic Atlas of Ontario and the Atlas of Saskatchewan appear to be the most thorough in their handling of provincial administrative and political topics.

3.4.2 Comparison to Earlier Studies

NICHOLSON (1952)

An early worldwide cross-sectional study of national atlases concluded that the maps were divided roughly equally between the physical (36.5%), economic (38.5%) and social (25%) topics (Nicholson, 1952; p.33). Examination of the 1974 Atlas of Canada, using our initial classification system, showed that of its 309 maps, 97 (31%) were physical, 132 (43%) economic, 74 (24%) social, and 6 (2%) general which is remarkably close to Nicholson's 1952 national atlas averages. The provincial atlases are far more variable, averaging a sharply lower percentage of physical maps (21%), similar percentages for economic (43%) and social (21%), the remainder (15%) as reference maps (See Table 3.4 and Figure 3.1).

STEPHENSON AND GALNEDER (1969) (Table 3.5)

Over twenty years ago, three of Canada's provincial atlases were included with 24 state atlases in a wide-ranging atlas comparison by Stephenson and Galneder (1969). In order to compare our findings with theirs, it was necessary to make some adjustments to our general classes. For example, "Wildlife" was shifted from "Physical" to "Economic", and "Administrative" from "Reference/Administration" to "Social-Cultural". Table 3.5 shows the results.

Table 3.5: Comparison to the Stephenson and Galneder Study (1969)

	Stephenson and Galneder's 27 state and provincial atlases*		Our 15 provincial atlases	
Category	*# Maps*	*%*	*# Maps*	*%*
General	97	*3*	68	*3*
Physical	510	*18*	297	*12*
Economic	1780	*63*	1499	*52*
Social-Cultural	444	*16*	1108	32
Total	**2831**		**2972**	

* Source: Stephenson and Galneder (1969), p. 25.

Our fifteen provincial atlases contain a very similar total number of maps. They have the same proportion of general location maps, slightly less physical and economic, but double the number of maps with social-cultural themes.

KENT AND TOBIAS (1990) (Table 3.6)

In order to make comparisons with the findings of Kent and Tobias (1990) concerning American state atlases, it was necessary to restructure some categories. "Agriculture" was separated from "Primary" to leave a class equivalent to their "Extractive" class; and "Industrial (manufacturing)" from the "Secondary and Tertiary" to equate to their "Interaction/Commercial" class. The "Socio-Cultural" class did not conveniently split into their "Population" and "Culture" classes, so theirs were combined. The "Physical" class was not altered, but Kent and Tobias included topographic and aerial photographic index plans in this category, which may account for some minor differences. In addition, they did not specify "wildlife" per se as a topic. We have therefore assumed it to have been included under "Biogeography".

The comparisons are shown in Table 3.6. Physical and tertiary economic activity show similar trends for Canadian provincial atlases and American State atlases. However, major differences become apparent when comparing the other economic classes. "Extractive Activity", which includes forestry, mining, fishing, and energy, is considered six times as important to Canadian provincial atlases as to American state atlases. This surely reflects the Canadian provinces' heavy dependence on such activity for their income.

Some anomalies surface: Kent and Tobias comment on the strange omission of extractive topics from the Atlas of Texas, despite that state's considerable oil industry. The Atlas du Quebec is the only provincial atlas to ignore primary industry, but, as previously mentioned, it is far from a general atlas given the heavy concentration on municipal maps. Coverage of "Agriculture" appears to be similar for American and Canadian atlases, though there is a wider range in variation in coverage amongst Canadian provincial atlases, as previously noted.

Canadian atlases show relatively little interest in secondary industry compared to state atlases, with only the Economic Atlas of Ontario exceeding the U.S. average.

Table 3.6: Comparison to the Kent and Tobias Study (1990)

	Mean Percentage Breakdown, by Thematic Category	
Category	*State Atlases**	*Provincial Atlases*
Physical	23.6	21.7
Population and Cultural	29.8	20.8
Industrial	9.6	3.5
Extractive	3.0	17.1
Agricultural	12.5	14.0
Interaction/Commercial	10.4	8.1
Introductory & Miscellaneous	10.6	14.9

* Source: Kent and Tobias (1990), p.318.

Almost a third of the U.S. state atlas maps represent population and cultural themes, whereas barely a fifth of the provincial ones do. Perhaps this reflects Canada's relatively meagre population and far greater interest in the distribution of natural resources. On the other side, the above is surprising given Canada's emphasis on multiculturalism compared to America's cultural policies. Only the general Atlas of Alberta and the Economic Atlas of Ontario stand out in this category, with 39% and 33% of their total maps respectively.

Boosting the "Miscellaneous" category for the provincial atlases is the greater emphasis on reference maps showing political divisions, and the very large number of reference maps of urban areas in both the Atlas du Quebec and the Alberta Report's Atlas of Alberta.

3.5 CONCLUSIONS

Unlike the more even thematic coverage found for national atlases (see Section 3.4.2), all three state and provincial atlas comparison studies discussed above observe a clear lack of balance between the general physical, economic and social themes, regardless of classification method employed. Comparison with the 1969 findings of Stephenson and Galneder suggests a marked increase in social-cultural themes through time, a trend also observed for American state atlases by Kent and Tobias in 1990, which may reflect a disciplinary shift within geography away from an emphasis on economic issues and towards social and behavioral research.

The major contrast between the content of state and provincial atlases appears to be in the sixfold higher proportion of provincial maps devoted to "Extractive Activity", which suggests a stronger Canadian than American interest in the continuing resource based economy.

Although a number of provincial atlases do tend to follow the national atlas pattern of content and composition, (Nicholson, 1970; p. 128), the figures demonstrate that there is considerable diversity between them. The majority of editors have opted to place greater emphasis on themes reflecting the character of the relevant province. The assumption that users will draw on the national atlas for general reference and information concerning physical themes is expressed by the editor of the Economic Atlas

of Ontario, the most ambitious attempt at breaking away from traditional atlas formats. However, despite the editor's hope that it would be a model for all future provincial atlases (Dean, 1970), the lead has not been followed. One cannot assume that access to a provincial atlas implies access to a national atlas; thus a provincial atlas should stand on its own. In addition, the Ontario atlas's structural organisation differed radically from all others, and its statistically derived maps may have proven too complex for even the highly educated user, a consideration which must be borne in mind by editors of digital atlases with sophisticated analysis techniques at their fingertips.

Study of the physical size and general format of the fifteen atlases showed a wide range of size and organization. Oversize and foldout options are not generally favoured, and no provincial atlases have yet used the looseleaf format. The portrait shape is more common than the landscape, with the average atlas only slightly larger than this page. Over half the atlases adhere to the one page:one map principle, but several atlases, particularly for the western provinces, far exceed this ratio. There is a particularly wide discrepancy in map complexity, as measured by the number of topics selected to be shown on a single map, which may reflect the variation in perceived markets.

Finally, as an indicator of possibilities for the future, the content and organisation of the first digital state atlas, the Atlas of Arkansas (1988), were summarized under the same system devised for the provincial atlases (see Figure 3.1). It was found to have 1.6 maps per sheet, very similar to the 1.7 mean for the provincial atlases, and 2.3 topics per map, somewhat more complex than the average provincial atlas. It has a lower than average number of maps of physical themes (12%) and a relatively high proportion of "Government" maps to boost the Reference and Administration category to 18%, but the overall design deviates little from the traditional atlas, despite its innovative format. These findings were surprising, given that the digital media promise to allow us to consider communication of spatial data and associated attributes never thought possible using paper based maps.

Having established in this chapter the thematic content and organisation of existing atlases, Chapter Four broadens the study by considering how these and similar products for the U.S.A. and Australia have been received by review experts. In the next chapter, aspects of atlas content and design are thus summarized and analyzed through the comments of provincial and state atlas reviewers.

CHAPTER FOUR
AN ANALYSIS OF PROVINCIAL AND STATE ATLAS REVIEWS

4.1 INTRODUCTION

Newly published atlases are subject to the same professional scrutiny as any other book. This frequently takes the form of reviews written predominantly by cartographers, geographers, and map librarians in cartographic, geographic, and popular journals. Such reviews of provincial and state atlases represent experts' opinions as to the merits of both content and design features of the atlases, and their perception of the atlases' value to potential users.

Experts evaluating the works of others in their field are likely to criticize what they feel to be erroneous decisions and to praise those with which they agree. Hence, consideration of a wide sample of reviews should permit the identification of major areas of consensus and of disagreement about atlas content and design criteria. Examination of reviews thus could be of considerable assistance in the development of a new provincial atlas.

The research reported here concentrates on reviews of general thematic atlases for individual provinces and states of Canada, the U.S.A., and Australia, all federal nations of culturally similar backgrounds. An effort was made to locate all the provincial and state atlas reviews in a total of fifteen geographic and cartographic journals from these three countries and the United Kingdom (see Table 4.1). Multiple reviews were located for several atlases, which allowed for some interesting comparisons. Since most of the Canadian and many of the American atlases were published from the late 1960s through the 1970s, and the Australian ones did not appear until the 1980s, the reviews span a 20 year period. In total, the contents of 78 reviews for 49 atlases were examined.

The major methodology employed, that of content analysis, is outlined below. The judgement criteria under which the atlases are reviewed are explained, and those eliciting considerable comment are discussed in some detail. Topics in which consensus is achieved and major areas of disagreement are noted in the conclusion.

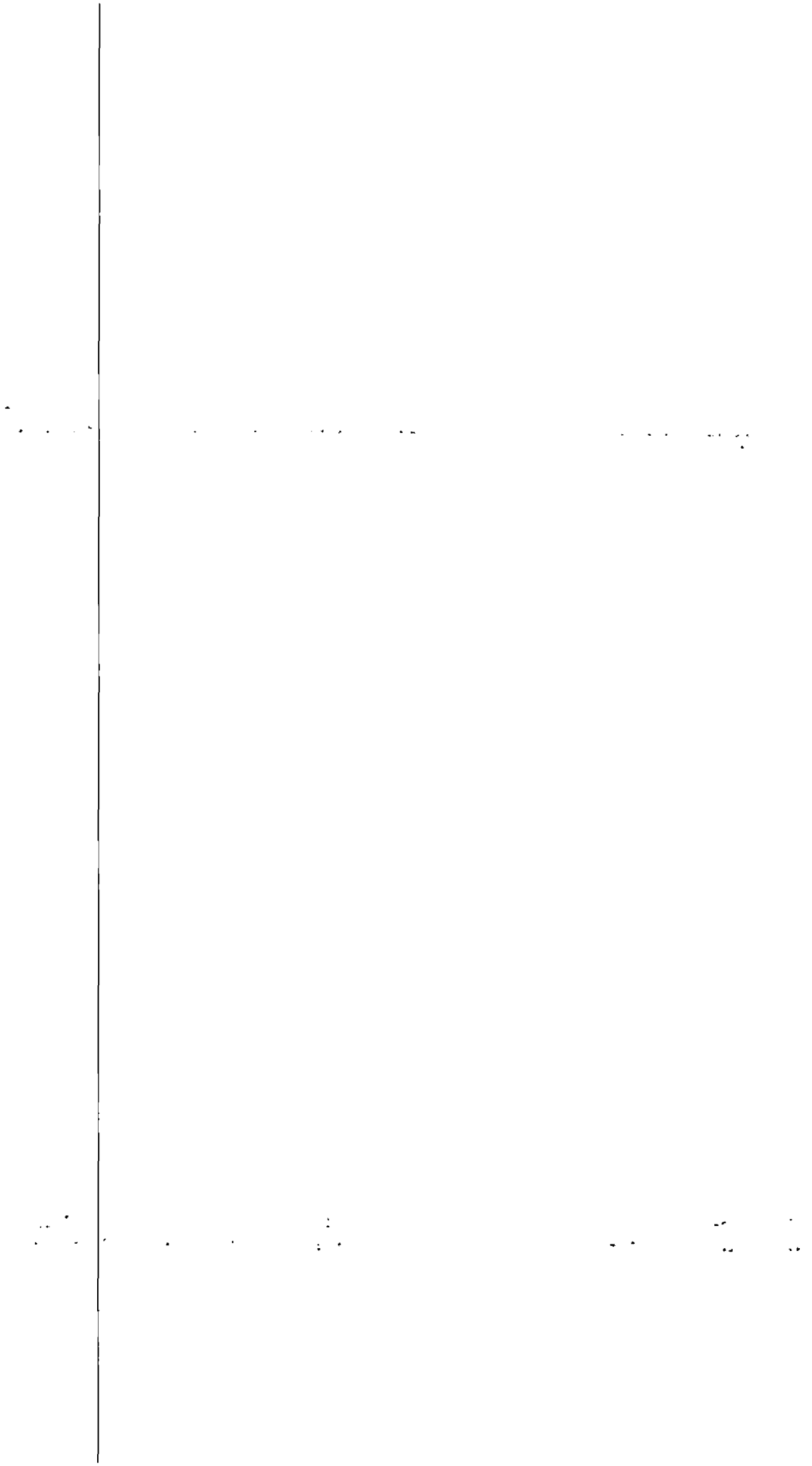


Table 4.1 Reviews Cited

Ref.	Name of Atlas	Date	Review Location*	Reviewer
CANADA				
1	Atlas of Alberta	1969	CGJ 1971, 83(6), vi	C.C.J.Bond
2	Atlas of Alberta	1969	CGR 1971, 15, 216	W.G.Dean
3	Atlas of Alberta	1969	CS suppl. 1971, 626	J.H.Holloway
4	Atlas of Alberta	1969	SLA 1970, 81, 73	A.H.Clark
5	Atlas of Alberta	1969	CJ 1970, 7(1), 54	J.S.Keates
6	Atlas of British Columbia...	1979	CY 1981, 12(2), 119	P.Crabb
7	Atlas of British Columbia...	1979	CGJ 1979, 99(1), 73	G.Falconer
8	Atlas of British Columbia...	1979	SUC 1984, 17(1), 51	A.J.Strachan
9	Atlas of British Columbia...	1979	AG 1980, 16, 57	D.C.Mundende
10	Atlas of British Columbia...	1979	SLA 1981, 124, 75	R.B.Kent
11	Economic Atlas of Manitoba	1960	CGR 1961, 5(1), 54	A.L.Farley
12	Atlas of Manitoba	1983	CGR 1985, 29, 89	W.G.Dean
13	Atlas of Manitoba	1983	CA 1987, 24(4),89	A.E.Gibson
14	Resource Atlas of Newfoundland	1974	CA 1978, 15(2), 200	N.L.Nicholson
15	Economic Atlas of Ontario	1969	CGR 1970, 14(2), 177	N.T.W.Thrower
16	Atlas of Saskatchewan	1969	CGR 1971, 15, 214	W.G.Dean
17	Atlas of Saskatchewan	1969	CS suppl. 1971, 68	I.Yost
18	Atlas of Saskatchewan	1969	SLA 1970, 80, 68	A.H.Clark
AUSTRALIA				
19	Atlas of New South Wales	1987	SUC 1988, 22(2), 38	T.Fearnside
20	Atlas of South Australia	1986	SUC 1987, 21(2), 115	J.C.Robertson
21	Atlas of South Australia	1986	CA 1988, 25(3), 151	L.Carstensen
22	Atlas of Victoria	1982	SUC 1984, 17(4), 131	J.C.Robertson
23	Atlas of Victoria	1982	CY 1983, 13(1), 58	J.Shields
24	Atlas of Victoria	1982	CY 1985, 14(1), 75	T.G.Birtles
UNITED STATES				
25	Atlas of Alabama	1973	SLA 1980, 120, 75	C.W.Olmstead
26	Atlas of Alabama	1973	SUC 1977, 11(2), 42	M.Blacksell
27	Atlas of Alabama	1973	CY 1975, 9(2), 125	M.R.Foale
28	The Arizona Atlas	1981	SLA 1983, 133, 64	R.B.Kent
29	The Arizona Atlas	1981	AC 1984 11(1), 93	C.W.Cox
30	Atlas of Arkansas	1973	SLA 1978, 112, 84	C.W.Olmstead
31	Atlas of California	1979	SLA 1981, 126, 74	T.R.Vale
32	Atlas of California	1979	CY 1982, 12(3), 178	F.H.Bauer
33	Atlas of Florida	1964	CGR 1965, 9(1), 62	W.G.Dean
34	Atlas of Florida	1974	CJ 1975, 12(1), 57	R.W.Anson

(continued...

Table 4.1 Reviews Cited (continued)

Ref.	Name of Atlas	Date	Review Location*	Reviewer
35	Atlas of Florida	1974	SLA 1980 120, 75	C.W.Olmstead
36	Atlas of Florida	1981	AC 1982, 9(2), 76	W.G.Loy
37	Atlas of Florida	1981	SLA 1985, 139, 75	L.Yacher
38	Atlas of Georgia	1986	CA 1987, 24(3), 103	J.C.Muller
39	Atlas of Georgia	1986	PG 1987, 39(4), 502	D.J.Cuff
40	Atlas of Hawaii	1973	CGR 1974, 18, 422	G.Matthews
41	Atlas of Hawaii	1973	SLA 1974, 97, 95	G.Lewthwaite
42	Atlas of Hawaii	1983	AC 1985, 12(2), 182	R.L.Williams
43	Idaho Economic Atlas	1970	SLA 1972, 87, 66	C.W.Olmstead
44	Compact Atlas of Idaho	1983	CJ 1985, 22(2), 150	H.A.Sandford
45	Compact Atlas of Idaho	1983	SLA 1985, 139, 77	L.Yacher
46	Illinois: An Atlas	1976	SUC 1979, 13(2), 64	J.H.Paterson
47	Illinois: An Atlas	1976	SLA 1977 110, 76	M.L.Selmer
48	An Atlas of Indiana	1970	CY 1973, 8(1), 46	B.E.Goodrick
49	An Atlas of Indiana	1970	SLA 1971, 83, 65	C.W.Olmstead
50	Atlas of Iowa	1974	SLA 1977, 110, 75	C.A.Seavey
51	Atlas of Kentucky	1977	SLA 1977, 118, 64	J.O.Minton
52	Kentucky in Maps	1980	SLA 1982, 128, 69	J.O.Minton
53	Kentucky in Maps	1980	AC 1983, 10(2), 170	J.R.Carter
54	Atlas of Maryland	1977	SLA 1979, 115, 75	P.M.Strain
55	Atlas of Michigan	1977	AC 1980, 7(1), 87	J.W.Wiedel
56	Atlas of Michigan	1977	SLA 1970 82, 62	A.G.Koerner
57	Atlas of Minnesota Res...	1969	SLA 1971, 83, 65	C.W.Olmstead
58	Atlas of Mississippi	1974	SLA 1980, 120, 75	C.W.Olmstead
59	Economic and Social Atlas of Missouri	1975	SLA 1971, 83, 65	C.W.Olmstead
60	Atlas of Missouri	1970	SLA 1978, 112, 84	C.W.Olmstead
61	Montana in Maps	1974	SLA 1980, 120, 79	C.W.Olmstead
62	Agricultural, Climatic and Economic Atlas of Nebraska	1977	CY 1979, 11(2), 117	L.Farkas
63	Agricultural Atlas of Nebraska	1977	SUC 1979, 12(2), 58	J.H.Paterson
64	Economic and Climatic Atlas of Nebraska	1977	AC 1980, 7(2), 181	C.H.Wood
65	New Mexico in Maps	1979	SLA 1981, 126, 74	P.Ives
66	North Carolina Atlas...	1975	SLA 1980, 122, 51	C.W.Olmstead
67	Atlas of North Dakota	1976	SLA 1980, 120, 78	C.A.Seavey
68	North Dakota Economic Atlas	1969	SLA 1970, 80, 68	J.C.Hudson
69	Ohio, an Atlas	1975	SLA 1979, 117, 69	P.V.Crawford
70	Atlas of Oregon	1976	SUC 1982, 15(2), 63	G.R.Lawrence
71	Atlas of Oregon	1976	SUC 1979, 12(1), 61	J.H.Paterson
72	Rhode Island Atlas	1982	SLA 1985, 139, 73	L.Yacher

(continued...

Table 4.1 Reviews Cited (continued)

Ref.	Name of Atlas	Date	Review Location*	Reviewer
73	Rhode Island Atlas	1982	AC 1985, 12(1)	D.J.Cuff
74	Atlas of South Dakota	1970	SLA 1972, 87, 67	C.W.Olmstead
75	Atlas of Texas	1976	SLA 1978, 112, 84	C.W.Olmstead
76	Atlas of Texas	1973	CY 1975, 9(1), 57	L.Sternstein
77	Atlas of Utah	1981	AC 1983, 10(2), 163	S.Lavin
78	An Atlas of Wisconsin	1972	CY 1978, 10(3), 169	G.Martin

Notes to Table 4.1

*Review Location = Journal, date of review, volume(number), page.

Journal Titles and Abbreviations

AC American Cartographer
AG Albertan Geographer
CA Cartographica/Canadian Cartographer
CGJ Canadian Geographic Journal
CGR Canadian Geographer
CJ Cartographic Journal (U.K.)
CS Canadian Surveyor
CY Cartography (Australian)
GM Geographical Magazine (U.K.)
PG Professional Geographer
SLA Bulletin of Geography and Map Division of Special Libraries Association
SUC Bulletin of Society of University Cartographers (U.K.)

Other Journals Searched

Annals of Association of American Geographers
Geographical Journal
Ontario Geography

4.2 METHODOLOGY - THE CONTENT ANALYSIS METHOD

Content analysis is employed in this study as a methodology to identify not only which aspects of content and design are of greatest interest to reviewers, but also those which cause greatest satisfaction or concern.

Content analysis is the systematic application of an objective set of rules to text. It was defined by Holsti (1969) as "any technique for making inferences by objectively and systematically identifying specified characteristics of messages." Based in sociology, the method is most commonly applied by geographers in a historical research context (Moodie, 1971), where it is used to quantify qualitative source materials. Source materials usually consist of a variety of documents not written with the researcher's purpose in mind, including letters, timetables, diaries, reports, and newspapers. The researcher enumerates specific words relating to the topic of interest, and results are analyzed in order to discover patterns in the data which can lead to generalizations, as well as to descriptions of trends in behaviours and attitudes over time.

The validity of this method of inquiry and the degree to which it is capable of achieving its aims depend on the rigour and exclusivity of the categories selected and on the objectivity which can be achieved in placing information within them. Reliability (i.e. objectivity or replicability) of results depends upon the level of ambiguity in source materials, clarity and exclusivity of categories, and coding consistency (Moodie, 1971).

The six steps of the method as specified by Kidder (1981; p.287) and their relevance to this study are outlined below.

1. Choice of phenomena to be coded: Reviews of provincial and state atlases.
2. Selecting the media from which observations are to be made: The journals cited at the foot of Table 4.1 represent both cartographic and geographic perspectives.
3. Derivation of coding categories: In order to gain maximum insight, the usual simple binary coding system (presence/absence) was expanded to include a range of comments from strongly positive to strongly negative. Coding categories were based on papers addressing both general and specific atlas themes (for example, Fremlin and Sebert, 1972; Petchenik, 1985; Castner, 1976; Loy, 1980;

Vedeneyeva, 1986), and evaluative criteria established for Kister's Atlas Buying Guide (1984); the pre-test readings of some reviews were also helpful. Judgement criteria are explained further in Section 4.3 below.

4. Sampling strategy: Here the total number of reviews was sufficiently small that every reference to the phenomena was coded.
5. Training coders: Not required - with a single researcher working over a limited time period, reliability is least compromised.
6. Data analysis: Coded data were summarized in absolute and percentage format. The Lotus 1-2-3 spreadsheet programme was used to assist in this aspect of the study. In addition, many aspects of the analysis which would be masked by numerical tabulations are summarized in written form in Section 4.4 below.

4.3 JUDGEMENT CRITERIA (Table 4.2)

4.3.1 Introduction

Although the specific topics which may be discussed by any individual reviewer vary enormously, all comments regarding provincial and state atlases tend to fall into four broad categories: Content, Data, Design and Format, and General. Specific topics within these broad divisions are listed in Table 4.2, which also summarizes the reviewers' frequency of mention and overall opinion of each topic.

4.3.2 Content Criteria

All but one reviewer mention TOPICAL COVERAGE, that is, description and critique of the subjects covered by the atlas, both in general and on specific maps. Satisfaction level is generally high, with only 10% less than satisfied. Less than half the reviewers discuss the ORGANISATION of topics, that is, the way in which topics are grouped. There is considerable dissatisfaction among these reviewers.

TEXT, including all written material, is frequently discussed, and generally considered to be of high quality. Half the reviewers mention INDICES, which help the reader to locate specific maps or data, and GAZETTEERS, which give locations of topographical data which may or may not be mapped as well. Other contents discussed

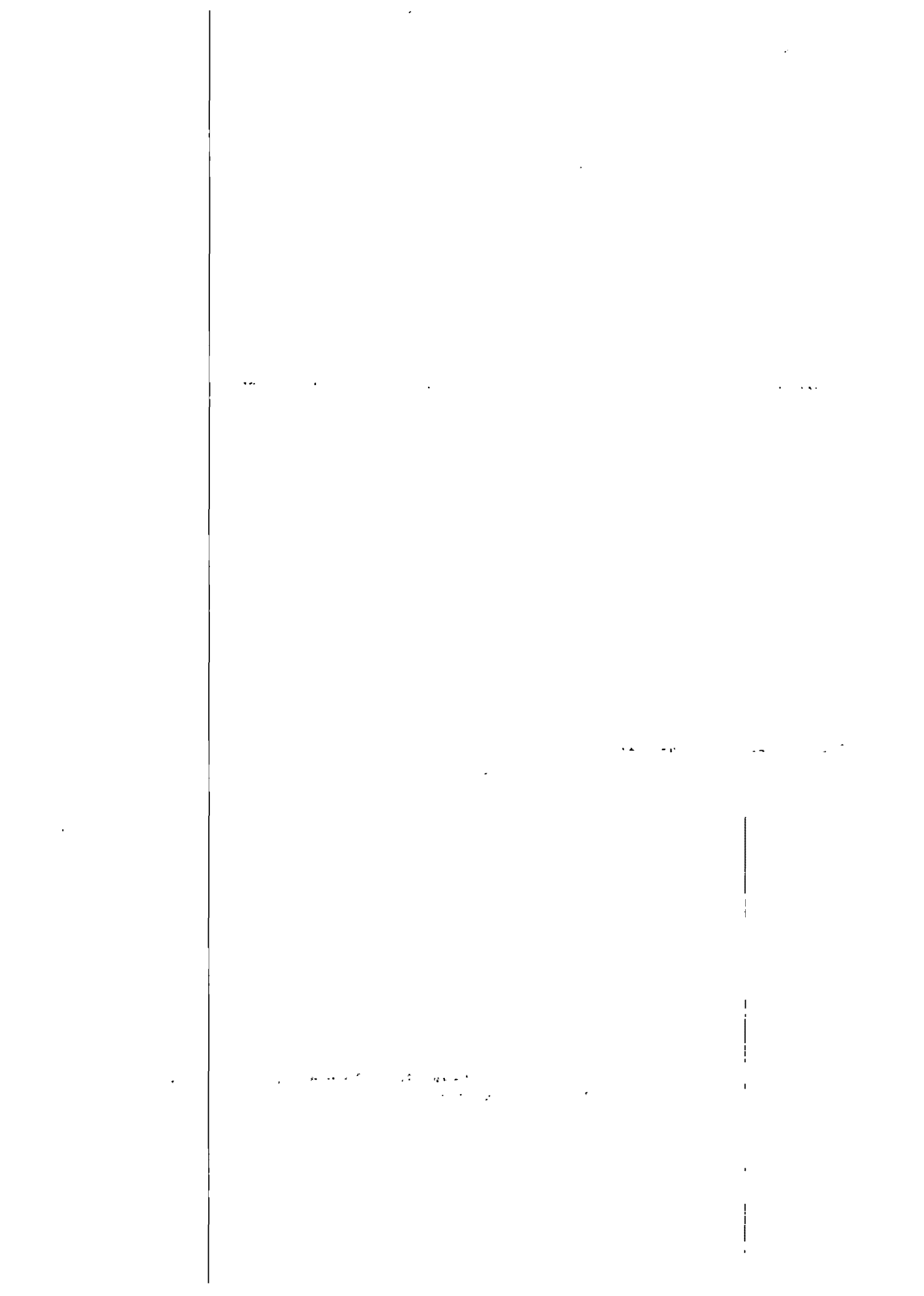


Table 4.2 Judgement Criteria

	MENTIONS			OVERALL OPINION, %					
	#	%	Frequency[a]	Strongly Positive	mildly	Neutral	Mildly Negative	Strongly	Satisfaction Level[b]
CONTENT									
Topical Coverage	77	99	often	45	8	36	4	6	high
Organisation	32	41		30	0	27	12	30	low
Text	55	71	often	42	5	40	2	11	high
Index/Gazetteer	35	45		29	3	63	0	6	high
Other	46	59		37	2	61	0	0	high
DATA									
Accuracy	10	13	rarely	30	0	30	0	40	low
Date	14	18	rarely	29	0	29	14	29	low
DESIGN AND FORMAT									
In general	46	59		63	0	15	0	22	high
Layout	22	28		55	0	14	9	23	high
Scales	33	42		24	3	42	12	18	
Symbols	51	65		27	8	35	14	16	
Colour	65	83	often	32	3	45	5	15	
Typography	22	28		23	5	0	23	50	low
Drafting	14	18	rarely	3	7	0	7	43	
Basemaps	14	18	rarely	21	0	14	36	29	low
Dimensions	34	44		24	0	71	3	3	
Binding	27	35		63	0	19	11	7	high
Printing	29	37		59	3	14	10	14	high
GENERAL									
Price	22	28		45	0	23	0	32	
User	44	56		50	0	43	0	7	high
Production Team	50	64		18	0	80	0	2	
Recommendation	77	99	often	56	0	27	5	12	high
TOTAL REVIEWS	78	100%							

Notes:

a. Rated "Often" if mentioned in over 70% of reviews.
Rated "Rarely" if mentioned in less than 25% of reviews.

b. Rated "High" if mean opinion is above halfway between Neutral and Slightly Positive.
Rated "Low" if mean opinion is below Neutral.

and generally approved include photographs, diagrams, statistical tables, lists of data sources and bibliographies.

4.3.3 Data

Data handling issues, which bridge the content and design categories, are not commonly addressed. Where discussed, comments are most often negative. Concerns include ACCURACY of data and whether sources are given, permitting accuracy checks and further research if desired. Comment is made about how UP TO DATE the data are or can be expected to be, and there are frequent concerns about whether absolute or relative data should be displayed.

4.3.4 Design and Format

General comment on OVERALL DESIGN is made about 60% of the time, expressing a high degree of satisfaction. LAYOUT, here taken to refer to the design of individual maps, is mentioned only half as often. Just over 40% specifically mention SCALES, which includes whether scales are acceptable and whether scale statements are present and accurate. SYMBOLIZATION, which includes the types of symbols used, their appropriateness and effectiveness, is second only to the use of COLOUR as the most frequently mentioned design category. About a third of the reviews include comment on TYPOGRAPHY, which covers diversity of size and style of type, and its placement. Although absolute numbers are not high, there is a higher proportion of negative comment regarding typography than about any other category. Neither DRAFTING, that is the execution of linework and symbolization, nor the content or design of BASEMAPS, is discussed often. Again, those who do mention them are generally dissatisfied.

With respect to the general format topics, nearly half the reviewers mention DIMENSIONS, the physical size and shape of the atlas. About a third discuss BINDING and PRINTING issues, and most comments are favourable. Printing includes aspects such as unevenness of colours, registration irregularities, and paper quality.

4.3.5 General Criteria

About a quarter of the reviews mention PRICE, which does not concern production costs, but the reviewer's perception of acceptability of the market price to a

potential buyer. A clear majority mention the PRODUCTION TEAM, who and how many people were involved, and the USER. Reviewers frequently note satisfaction with the atlas's stated purpose, as well as their own opinion as to appropriate use. Only one failed to give an opinion as an OVERALL JUDGEMENT.

Other categories originally proposed failed to attract more than a handful of comments. For instance, neither graticules nor projections were mentioned more than five times. This either suggests total satisfaction with the status quo, or that these criteria are judged by reviewers to be of little significance on non-global scale maps which are unlikely to be used to measure areas or to locate places absolutely.

4.4 THE REVIEWERS' COMMENTS

4.4.1 Introduction

Each topic of interest elicited an assortment of insightful comment not possible to include in the quantitative summary in Section 4.3 above. The following paragraphs, therefore, collate such commentary under the same topic headings, to present not only a qualitative summary of reviewers' comments, but also in an attempt to provide some explanation for the quantitative data above.

Specific reviews cited are indicated by square bracket reference to the reviews, numbered as listed in Table 4.1.

4.4.2 Content

TOPICAL COVERAGE

Only one of the 78 reviews fails to mention this category, and satisfaction level is high. Many praise the comprehensive nature of the coverage [5, 15, 23, 27, 46, 53, 57, 64, 76], which results in an uncomplicated, straightforward product [5]. Others question the need for encyclopedic coverage [2, 29, 71, 76] "A thematic atlas must do more than pile up maps" [76].

Some reviewers feel strongly that information readily available elsewhere need not be repeated [2, 47]. This is not always understood by reviewers: the reviewer of the Economic Atlas of Ontario, for example, was surprised not to find "an adequate relief map in the entire atlas" [15]. Unexplained inclusion of trivial subjects [42] and

unbalanced coverage [8, 18] may be the result of editors being swayed by availability of easily mapped government statistics [18, 22, 46]. Misguided attempts to appeal to the public market may lead to excessive shallowness of coverage [27].

Maps, it is observed, should be analytical and synthetic [2, 16], concentrating on display of spatial relationships between data; for example, usage of rail lines, not just their existence [71], population density related to the transport network [57], and the depiction of traffic volumes, not just roads [19]. After all, if maps do not show relationships between data, there can be no explanations of distributions [25].

A provincial atlas should concentrate on imparting the flavour of the province. Thus the Atlas of Alberta is praised for "outstanding coverage of oil and gas reserves" [4]. But there are many complaints: Iowa's atlas is frustratingly dry, giving little idea of what the state is like [50], California's surprisingly lacks maps of its fog, transport of water, or fault names [32]; North Dakota's has too little on the agricultural economy [68]; Hawaii's too little on vulcanism [41]. Ubiquitous topics which do not characterize the state are considered irrelevant, demonstrated by four pages on fast food outlets in Utah [77].

Non-traditional topics are more likely to be praised than criticised. These include: taxation and income in Florida [33], "courageous" maps of air pollution in Honolulu [40]; daytime population density in Winnipeg [11]; and "excellent off-beat New Mexican map topics", although this reviewer gives no specific examples [65].

General reference maps are considered important by some [23, 49], as is division of the state into regional components [11, 53]. Several stress the need to include maps of areas beyond the state boundaries to show its wider setting, by positive [37, 38, 39, 41, 44, 73, 75, 77] or negative [53, 26] comment, or both [3]. Inclusion of maps of wider climate patterns is particularly praised [41, 72, 73].

ORGANIZATION

"Traditional" organization -- a succession through physical, economic and social themes -- is acknowledged and favourably accepted by most reviewers. Only one reviewer obviously disagrees with this format. With regard to two atlases, he comments on "traditional hoary ordering" [2] and "usual tedious topical organization" [33] (That

this reviewer happens to be the editor of the unconventional Economic Atlas of Ontario perhaps is not mere coincidence!).

Illogicality [78] and lack of a clear focus, with no apparent order within [38, 55] or between [45] sections are decried. Unorthodoxy tends to elicit negative comment [23, 35] -- the reviewer's understanding of the logic is vital. The Atlas of Arizona's "unique organizational approach", with each chapter related to population is acceptable to one reviewer [29], but not to another [28] who finds it poorly planned and unbalanced. Placing maps which acknowledge people at the beginning of the atlas is "arguable" to one reviewer [32], but the first inclusion of people on page 105 of 135 is "far too late" to another [74].

TEXT

The major debate on the subject of text is whether it should exist at all, and if so, in what proportion. Should it be descriptive, should it be analytical, and should it cover a wider or the same range of topics as the maps? There are clearly two divergent points of view.

Several reviewers find text "a most useful means of explaining and amplifying patterns..." [11], and its absence is a cause for complaint: "Maps alone are not enough for a regional study. Some sort of supporting text is necessary" [78]. Without text a state's character is hard to show [50]. Those who support the inclusion of text tend towards recommending it take half the total space [11, 41, 43, 61, 66]. However, there are also calls for "about a third" [29, 71] and for "much less" text [22, 26, 30, 57, 59, 60]. Some reviewers are concerned that younger readers would be discouraged by excessive length of text [29, 72]. A few are happy with its total absence, on the assumption that maps should be self-explanatory [45].

Text is best located opposite the relevant map [11, 19, 21, 65], thus reducing page flipping. But effective communication is possible whenever graphics are "intelligently integrated into text" [66].

Text should be "straightforward and easily understood" [26], but mere description of map distributions is frowned upon in favour of interpretation and analysis [25, 60, 72, 74], as long as explanations are plausible [60]. Topics discussed in the text, but not mapped, are irritating to some [17], and actual disagreement between map and text is

intolerable [30]. Having a large number of contributors to one atlas causes one reviewer to complain of uneven textual coverage [23], while another reviewer of the same atlas appreciates the well balanced uniform style [24]!

OTHER CONTENTS

Other atlas components may include photographs, statistical charts and tables, overlays, index and gazetteer. Most are welcome additions. Indeed they may be perceived to be more effective than maps in showing some types of data [40].

Carefully selected photographs are frequently mentioned as an aid towards grasp of the character of a state [22, 71, 77] and their absence regretted [3, 50]. But they must be relevant [34] or the space is better used to increase map size [55] -- photographs of artists and sportsmen are not appropriate [24].

Some specifically note the need for an index and a gazetteer [4, 42, 76]. But the lack of charts, graphs and tables pleased one reviewer because their presence dates an atlas quickly [51].

Several reviewers are pleased to see transparent overlays of county names, towns, etc., as a handy reference tool [38, 44, 45, 51, 53, 57, 64]. A particularly poignant commentary in a scathing review suggests that the overlay "blank outline maps provided may be the most useful part" of the atlas [74].

4.4.3 Data

Most frequent comment regarding data refers to accuracy and date of information. Maps of outdated information are often regretted [29, 32], but the use of census data perhaps makes this inevitable [54] since its availability is beyond the atlas maker's control [33]. It is recognized that static maps of absolute data date far more rapidly than those showing relative data [24]. It may also be dangerous to show data for only one specific year which may not be typical, far better to show trends [20] or a "selective archival record" [19].

The relatively few atlases which fail to state sources of data clearly are given uniformly short shrift [2, 3, 25, 58], the most extreme comment being "a dire oversight giving the atlas a pretentious air of infallibility" [2].

Data accuracy per se is not frequently discussed, although specific mapping errors are. There is some unease that if simple spelling and location errors are detected there may be many other errors not obviously apparent. The comment: "Neither an atlas nor a railway timetable is of much use if it is not completely accurate" [3] is a sobering thought.

4.4.4 Design and Format

OVERALL DESIGN AND LAYOUT

Statements regarding the overall design tend to be rather sweeping generalizations. Simplicity is praised [19, 20, 31, 63], as is consistency of design by the use of a single cartographer [73]. Maps may be over-generalized [16] or over-reduced [29]. At worst, one atlas's presentation is described as "uninteresting, and, in many cases, unreadable" [76].

The chief complaint about layout of individual pages is that of legends placed in such a way that it is not clear to which maps they refer [9, 41, 53].

SCALES

Most references to scale are merely a listing of the scales used. Some, however, do note that the scale is too small for legibility [32], or incorrect for the page -- either too small [28] or too large [77]. Rounded scales are preferred [40]. Errors as a result of reduction [36] or computer distortion [54] are noted rarely. Scale statements are definitely expected [1, 3, 36, 51, 53, 69]. Only one reviewer considers it acceptable to omit them "in an atlas of this type" [5].

SYMBOLIZATION

A clear majority of reviewers is concerned about symbolization. Variety is praised [21, 67] as are clarity [24] and simplicity [5].

Choropleth maps are the most commonly criticised. There is strong disdain for those which display absolute rather than derived data, adjectives such as "meaningless" and "misleading" occurring often [35, 39, 55, 59, 60, 74]. Some, however, do allow that absolute data may be shown if areal units are uniform [35, 51]. Several reviewers want the classification system to be given explicitly [13, 36], to the point of inclusion of

statements of percentage of variance explained [38]. Frequency histograms are considered an excellent method of showing classes in the legend [21].

Dot maps are particularly praised as a useful technique for showing uneven distributions [20, 24, 43, 56, 69]. But there are criticisms of the placement [16] and sizing [22, 24] of the dot symbols.

Some reviewers think that graduated and proportional symbols are used too often [7, 12, 47]. Both their scaling and accuracy come in for criticism [36, 49, 64, 69, 73].

Isolines are fine for climatic data, but twelve classes are too many to read, and the lines must be included [59]. The data intervals must not be variable [77].

Though a variety of broken line symbols may be needed to discriminate between classes on black and white maps [74], those distinguished by colour are best left in solid form [22].

COLOUR

Reviewers clearly view colour from the user's perspective, considering separation, brightness and logic of system.

Poor separation of colour is noted frequently [8, 16, 33, 35, 41]. Bold colours are appreciated as "imaginative" [7, 23, 58], but are more likely to be disliked as "too bright" [36], "garish" [31] or as "too many gay splashes" [27]. Pastels and bold colours should not both appear in the same atlas [77]. Hue should not be used to show quantitative change [13].

Consistency across topics is praised [63, 73]. Specific inappropriate colour use is criticised, such as an "irritating lavender base for ski resorts" [24], a "visually irritating red base map" [56], and urban size discriminated by colour of type [11]. An appeal is made for consideration of the problems of those with colour blindness [32].

TYPOGRAPHY

The aspects of typography mentioned by reviewers include diversity of size and style, and placement. Most who comment on size consider type too small [11, 22, 36, 61, 64, 69], though only one specifies such size at 3 point. Only one other gives specific point sizes, noting that a range from 4.5 to 20 point is too large [34]. Use of different styles for maps and text is praised [38], but use of too many styles is confusing [22, 34,

39, 59]. Placement does not always follow convention, crossing coasts [36] and failing to curve along rivers [16].

DRAFTING

Drafting is not commonly mentioned per se. A large number of reviewers find linework to be too heavy [16, 17, 27, 29, 34, 39, 40, 53, 69]. However, this may often be a design error rather than a drafting error. Only one atlas was noted as using hand drawn symbols and template lettering, described as "skilfully prepared by hand" by one reviewer [29] but "almost medieval" in crudeness by another [28].

BASEMAPS

The key opinion of basemaps is that they must be kept clear, uncluttered and simple, so that they do not dominate the distribution mapped [5, 8, 20, 42, 78]. Content of the basemaps should be consistent to allow for easy comparisons [24, 68]. Specific recommendations include suggestions that county lines added to physical maps would allow the relating of physical to cultural data [35], and that population should have a road rather than a drainage network base as background [12]. A grey base is useful [73] but must not be so screened as to be barely visible [77].

DIMENSIONS, BINDING AND PRINTING

The few reviewers who do more than baldly state the dimensions vary greatly in their opinions. The 9" x 12" size is variously described as "manageable, easy to shelve" [38], large [39], and small [40]. The vertical format is noted to be preferred by the user as "more pleasing" [64], or "for user-oriented reasons" [24], but when the province or state does not share that shape, its use may cause maps to be too small [29] or to lose information in the central gutter [22].

This data loss is also attributed to too tight binding [2] and too narrow margins on the bound edge [17, 47]. Bindings should also allow the atlas to lie flat when open [30] and be strong enough for library use [54].

Unevenness of printing is noted, particularly the problems of worn screens [2, 16, 69, 77], and poor registration [2, 45, 46, 47, 69, 77]. Glossy paper is preferred by many

[25, 30, 35, 38], but one reviewer finds glossy paper "brash and garish", preferring matte [19]. One finds non-glossy thin paper totally unacceptable [59].

4.4.5 General Criteria

PRICE

Although some reviewers do find their atlas too expensive, a reviewer is just as likely to be pleased with the price, with comments such as "priced well below the expensive hours of labour and thought..." [24].

THE USER

Barely half the reviewers mention the potential atlas user, and only half of these note the intended market. Overall, there is a clear indication that education is a dominant goal, "students" almost always occurring in the list of potential users. The general public is also targeted, though at times in a derogatory fashion, on the assumption that lower standards are therefore required [24, 27, 33, 63]. Use by researchers is recommended less often, despite stated goals [17, 29, 37, 41, 51]. The same atlas may be considered good [41] or poor [40] for the specialist researcher. Eighteen reviews recommend their atlas for library acquisition. However, it should be noted that fourteen of these are published, not surprisingly, in the Special Libraries Association Bulletin.

PRODUCTION TEAM

A clear majority of reviewers note that the production of their atlases was orchestrated by universities, chiefly departments of geography. Student assistance is acknowledged [36, 43, 44, 45, 55, 57]. Several involved cooperation between universities and government, and a few were exclusively government productions.

Several reviewers praise the remarkable team efforts of large numbers of contributors from both university and government [15, 19, 23, 24, 27, 40, 55, 64]. The use of a large team of researchers allows for "deep and widespread research" [1] and for drawing on a diversity of talent [57] for "innovative ideas" [55]. But it is a difficult task to coordinate large numbers of contributors [64]. Though in one reviewer's opinion a hundred contributors managed to preserve an acceptably uniform style [24], having 125

contributors in another case was thought to cause many of the atlas's problems [77]. When the leadership is by committee, particularly if all are part-time, errors and inconsistencies can easily be missed [3]. The consistency in content and presentation which results from having a single editor and single cartographer is praised [73].

4.5 CONCLUSION: IS THERE CONSENSUS?

The foregoing discussion demonstrates that reviewers put forward a wide range of views. An attempt is made in this section to identify areas of consensus of opinion, and to acknowledge disagreements.

While some reviewers are satisfied with encyclopedic coverage of all mappable topics, there is a clear consensus that an atlas must be more than this. A provincial atlas should map topics which characterize the province, and thus include some unique subjects. Maps should aim to present spatial relationships between data in a search for explanation, not assume that the reader will make the connections independently. It is generally recommended that this explanation be expanded by inclusion of text of analytical rather than descriptive nature. Well chosen photographs and an index are also welcomed. Inaccuracies are not tolerated, indeed are pounced upon with apparent glee by some reviewers.

Logical organisation is vital. Most provincial and state atlases follow a standard pattern which has existed for a century. Deviation from this requires some textual explanation to convince most reviewers to accept it.

Data which are more than five years old are not appreciated. The mapping of trends and of relative data helps to reduce the outdating of information.

Although the atlases reviewed cover the whole spectrum of design complexity from a hand-drafted student effort to a massive tome to which 125 experts contributed, there is a fairly clear picture of what is acceptable design. Simplicity is praised for both basemaps and overall design. Scales must be rounded and clearly stated. Bold colours tend to be frowned upon, though even subdued colours must be clearly separated. Hue must not be used for quantitative divisions.

An atlas gains from use of a variety of symbolization. Choropleth maps come in for much abuse, especially if they are used to display absolute data. However, even this

is permitted by a minority. A minimal variety of type styles is preferred and many find type size too small. Linework is often found to be too heavy.

A roughly 9" x 12" vertical format seems preferred, if the province's shape permits without binding problems. Sloppy printing is uniformly decried. Glossy paper is generally, though not uniformly, preferred.

One of the few major areas of disagreement is in how the production team should be set up. Many of the atlases used large teams of wide expertise resulting in elaborate but uneven works. Some reviewers feel that, with a full time editor and less dispersed input, a more consistent and pleasing result is achieved, and with less errors and overlaps.

Though the objectives of specific atlas initiatives vary, there is clearly a public relations and prestige component to the majority. Most are aimed at the general public first, but the chief users will include educators and students from the high school level up. On the whole, the atlases are not thought to be valuable to specialist researchers.

While a large budget, multi-author, multi-colour tome can be expected to be both a coffee table book for the general public and a reference source for use by the scientific researcher, budget and time limitations of many projects should not cause a reviewer to reject a more modest atlas out of hand. Some of the strongest criticism is directed at low budget atlases which fail to justify their methods or to delimit their market. But this issue could easily be addressed by inclusion of an explanatory introduction in every atlas, making the mandate for the project clear.

CHAPTER FIVE

ATLAS USER SURVEY DESIGN

5.1 PURPOSE

This chapter introduces the questionnaire survey, which was initiated in order to obtain information from atlas users about their behaviour and opinions regarding atlases. The following four areas are addressed:

1. General Atlas Use - with the aims of establishing who uses atlases, for what purposes, how often, when and where.
2. General Atlas Content and Design - with the aim of eliciting opinion on existing atlas design.
3. An Atlas of British Columbia - with the aim of identifying content options by ascertaining levels of interest in topics covered by the 1979 Atlas, and by inviting suggestions for new topics.
4. Alternative Atlas Delivery Formats - with the aim of determining knowledge, interest levels and opinion of non-traditional methods of atlas presentation.

5.2 SURVEY METHOD

5.2.1 Introduction

Atlas users are an elusive and varied population. They can be contacted through very specific user groups (Kirby, 1970) or by rather unpredictable appeals to the general public. In this study, efforts were made to obtain input from both the general public and specific populations who were more likely to be atlas users - geography and history graduates, geography students, and school pupils. Since the information required covers a wide range of topics and some specific knowledge which may require time for consultation, and considerable freedom of choice, a mail format was selected as the major medium. As an additional consideration, mailing cost is independent of location of correspondent, and the same questionnaire could also be used for groups assembled at one time and place which allowed for compilation and comparison across groups.

5.2.2 Sample Selection Procedures

Each user group was sampled in a method appropriate to its characteristics, as outlined below. Telephone costs restricted the general public sampling frame to the local southern Vancouver Island calling area, introducing bias towards a rather small portion of the province. It does, however, include the whole Sooke to Sidney region, which has a considerable non-urban population. All other adult groups hail from a much larger catchment area, with respondents from Hawaii to Ottawa; thus the overall geographic bias is greatly reduced. Response rates for all groups are shown in Section 5.4.

GENERAL PUBLIC

Backstrom and Hursh-Cesar (1981) report that a 10% return is common for mailings to the general public. In an effort to improve on this, a decision was made to pre-screen the general public by making telephone contact first. People selected by a systematic random sampling of the Victoria telephone book were asked a few questions about their atlas use and demographics (See Appendix 1), and then whether they would be willing to complete a mailed questionnaire. Responses to these questions would reduce non-response bias by giving some indication of the characteristics of those who were not willing to complete it. Questionnaires were mailed to those who expressed willingness to reply. After two months, follow-up calls were made to those who had agreed, but had not yet responded.

UNIVERSITY ALUMNI

University of Victoria alumni were chosen to represent a specialised subset of the general public who were of above average education. An assumption was made that geography graduates would have been exposed to atlases at the university and have some clear opinions as to their value. History graduates, while of the same alumni population, would have a different perspective on the value of maps and perhaps be more closely related to the educated general public.

The University of Victoria agreed to supply a list of geography and history alumni for the years from 1979 to 1990. Earlier graduates were unfortunately excluded from the sampling frame due to unavailability of records. A stratified systematic random sample was taken from this list, and questionnaires were mailed with prepaid return envelopes

as for the general public sample. Unfortunately cost restraints precluded personal preliminary telephone or follow-up contact.

UNIVERSITY STUDENTS

Students studying the geography of Canada also form a clear population of potential atlas users. A cluster sample of whole classes was deemed an appropriate way to include all levels of enthusiasm while ensuring a basic level of interest and knowledge. The sample thus consisted of students of the summer and two of the fall 1990 laboratory sections of the Geography 361 (Regional Geography of Canada) class at the University of Victoria. A considerable proportion of these students were planning to teach social studies at the secondary school level.

SCHOOL PUPILS

In order to obtain the opinion of young atlas users it was considered appropriate to sample Grade Ten pupils, who include the study of British Columbia in their Social Studies curriculum. Two diverse cluster samples were used, consisting of all the Grade Ten pupils at an urban private and a rural public school. A letter explaining the purpose of the study was sent to parents (see Appendix 2).

SAMPLES NOT INCLUDED

a. Library self-administered. A passive attempt to obtain input from library atlas users produced only three completed questionnaires over a month. These were not therefore included. Suspicions that the questionnaire was too long for such self-directed acceptance were confirmed by the low response, and by return of one, uncompleted, with a note that students working in the library were just "too busy".

b. Teachers at the schools surveyed were invited to complete questionnaires. These assisted in the pilot stages, formed a valuable control for some factual responses by their pupils, and added useful comment in open-ended questions. Since the number of teachers consulted was too low to form a separate sample, they were not included in the results.

5.2.3 Format of the Questionnaire

As far as possible, the mailed questionnaire (Appendix 3) follows the design recommended by Dillman (1978). This includes grouping related questions by cognitive ties, and placing demographic questions at the end. The purpose of the study is explained in the covering letter (Appendix 4), which includes an eye-catching map illustration. Several open-ended questions are used, against Dillman's advice, because the study is concerned with potentially disparate views which would be lost with a totally closed format.

Despite restrictions of postal weight cost constraints, no questions overlap pages, and sections generally begin on a new page. Lower case letters were reserved for questions, easily distinguished from the answer choices in upper case. Plenty of space was allowed for open-ended responses and an invitation given to add pages as desired. A prepaid return envelope was included.

A copy of the Historical Atlas of Canada, Volume I was offered as a draw prize, as an incentive for return of the questionnaires.

5.2.4 Pre-testing

Preliminary formats of the questionnaire were critiqued by colleagues and committee members. After obtaining permission from the University of Victoria Human Subjects Research Committee to proceed with the survey, teachers and Grade 10 pupils of one school were asked for critical comment while completing a pilot version of the questionnaire. Choice of such a group permitted perusal by a large number of people in a short time. As a result, the wording of three questions was altered (one to omit the word "categories", two to make questions unambiguous), and the entire section regarding the atlas of British Columbia was reworked. Hence opinions of school pupils on topics for an atlas of British Columbia (Question 13) were not elicited. All other questions remained the same, allowing for comparisons between school and adult groups.

5.3 THE QUESTIONNAIRE

5.3.1 Telephone Questionnaire

Randomly selected Victoria residents were asked a few questions regarding atlases (Appendix 1), and whether they would be willing to complete a longer written

questionnaire. Since about half those responding to the oral questions did not complete the mailed questionnaire, the telephone responses allowed comparisons between respondent and non-respondent samples to be made. Telephone surveys were conducted by the author and a research assistant, Ms. Cheryl Peterson, whose assistance was funded through a Summer Work Study Grant.

5.3.2 Mailed Questionnaire

The questionnaire (see Appendix 3) is divided into four sections, General Atlas Use, the Atlas of British Columbia, Alternative Formats, and Background Information (Demographics). The following paragraphs will introduce and justify questions in each section in turn.

Section One: GENERAL ATLAS USE

Question 1: The first question "In your opinion, what is an atlas?" seeks consensus on atlas perception and definition. Contrary to most theory, this positioning of an open, rather difficult first question, not only establishes the respondent's definition of an atlas, but acts as a filter to aid in validation of subsequent questions. Those with no opinion (or knowledge) of what an atlas is are not likely to complete the questionnaire, which, although it reduces response rates, ensures that those who do complete it are more likely to represent true atlas users (which is the true population of interest).

Q. 2, 3: Atlas ownership and use are established nominally by questions 2 and 3 respectively, with owners and users invited to name the specific atlases they use. Leaving these questions open allows respondents to give as much or as little detail as they wish. For the purpose of this research, our interest is only in classifying general atlas type, rather than in individual named atlases per se. However, it was considered that classifying atlases based on titles supplied by respondents would be more valid than if respondents were to do the classification themselves.

Q. 4-6: Any number of the offered responses is permitted to question 4, which is designed to ascertain where atlases are used. Question 5 establishes

frequency of use. Responses to these questions could subsequently be cross-tabulated with demographic data to determine variations in use patterns. Question 6 establishes purpose of atlas use. Using an open format for this question was thought preferable since it forces respondents to question the purpose of their atlas use, rather than being guided by set response options.

Q. 7: Early placement of a question regarding currency of information was thought appropriate to establish the level of importance of up to date information to respondents, unconnected to questions concerning an electronic atlas concept introduced later.

Q. 8: Atlases frequently include a wide range of non-map components such as text, diagrams and indexes. Question 8 aims to elicit opinion on how valuable these components are to users.

Q. 9-10: The section concludes with an open-ended invitation to comment on any aspect of atlas content and design which particularly appeals to, or irritates, respondents.

Section Two: CONTENT OF AN ATLAS FOR BRITISH COLUMBIA

Although results and analysis of this section were subsequently to be separated from those of the other sections, these questions were placed near the beginning of the questionnaire to ensure that respondents were not constrained in their choice by concerns about possible delivery formats, which are raised in the following section.

Q. 11-12: One of the end goals of the research undertaken is to make recommendations for a new atlas of British Columbia. Respondents, therefore, are asked for their use of and views on an existing general atlas of the province. Thus Questions 11 and 12 seek to determine familiarity with and use of the 1979 Atlas of British Columbia.

Q. 13: This concerns opinion of potential contents for an atlas of British Columbia. Response choices were structured in conditional format so that the question could be answered by all respondents, whether they were familiar with the 1979 atlas or not. Topics and sub-topics were deliberately alphabetized to reduce any bias of ordering. Complete

freedom to suggest additional topics was given both with each general topic and at the end of the question.

Section Three: ALTERNATIVE FORMATS

In this section opinions are solicited about alternative atlas formats, some of which may not be familiar to respondents.

Q. 14: Eliciting opinion of the loose sheet format now adopted by the Atlas of Canada permits the respondent to consider first an easily visualised format that differs only slightly from that of a conventional book.

Q. 15-18: These query awareness and opinions of computer maps, and access to microcomputers.

Q. 19-21: These are designed to establish the level of interest in three areas (zoom, overlay and rapid update) in which an electronic atlas is generally assumed to be superior to a book.

Q. 22: Some possible electronic atlas formats are offered here, including a non-threatening option which allows those who do not understand the cited technology to indicate so in a clear alternate selection.

Q. 23-26: These questions are designed to establish the level of interest in paying for a new technology. The television option, as perhaps the most easily understood concept, is further explored, and comments are invited regarding other alternative format possibilities.

Q. 27-28: "Traditionalists" and others are invited to indicate their dominant preferences and to defend their choice.

Section Four: BACKGROUND INFORMATION

The demographic information elicited in this section permits classification by age (**Question 1**), household income (**Question 2**) and size (**Question 4**), gender (**Question 3**), education level (**Question 5**), and occupation (**Question 6**). The main purpose was to determine sample reliability, as well as to investigate possible relationships with atlas use and attitudes, where sample sizes permit. It is hypothesized that older respondents would be less interested in electronic atlases but would own more traditional atlases, for

example, and that those with lower education would own and use fewer atlases than those with higher levels of education.

Other questions in this section (**Questions 7-8**) explore possible uses for an atlas in work and leisure situations, and give final opportunity for general open comment.

5.4 TIMING OF SURVEYS AND RESPONSE RATES (Table 5.1)

Of the 242 members of the GENERAL PUBLIC identified by the systematic random sampling of the Victoria telephone book, 131 (54%) were contacted after two attempts, made between 5 and 8 p.m. on week nights in late June 1990. Of these, 50 (38%) refused to be interviewed, 81 (62%) answered the few oral questions and 54 (41%) agreed to do the mail survey. This was mailed out in early July. Of these 54, 37 returned it, representing 28% of the original contacts and 69% of those who had verbally agreed to respond.

Three hundred questionnaires were mailed in September 1990 to equal numbers of GEOGRAPHY AND HISTORY ALUMNI of the University of Victoria, who had been chosen by a stratified systematic random selection process, with no follow-up. Excluding the 32 (11%) which were returned unopened, address unknown, 30 (22%) of the history alumni and 47 (35%) of the geography alumni returned completed questionnaires.

The entire summer 1990 class and two of the four laboratory sections of the fall 1990 class of Geography 361A class of UNIVERSITY STUDENTS were also included. This gave a total of 161 adults.

Entire Grade Ten classes at a PRIVATE (60) and a PUBLIC SCHOOL (68) were surveyed in June, 1990, with only three questionnaires spoiled, for a total school pupil sample of 128.

Response rates are summarized in Table 5.1.

5.5 PREPARATION FOR QUESTIONNAIRE ANALYSIS

Data for completed questionnaires were coded by hand onto machine- readable coding forms and read into the University of Victoria's mainframe computer using the University of Victoria's Survey Automated Marking Service (Muttiah, 1988). Analysis was performed using the PC version of the Statistical Analysis System (SAS). Results are presented in the following chapters. General topics of atlas use and alternative formats

are presented in Chapter Six. Suggestions for topical content for a new atlas for British Columbia (Section Two of the questionnaire) are considered separately in Chapter Seven.

Table 5.1 Populations and Sample Sizes

	Selected	Contacted	Completed	Response Rate
General Public	242	131	37	28%(69%)
Geography Alumni	150	134	47	35%
History Alumni	150	134	30	22%
Geography Students		47	47	(100%)
TOTAL ADULT		446	161	(36%)

Public School	68
Private School	60
TOTAL SCHOOL	128

CHAPTER SIX

USER SURVEY RESULTS: GENERAL TOPICS

6.1 INTRODUCTION

This chapter is devoted to presentation of results from most of the atlas user survey undertaken in 1990, (based in part on the analysis and presentation methods recommended by Backstrom and Hursh-Cesar (1981)). It begins with a description of respondents, where possible relating their profile to those of known non-respondents, and to the population of Victoria as a whole. "Non-respondents" are defined as members of our initial public random sample who answered a few oral questions but were unwilling to complete the written questionnaire. The profile for the population of Victoria as a whole was derived from the Victoria Census Metropolitan Area (CMA) data in the 1986 Census of Canada (Statistics Canada,1986).

The overall adult sample is 161 respondents, composed of 37 general public, 30 history alumni, 47 geography alumni, and 47 geography students. The school pupil sample of 128 is composed of 68 public and 60 private school respondents. Results are generally reported as percentages of total respondents to each separate question, with sample size reported in each case. Note that where several responses are permitted, as in the open questions, percentages do not add to 100%. Calculation of a "Mean Rank" is made in some situations, not to imply any numerically meaningful unit, but in order to compare rankings between user groups. Bracketed numbers in the text refer to absolute numbers of respondents.

All closed and some open question responses are summarized in tabular format. The reader is encouraged to study the tables in detail to complement the brief written summary which follows. Complete detail of open responses is being kept on file and can be made available on request.

Following the profile of respondents, their perception of what constitutes an atlas is explored. The remaining sections of the questionnaire are analyzed in the following order: General Use of Atlases (6.3), General Views of Atlas Content and

Design (6.4), and Alternative Formats (6.5). User ideas for content of an atlas for British Columbia are addressed in Chapter 7.

6.2 PROFILE OF RESPONDENTS

6.2.1 Introduction

Adult respondents supplied demographic information on age group, household size and income, gender, education level, and occupation. This was compared with overall figures for the Victoria CMA, which were acquired from the 1986 Census of Canada. Members of the general public who answered the few telephoned questions but did not complete the written questionnaire supplied a comparative sample of "non-respondents" (See Section 5.2.2 and Appendix 1). All the school pupils fell into the same age and education level, so were separated demographically only with respect to gender.

6.2.2 Responses

AGE (Table 6.1)

The general public sample is considerably older than any other group, with a mean rank of 4.3 compared to the adult mean rank of 2.8 and that of the Victoria CMA of 3.1. But its composition is remarkably similar to the non-respondents' age profile (their mean ages are also close, at 48 and 45 years). Above the youngest age class our public sample shows a similar pattern to the census figures (note that the census categories are defined slightly differently from those for the survey).

The overall adult age profile's skew towards younger people reflects not only the university students, but also the fact that the alumni groups are somewhat younger than the average population, being biased by the availability of University of Victoria alumni records (see Section 5.2.2).

HOUSEHOLD INCOME (Table 6.2)

Overall adult average incomes are similar to the 1986 Census figures, but no adjustments were made for inflation, so our 1990 sample has undoubtedly rather lower than the overall population's average household income. Over a quarter of our sample are university students, which would be expected to skew the overall profile towards the lower income spectrum.

Table 6.1 Age Groups, by percentage

RESPONSE		VICTORIA*	ADULT ALL +	ADULT General Public	ADULT History Alumni	ADULT Geography Alumni	ADULT Geography Students	ADULT Nonresp.	SCHOOL ALL	SCHOOL Public	SCHOOL Private
under 21	(1)	23	8		4	-	21	13	100	100	100
21-30	(2)	16	48	11	65	48	68	24			
31-40	(3)	16	25	25	25	46	6	10			
41-50	(4)	11	6	17	-	4	4	15			
51-60	(5)	10	5	14	4	2	-	10			
61-70	(6)	11	5	17	4	-	-	5			
over 70	(7)	13	3	14	-	-	-	24			
Mean Rank		3.1	2.8	4.3	2.5	2.5	1.9	4.0	1.0	1.0	1.0
Sample Size		-	157	36	28	46	47	41	128	68	60

* Victoria Census Metropolitan Area age groups for the 1986 Census are: under 20, 20-29, 30-39, etc.

(#) Rank, used in calculation of Mean Rank

\+ Total adult sample, excluding non-respondents

Table 6.2 Household Income, by percentage

RESPONSE		ADULT						
		VICTORIA	ALL	General Public	History Alumni	Geography Alumni	Geography Students
under $20,000	(1)	37	35	20	35	11	72
$20-30,000	(2)	19	14	14	8	26	5
$30-40,000	(3)	15	15	17	15	22	5
$40-60,000	(4)	28	14	11	15	26	2
$60-80,000	(5)		15	26	19	11	7
$80-100,000	(6)		5	9	4	4	5
over $100,000	(7)		3	3	4	-	5
Mean Rank		2.5	2.9	3.5	3.0	3.1	2.0
Sample Size		-	150	35	26	46	43

(#) Rank, used in calculating Mean Rank

A third of the adult respondents have a household income below $20,000 which includes 3/4 of the students but only a tenth of the geography alumni and a fifth of the public sample.

HOUSEHOLD SIZE (Table 6.3)

Our sample overall has a mean household size of 2.4 persons, marginally above the Victoria mean of 2.3. There is little variation between the groups, except for the students, who are most likely to live alone. For all other groups, as well as the Victoria CMA, there are more two-person households than any other size. Our general public sample has the smallest range of household sizes.

GENDER (Table 6.4)

Males generally predominate over females, except for the general public sample, in which females dominate, showing remarkable similarity to the non-respondent and to the Victoria CMA ratio. The strongest contrast is the 2:1 ratio of males to females for geography alumni. This does, however, correctly reflect the ratio of male to female geography majors alumni. This was computed from counts for the calendar years 1990 and 1989 of those enroled in Geography 321, the only required course exclusive to University of Victoria geography majors. In each year the male:female ratio was 63:37. The geography students of our sample are not typical geography majors, since they were selected as atlas users for their study of the Geography of Canada (Geography 361A), a course with a high proportion of education majors.

There is a much higher proportion of male pupils in the private than the public school, which may affect some responses.

EDUCATION LEVEL (Table 6.5)

The unusually high education level profile reflects the deliberate seeking of student and university alumni samples. Comparison of percentages and mean ranks for our random public sample and Victoria's census data shows that our sample is somewhat better educated than the average for the metropolitan area. In addition, over a quarter of them are university graduates compared to only an eighth of the overall population.

Table 6.3 Household Size, by percentage

RESPONSE	VICTORIA	ADULT ALL	General Public	History Alumni	Geography Alumni	Geography Students
1 person	29	24	20	21	20	33
2	37	35	43	29	41	27
3	14	21	26	29	17	18
4	18	14	11	11	20	11
5		5	-	11	-	11
6 or more	2	1	-	-	2	-
True Mean	2.3	2.4	2.3	2.6	2.5	2.4
Sample Size	-	154	35	28	46	45

Table 6.4 Gender of Respondents, by percentage

		ADULT						SCHOOL		
RESPONSE	VICTORIA	ALL	General Public	History Alumni	Geography Alumni	Geography Students	Nonresp.	ALL	Public	Private
Male	48	57	46	57	67	55	45	57	52	63
Female	52	43	54	43	33	45	55	43	48	37
Sample Size	-	153	35	28	46	44	44	117	60	57

Table 6.5 Education Level, by percentage

RESPONSE		VICTORIA*	ADULT					
			ALL	General Public	History Alumni	Geography Alumni	Geography Students	
Grade 9	(1)	8	1	5	-	-	-	
Grade 12	(2)	28	6	25	-	-	-	
Some College	(3)	21	31	33	-	-	78	
College Diploma	(4)	19	4	8	-	-	4	
University Degree	(5)	12	47	25	83	74	15	
Graduate Degree	(6)		11	3	17	24	2	
Mean Rank		2.6	4.2	3.3	5.2	5.2	3.4	
Sample Size		-	157	36	29	46	46	

* Victoria CMA data gives percentage of population over 15 years of age

(#) Rank, used in calculation of Mean Rank

OCCUPATIONS (Table 6.6)

Occupations were grouped according to Census categories (Statistics Canada, 1981). Overall, our sample had a higher proportion of scientific and teaching occupations than the Victoria population, mainly in the geography alumni sample.

Our general public sample (as well as the non-respondents) includes a higher proportion of managers than in the Victoria CMA as a whole, and a sharply lower proportion of clerical, sales and service occupations. Here the non-respondents represent the middle group between the census figures and our sample. Over a third of our general public sample is retired, above the census average, but very similar to the non-respondents. Nearly half the history alumni sample classify themselves as students, a figure which is reflected in their low average incomes.

6.2.3 Conclusions

While it would be simpler to consider the entire adult sample as a whole, there are sufficient differences in the characteristics of the component groups that too much information would be lost by simple pooling of the data.

Comparison with the Victoria CMA census figures shows that our general public sample has minimal bias with respect to age, household income and size, and gender, but is better educated than most. Non-respondents, members of our randomly selected sample who answered only a few oral questions, were even more similar to our respondents in age, gender, and occupation, thus allowing for a considerable degree of confidence in generalizing our conclusions beyond the samples themselves. Nevertheless, for some specific questions, response rate does drop sufficiently low for some groups that results must be interpreted cautiously as experimental and by no means fully conclusive.

The high proportion of continuing students and associated low age and income of history alumni is the most extraordinary finding in the profiling of our respondents. Their overall response rate of 22% demonstrates the lowest level of interest in atlas use of all the user groups. The demographic profile of the sample perhaps suggests a propensity to assist a fellow student, despite their relatively low atlas use (See Section 6.3.2 and Table 6.13). Geography alumni, on the other hand, with a much higher 35%

Table 6.6 Occupations, by percentage

RESPONSE	VICTORIA*	ADULT						
		ALL	General Public	History Alumni	Geography Alumni	Geography Students	Nonresp.
Managerial/admin.	6	6	19	7	2	–	15
Science, health and engineering	9	18	11	18	43	–	5
Arts and recreation		5	3	4	13	–	–
Teaching	3	10	5	11	19	5	–
Clerical, sales and service	29	4	3	18	2	–	15
Retired, homemakers	40	9	38	–	2	–	40
Students		41	8	43	11	95	15
Other	13	6	14	–	9	–	10
Sample Size	–	159	37	28	47	47	41

* Victoria CMA data gives percentage of population over 15 years of age

response rate, show not only a greater interest in the topic, but also a far wider age, occupation and income range.

Although a deliberately selected characteristic of our alumni groups, the education level of the general public sample is also higher than the census average, which is perhaps also reflected in a correspondingly lower proportion of service occupations. Other discrepancies are reasonably explained by deliberate or recognized abnormalities in the samples.

6.3 GENERAL ATLAS USE

6.3.1 Introduction

This section first summarizes respondents' views as to what defines an atlas. It then identifies the level of atlas use within the user groups, differentiating between atlases owned and borrowed by atlas type. Frequency and location of use are investigated and the specific uses to which atlases are put are classified and summarized.

6.3.2 Responses

DEFINITION OF AN ATLAS

The vast majority of respondents (282 of 289) offered a definition of an atlas. A content analysis search for keywords revealed that 60% of respondents include the words "book" and "maps" in their definition, though only 5% have "a book of maps" as their complete definition. Less than half the adults include the word "book" whereas 3/4 of the school pupils do. Half of the adults but only a tenth of the school pupils include "geographic" or "spatial," and a similar proportion see an atlas as an "information" or "reference" source. A third of the school pupils include "world" in their definitions, versus less than a fifth of the adults.

The basic definition put forward by adults suggests that an atlas is simply a collection of maps. To this may be added "of the world," with the objective of enabling the user to locate places.

A second group were also concerned with the value of an atlas as a general reference source of geographical and statistical information:

"A pictorial representation of numerical facts."

"An encyclopedia of spatial information."

"A collection of graphic displays, supplemented with text, that provide information on any given subject(s) in terms of its (their) spatio-temporal qualities and context."

"A reference source that provides information on geographical subjects, topographic, demographic and economic."

Longer definitions may simply list more detail of topics an atlas should cover, but there is also a purposive element, suggesting the explanatory value of atlases:

"A way of making spatial sense of human, environmental and physical statistical information."

"...helps one better understand the environment."

"...helps you to visualize the area."

"...captures the human elements of the region it describes."

The value of a common theme is hinted at, but very little specific reference to the value of atlases in showing inter-relationships between thematic data. There are also the dreamers, who see an atlas as a means of expanding their horizons beyond everyday experience:

"...lots of things to look at and imagine."

"A ticket out, figuratively speaking, when a vacation isn't an option."

School pupils' definitions show a clear understanding of atlases as books which contain maps showing locations and geographical information about the world. Definitions are generally short, succinct, and accepting of an atlas as a valuable school resource. It is "a book that tells you where places are" or "provides information on the world in many different ways." A few do not appreciate atlases at all:

"An atlas is a book full of maps and pictures that doesn't have half the things your[sic] trying to find, and is confusing, and inacurtiate[sic]."

But there are also some which show considerable recognition of their value:

"It is a useful book which supplies us with the knowledge and understanding of the politics, population etc of different places in the world."

USERS AS A PROPORTION OF THE POPULATION (Table 6.7)

Nearly all those surveyed used atlases. In fact, of 289 respondents, only 6 admitted to not using one at all. This figure must not be thought to represent the overall

Table 6.7 General Atlas Use, by percentage

RESPONSE	ADULT						SCHOOL		
	ALL	General Public	History Alumni	Geography Alumni	Geography Students	Nonresp.	ALL	Public	Private
Atlas User?									
Yes	98	97	93	98	100	N.A.	98	98	99
No	2	3	7	2	0	N.A.	2	2	1
Atlas Owner?									
Yes	87	81	80	91	91	84	85	79	92
No	13	19	20	9	9	16	15	21	8
Atlas Borrower?									
Yes	63	53	63	64	71	N.A.	81	87	75
No	37	47	37	36	24	N.A.	19	13	25
Sample Size	161	37	30	47	47	44	128	68	60

population, however. It is likely that many who failed to return the mailed questionnaire did so because of a lack of interest in the subject.

The vast majority of atlas users have at least one atlas of their own. Geographers and private school pupils are more likely to own atlases than the other groups.

Less, though still a 2:1 majority, report that they borrow atlases. Here, the public school pupils show the highest proportion, followed by private school pupils and geography students. The general public borrow atlases least, though over half of them still do so.

NUMBER OF ATLASES OWNED: (Table 6.8)

The average adult respondent owns 1.7 atlases. Nearly half own exactly one, giving a clearly skewed distribution. Geography alumni own far more than others, averaging 2.5 atlases each. Though a fifth of the general public own none, fully a third own more than one. Interestingly, the non-respondent public (who answered only a few telephoned questions) own just as many atlases as those who filled in the mailed questionnaire. Thus it was not lack of ownership of atlases that discouraged them from further participation.

School pupils own fewer atlases than do adults, averaging just over one atlas each. It is possible that there is degree of under-reporting here, however. Although letters were sent home requesting pupils to check at home, questionnaires were filled out in a classroom situation during which recall could be incomplete.

TYPES OF ATLASES OWNED: (Table 6.9)

Atlases named by respondents were classified by type, with overlapping classes being scored twice. These included historical atlases of Canada, Canadian school atlases, British road atlases, and the New Canadian Oxford Atlas with Canadian and world sections.

World atlases are by far the most popular, with 3/4 of adults and a majority of pupils owning one. Geographers lead at well over 80%, the student component involving perhaps an element of coercion, since the New Canadian Oxford Atlas is a required text for their course. Second to world atlases, Canadian atlases are owned by more than 10% of every group. Not surprisingly, a higher proportion of history alumni own historical

Table 6.8 Number of Atlases Owned, by percentage

RESPONSE	ADULT							SCHOOL		
	ALL	General Public	History Alumni	Geography Alumni	Geography Students	Nonresp.		ALL	Public	Private
None	13	19	20	9	9	16		15	21	8
1	41	38	37	28	60	50		47	51	42
2	20	22	13	21	21	18		15	13	17
3	9	5	10	15	4	9		5	3	7
4	4	5	3	6	2	-		1	-	2
5	4	3	-	6	4	4		-	-	-
6 or more	2	-	-	9	-	2		-	-	-
No Response	7	-	17	6	-	-		18	15	26
True Mean	1.7	1.4	1.3	2.5	1.4	1.5		1.1	1.0	1.3
Sample Size	161	37	30	47	47	44		128	68	60

Table 6.9 Type of Atlas Owned, by percentage

RESPONSE	ADULT							SCHOOL		
	ALL	General Public	History Alumni	Geography Alumni	Geography Students	Nonresp.		ALL	Public	Private
World	73	59	53	83	87	73		58	53	63
Junior	9	14	17	11	–	11		4	3	5
Canadian	39	16	23	34	72	7		11	10	12
Provincial	4	–	–	11	2	–		2	1	2
Historical	7	–	13	11	6	–		1	1	–
Road	9	22	–	13	2	–		2	1	3
One country	5	5	3	6	4	–		2	1	3
One theme	7	5	7	13	2	–		2	1	2
Other	1	–	–	2	–	4		1	–	2
Don't know	1	–	3	–	2	–		22	18	27
Sample Size	161	37	30	47	47	44		128	68	60

atlases than do other groups. Geography alumni own the greatest variety of atlases, including the most provincial atlases, though this represents a total of only eight respondents in all. The general public own more road atlases than do others.

NUMBER OF ATLASES BORROWED: (Table 6.10)

A considerable number of respondents did not specify which (or even how many) atlases they borrowed, so these results are not as reliable as are the results for atlases owned. It is clear, however, that far fewer atlases are borrowed than are owned, on average less than one. Most pupils use one, more in public than in private schools. Most adults do not borrow them at all and, apart from two enthusiastic geography alumni who use more than six, those who do are most likely to be students.

TYPES OF ATLAS BORROWED: (Table 6.11)

The atlases borrowed by adults are almost all world or Canadian whereas pupils use Canadian junior atlases most. Again, history alumni are most interested in historical atlases.

LOCATION OF USE (Table 6.12)

Eighty percent of all user groups use atlases at home, by far the dominant location overall. Pupils and students are more likely to use atlases at school than at home. Private school pupils, who tend to own atlases rather than borrow them, use them more at home than do public school pupils. A third of all the adults use atlases in public libraries, led by half the history alumni and trailed by a fifth of the general public. Overall, a quarter use atlases at work, though nearly half the geography alumni do. A fifth use them in a car. Twenty school pupils chose the "in boat" option (offered separately to them but not in the adult questionnaire) which may boost their "other" value illogically.

FREQUENCY OF USE (Table 6.13)

The modal class selected was the middle, "more than monthly," representing nearly half the respondents overall, and dropping normally to both extremes. There is, however, variation between the user groups. The general public use atlases considerably

Table 6.10 Number of Atlases Borrowed, by percentage

	ADULT					SCHOOL		
RESPONSE	ALL	General Public	History Alumni	Geography Alumni	Geography Students	ALL	Public	Private
None	56	67	67	57	41	23	14	38
1	30	22	22	25	44	69	77	57
2	10	7	11	11	13	7	9	5
3	2	4	–	–	3	–	–	–
4	–	–	–	–	–	–	–	–
5	–	–	–	–	–	–	–	–
6 or more	2	–	–	7	–	–	–	–
No Response	36	29	43	43	35	25	15	37
True Mean	0.7	0.5	0.4	1.0	0.8	0.8	0.9	0.6

Table 6.11 Type of Atlas Borrowed, by percentage

RESPONSE	ADULT						SCHOOL		
	ALL	General Public	History Alumni	Geography Alumni	Geography Students		ALL	Public	Private
World	19	8	20	26	21		11	6	17
Junior	4	5	3	2	4		46	72	17
Canadian	14	3	20	9	23		38	60	13
Provincial	2	–	3	2	4		–	–	2
Historical	4	–	13	2	2		–	–	–
Road	–	–	–	2	–		–	–	–
One country	2	–	–	2	4		–	–	2
One theme	3	5	3	4	–		–	–	–
Other	1	5	–	–	–		–	–	–
Don't know	13	8	13	21	9		23	6	42
Sample Size	161	37	30	47	47		128	68	60

Table 6.12 Where Atlases Are Used, by percentage

RESPONSE	ADULT						SCHOOL		
	ALL	General Public	History Alumni	Geography Alumni	Geography Students		ALL	Public	Private
At home	83	78	80	85	87		81	78	85
At school	48	16	47	32	89		94	99	80
At public library	36	22	53	38	34		37	35	38
At work	27	22	26	47	13		2	4	-
In car	22	19	10	23	11		23	24	23
Other	6	16	7	2	-		23	25	20
Sample Size	161	37	30	47	47		128	68	60

Table 6.13 Frequency of Use of Atlases, by percentage

	ADULT							SCHOOL		
RESPONSE	ALL	General Public	History Alumni	Geography Alumni	Geography Students	Nonresp.		ALL	Public	Private
>daily (1)	3	–	7	6	–	–		1	2	–
>weekly (2)	22	16	23	23	26	–		14	20	8
>monthly (3)	44	38	37	40	55	19		50	63	37
>annually (4)	28	46	17	30	19	67		31	14	50
<annually (5)	3	–	17	–	–	14		3	2	5
Mean Rank	3.1	3.3	3.1	2.9	2.9	3.9		3.2	2.9	3.5
Sample Size	161	37	30	47	47	37		125	65	60

(#) Rank, used to calculate Mean Rank

less frequently than all other adult groups, though far more than those who chose not to answer the written questionnaire. It would appear, therefore, that it is use level, not ownership, that explains their reluctance to fill out the longer survey. Geography alumni, students, and public school pupils claim to use atlases most often. Private school pupils use them least, though five history alumni claim to use an atlas even less than once a year.

REASONS FOR USE (Table 6.14)

Since this was an open-ended question, answers had to be coded as given. Some chose to answer with generalities ("for school," "general interest") while others were very specific. Many categories were devised, therefore, so that no one comment would be counted twice.

Topographic uses clearly dominate over thematic. Well over half of those surveyed use atlases to locate places, often prompted by connections with travellers or visitors. City locations are most often sought, followed by countries, mountain ranges and rivers. Planning personal travel or following news items are more specific uses of atlases for purely locational purposes, led by the general public group. Two out of three students note that they use an atlas for school work or research.

Although a wide variety of specific thematic topics is mentioned by all user groups, they represent only a quarter of all respondents. Population is the most commonly recurring theme (21 mentions) with climate second (14). "Statistics," in a general way, are mentioned 18 times and there are references to many other topics including geology, trade, resources, industry, economy and language. Several history alumni seek specific historical information. A third of all respondents mention "general interest." An enthusiastic, though small, percentage use their atlases for "fun," "daydreaming," crossword puzzles and trivia games, "just being inquisitive" and "because maps are aesthetically pleasing."

Other uses mentioned include general "topographic information," measuring distances (8), checking spelling (4), as examples for teaching, and as base maps for producing their own maps (4).

Table 6.14 Atlas Uses, by percentage

	ADULT					SCHOOL		
RESPONSE	ALL	General Public	History Alumni	Geography Alumni	Geography Students	ALL	Public	Private
Locating places	59	73	57	60	49	51	51	50
Following news	16	38	10	15	9	4	3	5
Planning travel	30	41	20	36	23	13	7	18
School/work/research	34	13	20	28	66	37	44	28
Specific themes	28	27	27	30	28	30	37	23
General interest	34	19	23	43	20	9	6	12
Curiosity	12	8	8	23	13	8	4	12
Other	13	11	3	23	11	16	19	12
Sample Size	161	37	30	47	47	128	68	60

POTENTIAL OCCUPATIONAL AND LEISURE USES FOR AN ATLAS (Table 6.15)

As well as requesting to what uses atlases are actually put, respondents were surveyed as to what possible uses they could envision for an atlas at work and at leisure. Responses separated into much more clearly defined groupings than for actual uses. The number of responses suggesting occupational activities which might make use of an atlas was remarkably lower than for actual uses, confirming the belief that atlases are more often perceived as for personal rather than business use. Students and alumni envision using atlases for research/study, and to a lesser extent for teaching, but all other potential uses are meagre. Geography alumni see a wide variety of other possible idiosyncratic uses, including a rancher deciding which crops to grow, a travel consultant checking ferry routes, a policy advisor monitoring oil exploration, a silkscreen artist seeking T-shirt patterns, and a toy manufacturer looking for potential markets.

For leisure use, half the adults and a quarter of the pupils thought they might use an atlas for following friends' travels or for planning their own. A third could visualise using one for a wide range of outdoor recreational pursuits such as cycling, hiking, boating or camping. "General interest" includes a number of armchair travellers, as well as players of general knowledge games. Others include political speculation, gardening and historical research, and looking for names for pets. The topographic component is clearly dominant in the leisure use of atlases.

6.3.3 Conclusions

Almost everyone owns an atlas, but the practice of borrowing them is predominately limited to students, at all levels.

General world atlases are clearly the most commonly used, with student versions of them having a high Canadian content. A wide range of other types in use includes very few provincial or thematic atlases, of which only historical and road atlases have an appreciable following. But even here, the figures for road atlases contrast sharply with a British survey in which road atlases represented half of the total holdings (Kirby 1970, p.37). The North American road system is far less complex than the British, and travellers are well served by freely distributed provincial road maps in sheet form.

Atlases are mainly used at home, most commonly for locating places. Familiarity with their use and understanding of their value for other purposes may have led fully

Table 6.15 Activities That May Make Use of an Atlas, by percentage

a. Occupational

RESPONSE	ADULT					
	ALL	General Public	History Alumni	Geography Alumni	Geography Students
Locating places	9	14	13	2	9
Travel	7	8	3	11	6
Research/study	34	5	37	32	55
Teaching	13	5	13	21	11
Other	16	11	10	32	9

Table 6.15 Activities That May Make Use of an Atlas, by percentage

b. Recreational

RESPONSE	ADULT					SCHOOL		
	ALL	General Public	History Alumni	Geography Alumni	Geography Students	ALL	Public	Private
Travel	52	51	43	62	49	23	15	25
Planning vacation	9	5	13	15	2	9	9	8
Outdoor recreation	33	19	20	49	36	28	26	30
General interest	26	27	33	30	17	5	3	8
Other	4	8	7	2	2	9	9	8
Sample Size	161	37	30	47	47	161	68	60

half the geography alumni to make use of atlases at work. School assignments prompt much use overall, but there is also considerable general enthusiasm for knowledge of other countries and for constructive dreaming. Use is also envisioned for a wide variety of applied purposes, both practical and frivolous.

6.4 ATLAS CONTENT AND DESIGN

6.4.1 Introduction

This section includes opinions of specific non-map atlas component, and of general content and design aspects.

Closed questions specifically cover opinion of the value of text, indices, diagrams, statistics, and photographs. Totally open-ended comment was also invited on these and any other content and design topics. Over 70% of respondents completed this section, with some interesting contrasts appearing in the concerns of adults and school pupils. Despite provision of definitions in the preambles, there was some confusion of the meaning of the words "content" and "design," so responses were collated freely under the appropriate headings. Since unsolicited written comment is necessarily provoked by strong convictions, all thoughts expressed by more than one respondent are here reported, as well as directly quoting some particularly pertinent suggestions. Adult comment is separated from that of school pupils.

6.4.2 Results

VALUE OF NON-MAP ATLAS COMPONENTS (Tables 6.16, Figures 6.1, 6.2)

Respondents indicated whether they found non-map components of atlases very useful, useful, or did not use them. Cross-tabular checking of diagrams x photographs, controlling for text (Figure 6.1), showed that while there was some tendency towards the central "useful" category, there was no clear connection between responses to each query, that is, that each had been assessed individually. In addition, there are clearly many who find all three of text, diagrams, photographs to be "very useful" and different people find each valuable, whereas relatively few use none of them, so there are certainly grounds for keeping all of them in an atlas.

Overall, the most useful components are considered to be an index or gazetteer. This includes both reference to map content and to place name location and corroborates

Table 6.16 Value of Non-Map Parts of Atlases, by percentage

RESPONSE	ADULT							SCHOOL		
	ALL	General Public	History Alumni	Geography Alumni	Geography Students			ALL	Public	Private
Index/gazetteer:										
Very useful (1)	71	66	73	76	67			69	75	63
Useful (2)	26	34	20	20	31			26	21	32
Not used (3)	3	-	7	4	2			5	4	5
Mean Rank	1.3	1.3	1.3	1.3	1.4			1.4	1.3	1.4
Sample Size	156	35	30	46	45			127	67	60
Text:										
Very useful (1)	33	15	37	35	41			22	25	18
Useful (2)	54	76	30	54	54			50	51	50
Not used (3)	13	9	33	11	4			28	24	32
Mean Rank	1.8	1.9	2.0	1.8	1.6			2.1	2.0	2.1
Sample Size	156	34	30	46	46			123	63	60

(continued...

Table 6.16 Value of Non-Map Parts of Atlases, by percentage (cont.)

Diagrams:

Very useful (1)	41	29	33	43	54	50	49	51
Useful (2)	50	60	47	57	39	44	46	41
Not used (3)	8	11	20	-	7	6	5	8
Mean Rank	1.7	1.8	1.9	1.6	1.5	1.6	1.6	1.6
Sample Size	157	35	30	46	46	124	65	59

Photographs:

Very useful (1)	23	28	23	17	24	44	42	46
Useful (2)	58	53	50	63	62	45	50	41
Not used (3)	19	8	27	20	13	11	8	13
Mean Rank	2.0	1.9	2.0	2.0	1.9	1.6	1.7	1.7
Sample Size	157	36	30	46	45	123	64	59

Statistics:

Very useful (1)	41	40	50	30	48	44	44	45
Useful (2)	46	46	30	61	41	42	45	38
Not used (3)	13	14	20	9	11	14	11	17
Mean Rank	1.7	1.7	1.7	1.8	1.6	1.7	1.7	1.7
Sample Size	157	35	30	46	46	122	64	58

Figure 6.1 Cross-Tabulation of Value of Text, Diagrams and Photographs to Atlas Users

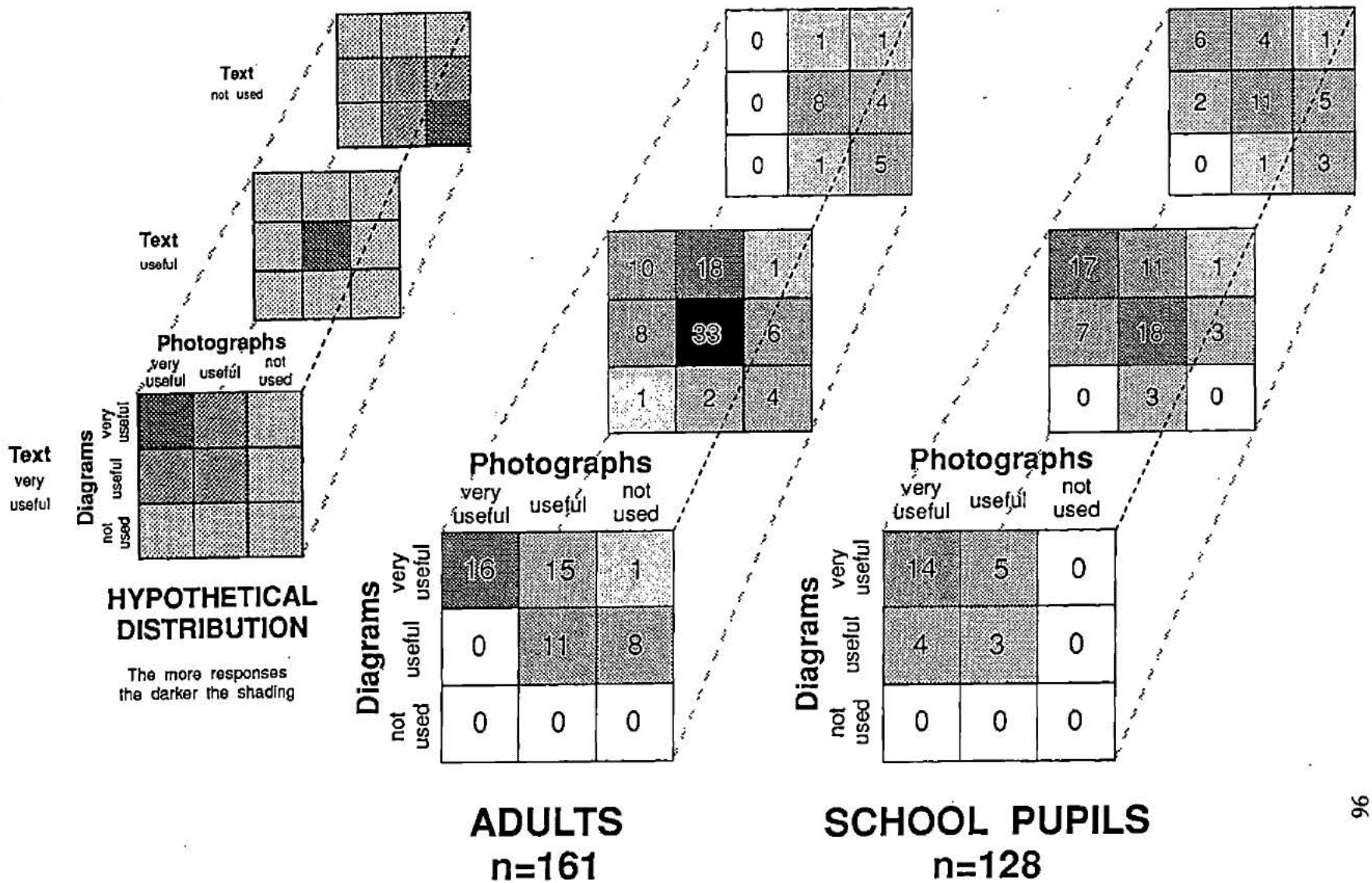
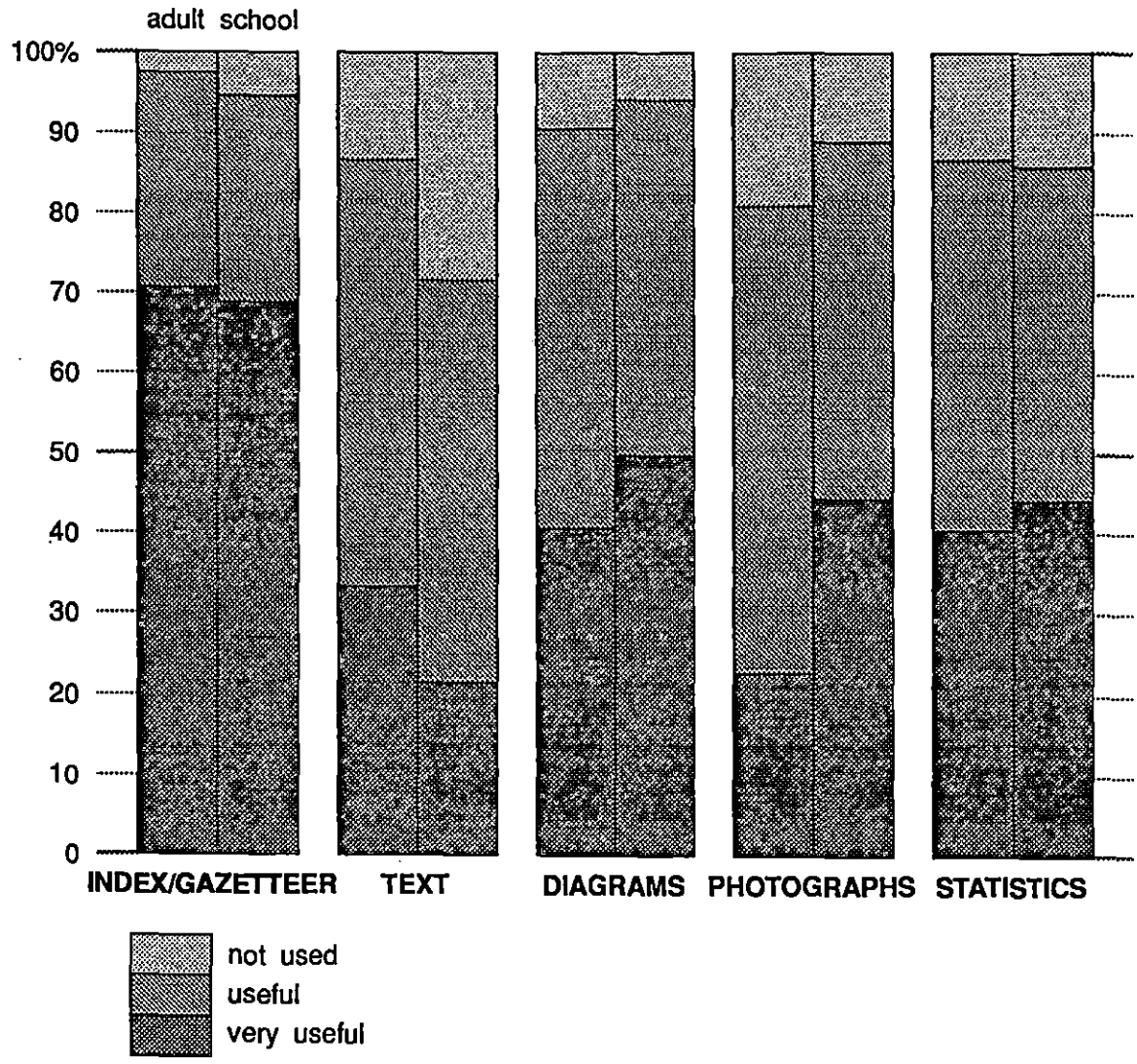


Figure 6.2 Value of Non-Map Atlas Components to Atlas Users



the primary map use found earlier of locating places. There is little diversity of view between user groups.

Diagrams have the second highest mean rank, but a much lower percentage of "very useful" choices. There is much more variation between user groups, with half the students and pupils finding them "very useful," down to less than a third of the general public. History alumni are most likely not to use them at all.

Statistics show a similar pattern overall, though there is a higher likelihood of their not being used. Nearly equal percentages of students, pupils and the general public find them very useful or useful. Geography alumni are surprisingly indifferent to their value, whereas half the history alumni find them very useful.

Use of photographs in atlases represents the sharpest contrast in views between adults and school pupils. Whereas nearly half the pupils find them very useful, less than a quarter of the adults do. The general public is somewhat more enthusiastic than the alumni groups, a quarter of whom do not use photographs at all.

Text was considered least useful overall, and had the widest range of rankings. The value to adults and pupils is reversed from that of photographs, with over a quarter of school pupils not using text at all. Students are the most enthusiastic group of adults. The public chose "very useful" least often, history alumni most often. However, a full third of the history alumni echo the school pupils' choice not to use text at all.

Open comment on non-map parts of atlases was made by 34 (21%) adult respondents, half of them geography alumni.

Several respondents make it clear that an atlas's major component must be maps, with non-map components, including text, definitely subsidiary, supplementing the maps. A historian points out that text in atlases is never specific enough for an individual researcher's needs. A geographer concurs, preferring to seek textual information in encyclopedias.

Photographs are viewed with suspicion by some as a cheap filler, useful only to break up the maps. Though this simple goal is acceptable to one, others believe photographs should be used only if "appropriate," to "display significant features." One notes their value in "providing a context for discussion."

Statistical tables and diagrams elicited most specific comment, being viewed as "very important for a better understanding of the area being studied." But they are the first part of an atlas to become outdated and often contain too much information which requires written explanation. The data must be recent and dates clearly stated.
A few point out that their use level of non-map parts of atlases depends on the purpose of their search, and also on the quality of the atlas in question.

OPEN COMMENT BY ADULTS ON ATLAS CONTENT

The highest number of comments for a specific topic concerned the quality of data. Fifteen respondents, a majority geography alumni, note that data must be as up to date as possible, with data dates clearly stated. One found the 1979 Atlas of British Columbia's use of 1971 statistics unsatisfactory. One was uneasy about the quality of all third world data, and one sensibly suggested that data should be "well-qualified, noting where political omissions and limitations exist." Four note the need to state data sources, and three specifically stress the need for accuracy.

Equal numbers (6 each) counted statistical tables under "likes" and "dislikes." Even some who like them prefer some explanation ("I find it more useful when there is a bit of a write-up besides statistics tables and diagrams to demonstrate how the information can be applied to various things," "I like statistics which can be compared to other places so you can understand a region's position in the larger context"), and several want to see them well integrated with maps, as noted later under "Organization." Some detractors prefer information symbolized directly on maps or diagrams to any tabulated data. One singles out the New Canadian Oxford Atlas for statistics which are "too vague and simplistic." A teacher notes that pupils have trouble understanding statistics in any form!

The four comments in this section regarding text are all negative. It must be relevant, tied directly to the maps, and succinct. One particularly deplores atlases which contain whole chapters of text without maps or diagrams.

The importance of an index is stressed by 12 respondents. Specific suggestions include the inclusion of a thematic index clearly separate from a gazetteer. Reporting of locations to accuracy of seconds would help in location of places. Place names elicited

8 comments. Most wanted more, one wanted less, and three suggested former or alternate spellings be given.

Ten respondents mentioned American bias, particularly of "world" atlases published in U.S.A. in which the U.S. is treated regionally but many smaller countries do not warrant even one separate map. Northern Canada and the world's oceans are each seen by three respondents to be given short shrift.

A few respondents note atlases' generally minimal treatment of regional differences. "Lots of small regional maps" are suggested for British Columbia in particular, rather than always showing the whole province. Another pleads: "give all areas equal coverage - nowadays people are interested in remote areas."

Specific Topics Mentioned

An assortment of specific topics is mentioned. Only multiple mentions are discussed here. Six particularly want population data, seven want more contour detail, four like to see urban plans and seven, mainly history alumni, want more historical information, especially of settlements. Two history alumni find agriculture and soil maps tedious, two others want economic information "set in the social context." Two each want more climate, roads and flags.

Apart from specific topics, several stress the need for variety in the kinds of maps shown, with both topics and scales mentioned. Others, however, call for "all areas covered in the same depth" or "common formats for easy comparison." A teacher notes that atlases "must reinforce textbook material, allowing students to draw their own conclusions based on research."

A geography alumnus now a professor of cartography warns: "subjects of limited personal interest to the atlas compiler are often treated very poorly indeed - get expert help!"

OPEN COMMENT BY ADULTS ON ATLAS DESIGN

Organization and Layout: Over sixty respondents contributed comment regarding organization of atlas information. While there are general cries of "poor organization" and "messy layout," there are also suggestions from alumni as to how this can be

rectified. They suggest dividing an atlas regionally with all maps of one area together, keeping statistical tables close to (or even on) maps of the relevant region, and using a variety of scales, with insets, if appropriate. Few consider thematic maps separately. One notes "it is awkward having to flip pages to overlap information for a particular area," one suggests that many small thematic maps of the same region be placed together on the same page for easy comparisons, but another notes that "different subjects" should be clearly separated. The New Oxford Atlas is specifically praised by two students as being well organised and understandable. The Canadian Oxford School Atlas is disliked for combining physiographic with political information, whereas the Rand McNally International Atlas is praised for precisely the same combination.

Maps spanning more than one page are not appreciated, particularly if they result in data being lost in the gutter by poor layout and overtight binding, which fully 10 respondents deplore. Six others dislike a book which does not lie flat, presumably for the same reason (spiral binding is twice offered as a simple solution), and three particularly dislike "fold-outs."

Ten respondents want more detail on maps but an impressive 25 find atlas maps and diagrams contain too much information, leading to a cluttered appearance. Quick access to information is a goal of many, "for maximum information at a glance." The words "simple" ("the simpler the better"), "uncluttered," and "clear" occur often. A geography alumnus decries "the inability of cartographers to leave an area blank, if there's nothing of significance there."

Colour is mentioned as an important factor by 22 respondents. "It can be stylistic and clear, or ugly, muddy and confusing. Good colour helps understanding," says one. There are warnings against having too many different colours on a map or too subtle differences to be easily distinguished. Bold colour is praised but must not be "so bright that it obscures print." Two praise the use of colour coding of map pages for quick referencing. Two alumni are particularly irritated by "arbitrarily colouring countries."

Projections are mentioned five times. History alumni like conventional projections, a geography alumnus prefers a variety, and one takes particular exception to the use of the Mercator projection.

Twelve respondents have concerns about scales. Four find scales usually too small, two find them sometimes wrong for the level of information, four prefer all maps

in an atlas to have the same scale for ease of comparisons. Scales must be stated, preferably including a bar format for measuring distances.

Symbols are rarely discussed, only small size and obscure shapes being singled out. Boundaries elicit two interesting comments - atlases "should not give the impression that regional boundaries exist when they do not" and one is irritated when data is "abruptly cut off at political boundaries."

Lettering is occasionally found to be too small and italic type hard to read. Page numbers are not always sufficiently obvious, and titles are preferred centred at the top.

The physical size of atlases is of concern to a dozen respondents. Six find them too large "and cumbersome to take to any of the places they describe." One finds "odd sizes hard to shelve or lift." One recommends "a few small or thinner volumes" rather than the "monster books" he finds. A teacher prefers atlases no larger than regular note books. On the other hand, four prefer large "uncramped" atlases.

There were just a few general comments about atlases, appreciating "varied and adaptable cartography," "high quality printing" and stating that "most atlases are very good."

OPEN COMMENT BY SCHOOL PUPILS ON ATLAS CONTENT

In contrast with the adults, only two school pupils expressed concern about out-of-date data and only four about data accuracy. Only one adult mentions pictures whereas 14 pupils do, all but one with enthusiasm.

An equal number of pupils as adults note their appreciation of a good index. The pupils' strongest criticism is reserved for text, with a dozen critical comments, mainly from the private school. If there must be text, keep it short and simple, they say. They specifically dislike: "Too much text all together that goes on and on so most people are not interested to read it all," "having to read a page or two about an item to find what I am looking for," "when atlases have barely any maps or diagrams and all words," and, most telling, "[I dislike] the large amount of text -- when I think of an atlas I think of maps."

Nine of the 13 pupils commenting on statistical tables like them, but they are perceived by others as hard to follow, too big, boring and confusing. Four like graphs in particular, but one would prefer more explanation of them.

School pupils mention far less specific thematic topics than do adults, multiple requests showing only for city (5) and road (2) maps. Six want such general themes as "more information about people and places."

There is absolutely no mention of American bias -- one even dislikes "concentrating on Canada too much."

OPEN COMMENT BY SCHOOL PUPILS ON ATLAS DESIGN

Organization and Layout: Nearly all (92) of the pupils writing comments have something to say about organization of atlases. While there are many simply expressing dislike for "poor organization," the twenty using terms such as too cluttered, too confusing, too crowded, too cramped and too complicated have a clear message. Only nine want more detail. Pupils want atlases showing information which is easy to understand and easy to read, in which it is easy to find locations. Specific dislike is expressed for charts, texts and maps for one place scattered throughout the atlas, poor legend placement and poor linework variation. Four are concerned about loss of information of double page maps in the central gutter due to poor binding planning.

As is the case with the adult respondents, many pupils (26) were concerned about colour, but only a handful had specific comment to make. The colours used must show sufficient contrast, be "bright" and "bold," not "horrid."

All six respondents mentioning type size prefer it to be larger. There is only one specific mention of scales, that they are hard to use. Two others imply that larger scales would improve map legibility.

Projections and symbols are not mentioned at all.

Six discuss overall atlas size, equally divided between "too small" and "too large." Two say an atlas should certainly be small enough to carry around.

General comments regarding atlases were more negative than positive. The word "boring" occurred six times. Comments such as "I hate using atlases" and "I don't care

much for atlases at all" are hard to address. But the future atlas maker would do well to bear the following pupils' concerns in mind:

> "Atlases should be less technical and more interesting."
>
> "I dislike atlases that are dull and hard to understand."
>
> "Good for looking information up but they are kind of boring."
>
> "I think atlases should be made easier to understand and for all ages not just adult so that the elementary grades can start younger."

6.4.3 Conclusions

Respondents' evaluations of non-map parts of atlases both objectively and subjectively elicited some fascinating results.

Referencing systems, which include an index, which references map topics, and a gazetteer, which references locations, are the most desired non-map atlas components, with all groups acknowledging their necessity.

Statistics and diagrams also are valued highly. Geographers and school pupils are slightly more interested in diagrammatic form whereas historians and the general public slightly prefer the raw statistics, which may reflect their suspicion of massaged data. The more quickly accessed diagrammatic information no doubt appeals to school pupils' frequent pleas for easy to understand material. Some also want written explanations. There is a general concern that statistics are the first part of an atlas to become outdated.

School pupils' quest for easily accessed information is also reflected in their desire for relatively more photographs, of much lower importance to adults, some of whom consider them a cheap filler.

The modern trend for atlases to contain more and more text is clearly not appreciated. School pupils in particular find it out of place in an atlas.

A number of adults decry the American bias of so-called world atlases. At the time of purchase they were presumably unaware that most world atlases available in Canada are produced predominantly for the much larger American market.

Design comments concentrate on organisational aspects. School pupils want maps simplified, alumni suggest sharper regional division, but there is no call for thematic organisation.

Colour evokes considerable comment, though many merely mention it, perhaps suggesting only that they do not appreciate black and white atlas maps. Bold colours are clearly preferred to subtle.

Projections, scales and symbolization are mentioned by only a handful of adults. Type size is sometimes found to be too small, never too large, another reflection of the "simplify" cry. More find the physical size of atlases too large than too small.

So what is desired? A compact loosely bound book with simple brightly coloured regionally organised maps, a few tables, an index, minimal text, and one or two photographs. Or is there room for an entirely different concept? The next section investigates attitudes towards possible alternative formats.

6.5 ALTERNATIVE FORMATS

6.5.1 Introduction

This section is concerned with respondents' understanding and opinion of a variety of possible atlas formats as alternatives to the traditional bound book. It starts with the loose sheet format of the Atlas of Canada, then probes respondents' familiarity with and opinion of several possibilities for electronic atlas formats. It includes questions of the importance of some potential attributes of electronic atlases, including the ability to update rapidly, to change scales by zooming and to integrate data by overlays. Finally, willingness to exchange book for electronic format is queried.

6.5.2 Results

LOOSE SHEETS (Table 6.17)

On balance, the majority of adults surveyed do not approve of this format. In detail, however, both alumni and general public groups divide roughly equally between approval and otherwise, while the students strongly disapprove of the format.

Much more negative than positive comment is made, suggesting that the detractors have stronger convictions than the supporters. The most oft-mentioned complaint (28 respondents) is the inconvenience of storing, handling and transporting large sheets. A further 21 refer to organizational problems such as those of keeping maps in correct order, especially if used by many, and the need for a particularly good

Table 6.17 Opinion of Loose Sheet Format, by percentage

RESPONSE	ADULT							
	ALL	General Public	History Alumni	Geography Alumni	Geography Students
Like	37	38	40	47	25
Dislike	49	32	47	43	69
Unsure	14	30	13	10	6

indexing system. Others are concerned that maps could easily be lost (15) or damaged (10). Several who prefer a book appreciate that information is "tied together" and "complete – who knows when you will need something obscure?"

Supporters of the loose sheet format are particularly keen on the possibility of easily updating single sheets (13). A similar number recognize the reduced costs incurred if a user is required to purchase only for immediate needs. Less (8) appreciate the ease of working with flat sheets, with no data losses in tight bindings, and a few note the advantages of larger scales and use of the atlas by many users at one time.

Compromise is the conclusion of several respondents. Half a dozen suggest binder format "for the best of both worlds," and an equal number would like both: "loose sheets are great if you only want a specific map, but if you want the whole thing it would be nice to have it in a book."

School pupils were not asked their opinion per se, but were invited to give positive and negative comment. Many gave both. Overall, there were 67 positive and 104 negative comments.

Their greatest concern was worry about loss of sheets (36), though the inconvenience of large sized sheets was a close second (32). Potential for damage (17) and disorganization (9) were of lesser importance.

Pupils like the idea of working with flat sheets (24) and several recognize that it allows others to use not only other parts of the atlas but also the same sheet at the same time. Second in importance to them (22, compared to only a handful of adults) is the potential for larger scale maps which would be easier to read and would contain more detail without crowding. A few note that it would be easier to compare maps, not needing to flip pages.

COMPUTER MAPS (Tables 6.18-6.20)

Sixty per cent of all respondents have seen maps displayed on a computer screen (Table 6.18). While the school pupils and history alumni groups are very close to this proportion, only half the students and general public have seen them, versus over 80% of geography alumni. Cross-tabulation with gender suggests that men are more likely to have seen them than women (2 in 3 males versus 1 in 2 females). But there are also

Table 6.18 Maps Displayed on a Computer Screen, by percentage

	ADULT					SCHOOL		
RESPONSE	ALL	General Public	History Alumni	Geography Alumni	Geography Students	ALL	Public	Private
Have Seen	61	49	60	83	51	58	56	61
Have Not Seen	39	51	40	17	49	42	44	39
Sample Size	160	37	30	46	47	127	68	59

Table 6.19 Where Computer Maps Were Seen, by percentage

RESPONSE	ADULT						SCHOOL		
	ALL	General Public	History Alumni	Geography Alumni	Geography Students		ALL	Public	Private
School/university	35	11	44	37	42		39	42	36
Work	14	17	6	24	4		4	5	3
Demonstrations	15	17	11	21	8		8	11	6
Government offices	20	11	11	34	13		5	-	11
Home computer	7	6	11	3	13		19	15	22
Television	4	6	-	8	-		3	-	6
Other	5	11	6	3	4		16	21	11
Sample Size	98	18	18	38	24		74	38	36

Table 6.20 Opinion of Computer Maps, by percentage

	ADULT					SCHOOL		
RESPONSE	ALL	General Public	History Alumni	Geography Alumni	Geography Students	ALL	Public	Private
Like	81	79	82	86	77	79	86	74
Dislike	19	21	18	14	23	21	14	26
Sample Size	97	19	17	35	26	85	35	50

more young men and older women in the samples, so age may be a confounding factor here.

Over a third overall have seen computer maps at school or university, evenly spread over all but the general public group (Table 6.19). Government offices are the second most likely location, followed by at work, and exhibits and demonstrations of various types. Fourteen school pupils, but only four adults, have seen them on home computers. Among other locations, the public library is mentioned by 4 pupils.

There is general satisfaction with computer maps (Table 6.20) with 80% approval. Variation between user groups is minimal.

OPINION OF MAPS ON COMPUTER SCREEN (Table 6.21)

The written adult opinions are very evenly divided between positive and negative, but school pupils' comments are far more often positive, outnumbering negative by seven to one. There is some thought among adults that computer maps are easier to read and are more versatile than paper maps. Others are attracted by the ability to vary the display either by changing scale or topical content, using overlays. Just a few mention speed and efficiency, of both access and storage of data, and the ease of updating. Among other positive comments are versatility and fascination with a new technology.

Most negative comment concerns disappointment with poor quality and clarity, leading to a lack of detail which can be shown on-screen. Several recognise that this is technology dependent, however, and anticipate rapid improvements with time.

Eleven rightly point out that access to a computer is a first requirement, 6 complain of eyestrain in use, 5 of lack of portability and 5 others of expense. Among those concerned about display quality are 5 geography alumni who plead strongly that the computer map will never replace the artistic quality of a paper map (see below for more comment on this theme) and a history alumna comments controversially that computer maps "reduce the chance of serendipitous discoveries."

Unlike the balanced adult opinion, school pupil opinion is strongly biased towards computer maps, with 79 positive to 12 negative comments. Nearly half are of the opinion that computer maps are easier to use than paper ("all you have to do is push

Table 6.21 Reasons for Opinion of Maps Displayed on Computer Screen, by frequency

RESPONSE	ADULT								SCHOOL		
	ALL	General Public	History Alumni	Geography Alumni	Geography Students	ALL	Public	Private
Positive comment:											
Easy to use/read	12	1	1	4	6	36	14	22
Efficient/faster	5	1	1	2	2	7	4	3
Easy to update	6	-	2	2	2	1	-	1
Display change	11	3	3	6	1	6	3	3
Other	21	5	2	6	5	29	12	17
Total	55	10	9	20	16	79	33	44
Negative comment:											
Lacks detail/ clarity/quality	15	2	3	6	4	4	1	3
Need computer	11	4	-	3	4	2	1	1
Other	31	3	7	12	9	6	2	4
Total	57	9	10	21	17	12	4	8

a button and there it is!"). Seven think they are faster to use, 6 that they allow rapid change.

There is a wide assortment of other enthusiastic comment. Eight think electronic atlases are "much more interesting" and five that they have "more detail." Several comments reflect a clear belief that computers are the way to go: "neat," "high tech" and "cool," "much more fun than reading a book," and "easier than having to go look in an atlas."

COMPUTER ACCESS (Table 6.22)

The vast majority of respondents (80% of adults and 95% of school pupils) do have access to micro-computers. Fully half have them at home, with slightly smaller proportions using them at work or at school. Leading the groups, two thirds of the history alumni and of the private school pupils have computers at home, compared to only a third of the general public. Two thirds of the geography alumni have access to a computer at work, but only half the history alumni and a third of the general public do.

IMPORTANCE OF ATLAS ATTRIBUTES (Figure 6.3)

Currency (Table 6.23)

In Question 7 of the questionnaire, well before the suggestion of electronic atlases was introduced, respondents were asked to rate the importance of an atlas being up to date. Table 6.23A shows that about 2/3 of the adults and 4/5 of the pupils consider currency of information to be very important. All the adults and all but a tenth of the school pupils find it at least "important." Overall, the students are the most concerned group and the general public by far the least, with only a third ranking it "very important."

When later asked to rate the possibility of data being rapidly updated (Table 6.23B) ratings drop slightly. While the proportion of "very important" responses is similar, the composition of the overall figure differs, and there is a measurable shift to the "not at all" category for both history alumni and general public groups. Students find this attribute a little more important than currency, and general public responses are more widely spread, with shifts both to more and to less important.

Table 6.22 Access to Computers at Home, Work, and School, by percentage

	ADULT					SCHOOL		
RESPONSE	ALL	General Public	History Alumni	Geography Alumni	Geography Students	ALL	Public	Private
At home	50	32	67	47	55	55	49	62
At work	40	35	53	66	10			
At school	35	14	30	21	70	79	81	77
Not at all	20	41	10	7	7	5	6	2
Sample Size	161	37	30	47	47	161	68	60

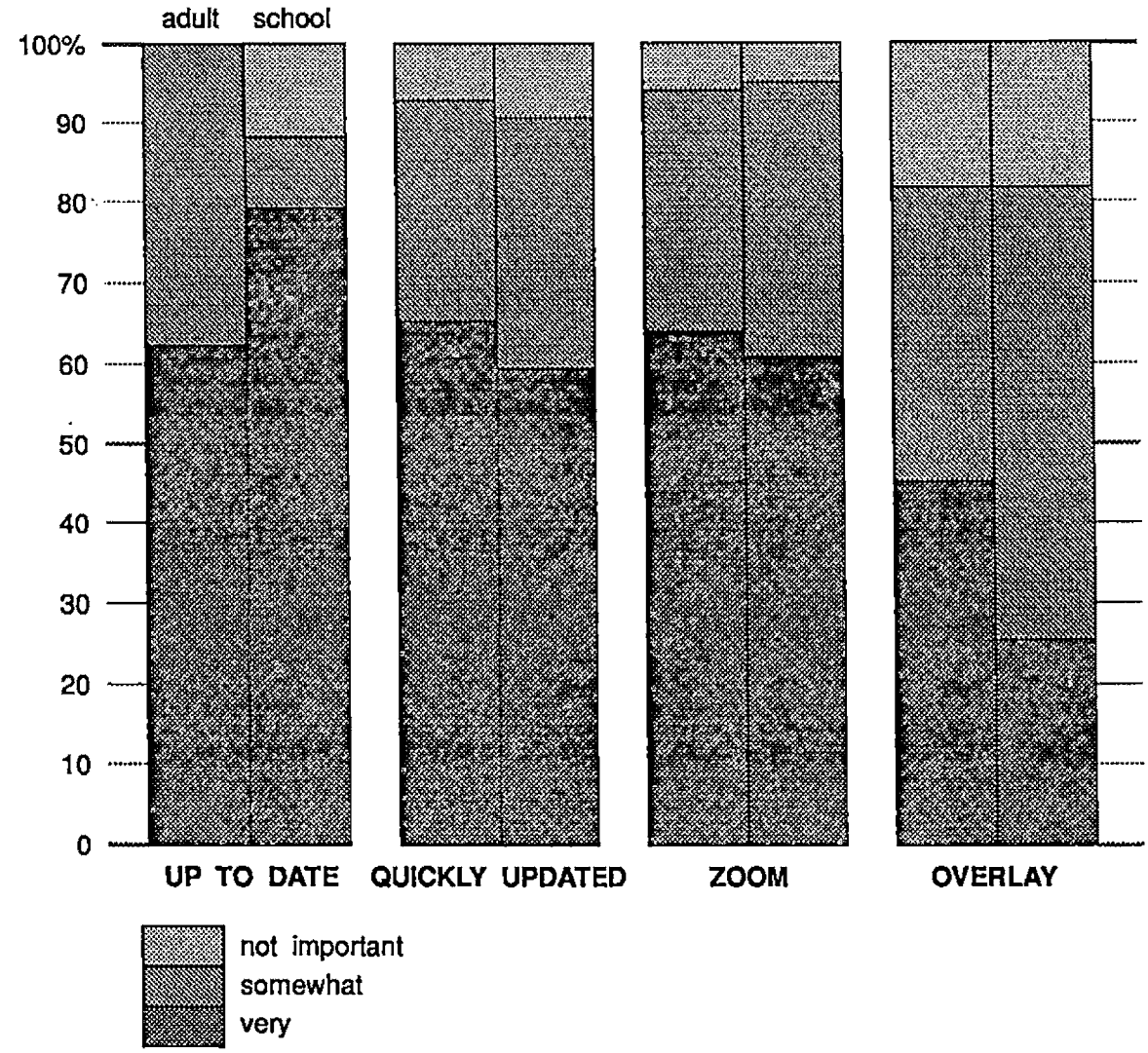
Totals add to more than 100% because of multiple access to computers

Table 6.23 Importance of Current Information, by percentage

RESPONSE	ADULT							SCHOOL		
	ALL	General Public	History Alumni	Geography Alumni	Geography Students			ALL	Public	Private
a. Be up to date:										
Very important (1)	63	35	73	63	79			79	83	75
Somewhat (2)	37	65	27	37	21			9	14	3
Not at all (3)	-	-	-	-	-			12	3	22
Mean Rank	1.4	1.6	1.3	1.4	1.2			1.3	1.2	1.5
Sample Size	160	37	30	46	47			126	66	60
b. Be quickly updated:										
Very important (1)	66	47	55	66	87			59	73	43
Somewhat (2)	27	38	31	30	13			32	22	43
Not at all (3)	7	15	14	4	-			9	5	14
Mean Rank	1.4	1.8	1.6	1.4	1.1			1.5	1.3	1.7
Sample Size	156	34	30	46	47			118	60	58

(#) Rank, used in calculating Mean Ranks

Figure 6.3 Importance of Atlas Attributes to Users



Scale Change (Table 6.24)

The ability to change scales by zooming in is rated very similarly to currency, though the range of rankings across the groups is less. Students are slightly less enthusiastic about this feature than that of rapid updating, private school pupils and the general public rather more.

Overlays (Table 6.25)

The overlay feature, with personal display selection, is the least highly rated attribute overall with nearly 20% counting it not at all important. Yet nearly half the adults still find it very important, totally dominated by 2/3 of the students and of the geography alumni. The history alumni and general public form an opposing group with higher proportions rating overlays not at all important than very important. School pupils are similarly uninterested, backing up their thoughts that computer maps are "easy" to use.

PAYMENT FOR A COMPUTER ATLAS (Tables 6.26, 6.27)

A majority of respondents would be willing to pay more for a computer than a book atlas, other things being equal. Students are the most enthusiastic, with 70% "Yes" responses (despite the fact that only 50% of them have seen maps displayed on a computer screen), and the public least, responding 2:1 against.

An invitation to suggest how much they were willing to pay in dollar terms elicited a considerable number of "I don't know" responses. However 163 respondents did suggest values, as summarized on Table 6.27. It includes a few perhaps irrational school pupil estimates of under $5 and two of $1000 (two $1 million estimates were omitted from the summary). The overall mean of approximately $100 for both adults and schools masks group means ranging from $62 to $163. Despite their enthusiasm to pay, the students offer the lowest dollar amount, probably reflecting their budgetary constraints. The low general public figure suggests that even the few willing purchasers may not be very enthusiastic. The history alumni's high figure belies their low incomes.

Cross-tabulations with age and with computer ownership suggest that computer owners and younger people would be most willing to pay more.

Table 6.24 Importance of Ability to Change Scale by Zoom, by percentage.

RESPONSE	ADULT						SCHOOL		
	ALL	General Public	History Alumni	Geography Alumni	Geography Students		ALL	Public	Private
Very important (1)	64	56	60	63	74		61	63	57
Somewhat (2)	30	35	27	33	24		34	30	39
Not at all (3)	6	9	13	4	2		5	6	4
Mean Rank	1.3	1.5	1.5	1.4	1.3		1.4	1.4	1.5
Sample Size	156	34	30	46	46		119	63	56

Table 6.25 Importance of Ability to Overlay Data, by percentage

RESPONSE	ADULT						SCHOOL		
	ALL	General Public	History Alumni	Geography Alumni	Geography Students		ALL	Public	Private
Very important (1)	46	9	27	62	70		26	29	24
Somewhat (2)	36	50	43	31	26		56	63	49
Not at all (3)	18	41	30	7	4		18	8	27
Mean Rank	1.7	2.3	2.0	1.4	1.3		1.9	1.8	2.0
Sample Size	156	34	30	45	47		114	59	55

(#) Rank, used in calculating Mean Rank

Table 6.26 Willingness to Pay More for a Computer Atlas than a Book Atlas, by percentage

	ADULT							SCHOOL		
RESPONSE	ALL	General Public	History Alumni	Geography Alumni	Geography Students			ALL	Public	Private
Yes	57	35	60	58	70			62	66	59
No	43	65	40	42	30			38	34	41
Sample Size	150	34	30	43	43			120	62	58

Table 6.27: Amount Willing to Pay for an Electronic Atlas, by percentage

RESPONSE	ADULT						SCHOOL		
	ALL	General Public	History Alumni	Geography Alumni	Geography Students		ALL	Public	Private
Under $26	10	23	-	3	15		21	19	23
$26-$50	26	15	18	20	42		35	33	38
$51-$75	18	25	18	17	15		13	13	15
$76-$100	23	31	23	24	21		14	13	13
$101-$200	16	7	23	28	6		10	13	7
$201-$500	5	-	18	7	-		4	3	5
Over $500	1	-	-	-	-		3	6	-
True Mean	**$97**	$66	$163	$112	$62		**$102**	$134	$77
Sample Size	92	13	17	29	33		71	31	40

LEVEL OF INTEREST IN ALTERNATIVE FORMATS (Table 6.28, Figure 6.4)

Respondents were asked to indicate their level of interest in three technologies that currently exist but have not as yet been widely used for conveying atlas information.

The highest interest is expressed in floppy diskettes, both when considering high interest levels alone, and by combining high and slight interest. Adults overall are more interested than school pupils, with students highest and general public lowest. Cross-tabulation with computer ownership shows that over 90% of owners versus only 40% of non-owners are interested in this system. The more highly educated also appear to be more in favour, as indicated by comparison of interest with education levels.

Only half as many respondents overall express strong interest in CD-ROM or video tape technologies. More adults have no interest in CD-ROMs than have no interest in floppies, the general public again with the highest proportion, a full quarter.

Video tape technology attracts least strong interest but has more interest overall than CD-ROMs. However, video tape has double the proportion of people "not at all" interested. This number is dominated by geography alumni.

Inclusion of a category "don't understand the technology" garnered some fascinating results. Fully a third of those responding to this question admit to not understanding CD-ROM technology. A further quarter of the general public do not understand floppy diskette technology. Numbers of respondents who answered this question at all are also small, especially for the general public. This means that the unknowledgeable group is probably considerably under-reported. If all non-respondents were known to fall into the "don't understand" category, the proportion for CD-ROM would rise from 35 to 52% for all adults, for example, and from 37 to 73% for the general public sample.

ATLAS VIA TELEVISION CHANNEL (Table 6.29)

Though the technology does not as yet exist, level of interest in the possibility of atlas information being accessed via a television channel was explored. Two thirds of adults would be interested, but a majority overall would not be willing to pay for it. There is minimal variation between adult groups. The sharpest contrast in proportions

Table 6.28 Level of Interest in Alternative Formats, by percentage

Level of Interest	FORMAT	ADULT ALL	ADULT General Public	ADULT History Alumni	ADULT Geography Alumni	ADULT Geography Students	SCHOOL ALL	SCHOOL Public	SCHOOL Private
High	Floppy	59	36	43	60	79	48	55	40
	CD-ROM	30	19	23	38	31	29	39	18
	Video	24	37	29	23	14	26	20	33
Slight	Floppy	27	32	50	22	14	31	23	38
	CD-ROM	19	19	27	24	8	26	27	25
	Video	41	42	42	28	53	41	48	33
None	Floppy	6	9	7	9	2	13	13	15
	CD-ROM	16	25	18	10	18	11	6	16
	Video	32	17	29	44	30	26	22	30
Don't understand	Floppy	8	23	–	9	5	8	9	7
	CD-ROM	35	37	32	28	44	34	27	41
	Video	3	4	–	5	3	7	9	4
Sample Sizes	Floppy	138	22	28	45	43	111	56	55
	CD-ROM	119	16	22	42	39	100	51	49
	Video	123	24	24	39	36	105	54	51

Figure 6.4 Level of Interest in Alternative Atlas Formats

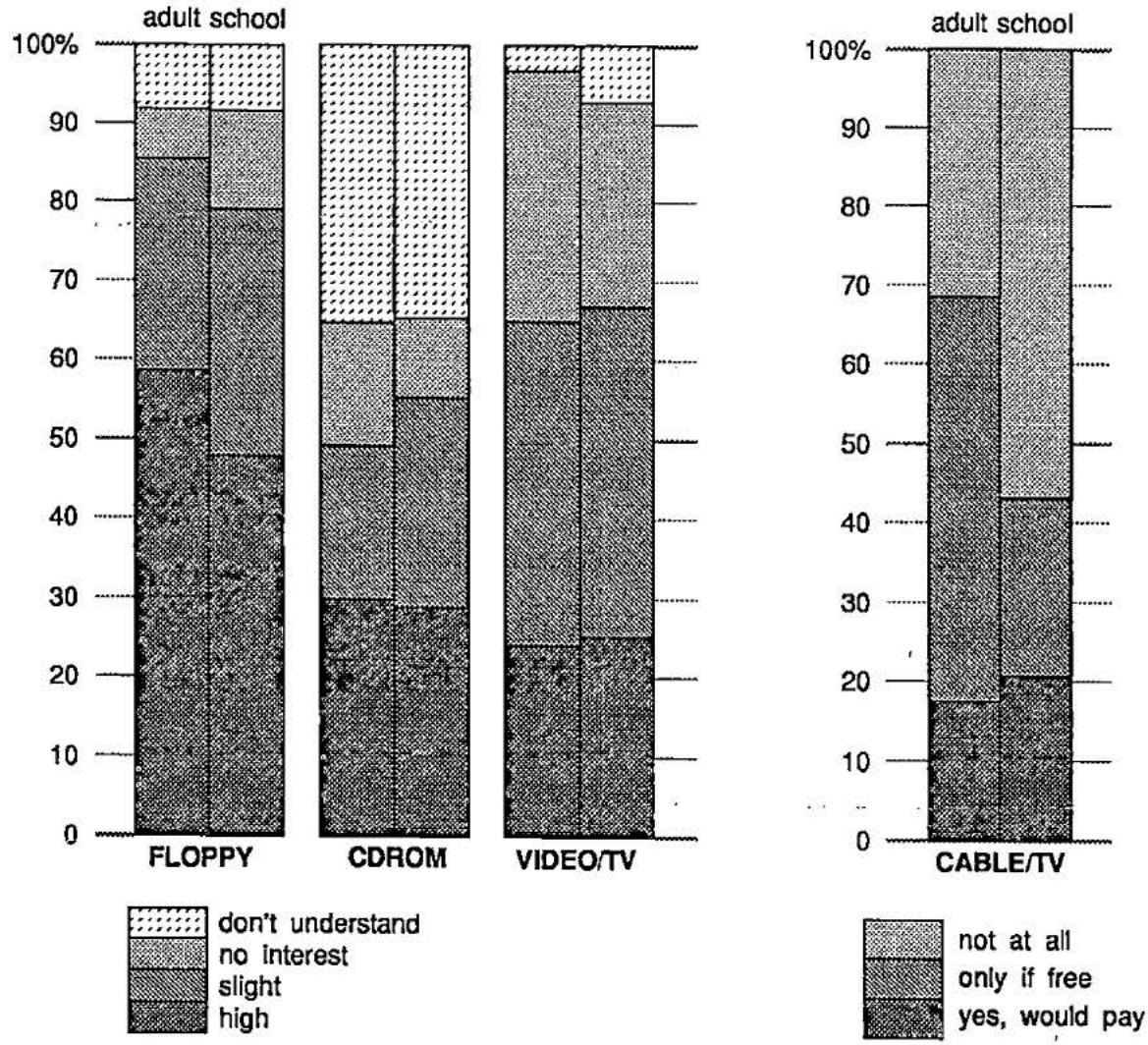


Table 6.29 Interest in Atlas via Television Channel, by percentage

RESPONSE	ADULT						SCHOOL		
	ALL	General Public	History Alumni	Geography Alumni	Geography Students		ALL	Public	Private
Yes, would pay	17	20	17	20	12		21	25	16
Only if free	51	58	52	41	55		22	14	31
Not at all	32	22	31	39	33		57	61	53
Sample Size	151	36	29	44	42		120	63	57

is between adults and school pupils. Nearly 60% of pupils, twice the adult figure, would not choose to have atlas information via a television channel even if it were free.

BOOK VERSUS ELECTRONIC FORMAT (Tables 6.30-6.32)

If forced to choose between an atlas in book or electronic form, 2/3 of adults would select a book. While a book would be an even clearer choice for alumni and general public, students are ambivalent (Table 6.30). However, when asked whether they would still want a book as well as an electronic atlas, all groups, led by alumni, were clearly very much in favour (Table 6.31). Women seem to be more adamant about this than men, 90% wanting a book too, to 75% of men (though, again, the age factor may confound this conclusion).

Open comment, summarized in Table 6.32, was made by 69 adults. Fully a third of these point out the portability and ease of access to information in books: "you can't put a computer in the back pocket of your jeans," and "who wants to boot up their computer every time they just want to look for a placename?" Familiarity with the format is the key factor for 8 respondents, which includes several pleas for the atlas's "inherent charms": "A well-made book is a beautiful artifact, not just a research tool. Do not lose sight of this!"

Among other comments in praise of the book format are independence of worry about power failure, lower costs, and lack of requirement either of a computer itself or of training in using it.

Among the minority favouring the electronic format, small numbers point out specific attributes such as the opportunity for rapid updating and the larger potential ("possibilities are endless"), but nearly half the comment includes a caveat: "only if the quality of image was comparable to the finished image in a book;" "assuming a flat screen monitor was available;" "must have means of getting a hard copy (not possible via home TV)." There are also great optimists -- five respondents selected electronic despite not having access to a computer at present, and enthusiasts " great idea -- hope it happens -- would be super to make it accessible to students -- to bring geography alive!"

Table 6.30 Preference for Book or Electronic Format, by percentage

	ADULT					
RESPONSE	ALL	General Public	History Alumni	Geography Alumni	Geography Students	
Book	68	72	80	75	50	
Electronic	32	28	20	25	50	
Sample Size	156	36	30	44	46	

Table 6.31 Need for Book Atlas as Well as Electronic, by percentage

	ADULT					SCHOOL		
RESPONSE	ALL	General Public	History Alumni	Geography Alumni	Geography Students	ALL	Public	Private
Yes	81	74	86	88	78	82	77	88
No	19	26	14	12	22	18	23	12
Sample Size	151	34	28	43	46	120	62	58

Table 6.32 Reasons for Preference for Book or Electronic Atlas Format, by frequency

REASON	ADULT					
	ALL	General Public	History Alumni	Geography Alumni	Geography Students	
Pro-book:						
Easy access	8	-	3	-	5	
Portability	12	3	-	6	3	
Familiarity	8	4	3	6	1	
Other	15	2	2	6	4	
Pro-electronic:						
Change possible	7	2	-	2	3	
Have computer	5	2	-	-	3	
Printout needed	5	-	1	4	-	
Other	12	-	1	5	6	

OTHER IDEAS FOR RECEIPT OF ATLAS INFORMATION

A small number of respondents (24 adults and 20 pupils) contribute suggestions, some more practical than others. Seven, representing all but the general public group, suggest Modem connection to a centralized database. Several see a strong role for libraries in handling various electronic formats, perhaps in lending discs out, using a CD-ROM system, or providing a "toll-free information access line, staffed with people who are well trained." Breaking a printed atlas down into several smaller booklets appealed to five respondents as a cheap way to buy in parts and update gradually. How three pupils expect atlas information to be transmitted by radio remains a bit of a mystery.

6.5.3 Conclusions

The loose sheet alternative format suggested was not popular, with only geography alumni generally in favour. Inconvenience of storage, handling and transporting loose sheets, and organizational difficulties were cited, as well as potential for loss and damage. School pupils, however, could see advantages for sharing among many users at a time, no doubt based on difficulties encountered in sharing a bound atlas. They also recognized the potential for larger scales, facilitating more detail or less crowding, which appeals to them.

Computer maps had been seen by little over half the respondents. Of locations mentioned, the greatest exposure was at school or a demonstration, rather than in a work situation. Few had seen them on television. But the survey data was collected by November 1990, before Middle East events unfolded, so such figures are no doubt rapidly changing.

While adult opinion of computer maps is ambivalent, school pupils' enthusiastic positive comment totally outweighs their negative thoughts. However, there are definite misconceptions about the ease and speed of access to information which may not carry over to actual use situations.

It is no surprise that all adults find up to date information important. But the general public finds it only "somewhat" important, a factor to consider when pondering the potential market for an electronic atlas. The many school pupils not at all concerned about currency of information may be generally disenchanted – surely they would be among the early complainers if their atlas failed to give current country names?

Though geographers are equally concerned that atlas information be quickly updated, a noticeable number of general public and history alumni do not find this ability at all important. Again this suggests a division of priorities between the groups.

This is reinforced when other potential attributes of an electronic atlas are investigated. Overlay possibilities and, to a lesser extent, scale changes, are more highly favoured by students and geography alumni than by general public and history alumni. School pupils are ambivalent towards overlay possibilities. It is clear that to them a computer atlas would simply make learning easier and more exciting, but they do not appreciate its potential for widening the scope of use of geographical data.

A majority overall would pay more for a computer atlas than a book atlas, but the amount they are willing to pay varies considerably about the $100 mean. Impecunious students and wary public would pay less, with alumni perhaps more adventurously willing to spend more.

The alternative format garnering the highest level of interest was floppy diskettes, with CD-ROMs least. Perhaps the most telling response to this question, however, is the high number of respondents who admit to not understanding the technologies (especially the CD-ROM format overall and the public for the floppy diskette format), thus being unable to state a level of interest.

The idea of atlas information accessible via a television channel is of interest to 2/3 of adults but, remarkably, a clear majority of school pupils are <u>not</u> interested. Television, we were told, is meant for entertainment, not to be cluttered up with school work.

Despite predominantly favourable comment about computer maps, over 2/3 of adults would choose a book format given the option. Only students, young and adventurous, give electronic atlases equal status. But even they join the more cautious in wanting a book as well, if they could have both. All groups like the portability and familiarity of books, and their "inherent charms," which a computer can never emulate.

6.6 GENERAL CONCLUSIONS

The survey undertaken collected information from a range of atlas users. While its length may have discouraged some potential respondents, it also gave ample

opportunity for opinion to be expressed on many related topics. Final general open comment expressed considerable enthusiasm about atlases overall:

> "atlases are fun to browse through and useful for getting a lot of information in one fell swoop"

Comment ran 3:1 for the development of an electronic atlas versus staying with a purely traditional atlas of British Columbia. But the caveats remain:

> "Avoid electronic maps until technology refines the product. Electronic maps are too complex for the casual user. Manual maps are proven products with several centuries' use. If derivative maps made for a special purpose or recent updates are desired, make copies and sell them to the user. The purchaser gets something solid and not just coloured images on the screen which disappear at the flip of a switch."

Selection of several disparate populations to survey has given us a good range of opinion. Our general public sample was found to represent the larger population well with respect to gender, age, household size and income, when compared to the Victoria CMA population, though overall our sample is better educated than most.

Atlas definitions given range from simply "a collection of maps" to fairly complex references to an assortment of topics, and hints at the value of atlases in "understanding." But there is a surprising absence of any specific reference to the value of atlases in showing interrelationships between phenomena.

Almost everyone owns an atlas or two, most likely a world one, which is probably used for locating places. American bias of content is criticised. Respondents most appreciate atlases which contain a clear index and gazetteer, but are not keen on a great deal of textual information. Adults and school pupils differ in their opinion of photographs, with pupils far more in favour of them.

Regional (presumably rather than thematic) atlas organisation is preferred, with bold colours and larger type. Far fewer people want more detail than want less -- "simplify" is a common cry.

The boxed set of loose sheets is not attractive to most as an alternative format to the traditional bound book, though school pupils in particular can see its merit for sharing materials.

Computer maps particularly appeal to school pupils, though the main reason (that they are easier to use) may not be borne out in practice. Floppy disk technology is the

most popular as an electronic atlas medium, particularly among computer owners, who are already familiar with its use. School pupils are far less interested than adults in an atlas channel on their television sets. They clearly perceive atlases as connected with work rather than leisure.

But however enthusiastic they are about the new technologies, no group wants to see the demise of the traditional bound book atlas.

CHAPTER SEVEN

USER SURVEY RESULTS: AN ATLAS FOR BRITISH COLUMBIA

7.1 INTRODUCTION

Section Two of the survey questionnaire was designed to establish who uses the most recent general atlas of the province, the Atlas of British Columbia, People, Environment, and Resource Use, (Farley, 1979), and for what purposes. It also probes views on appropriate content for a new atlas for the province. After a simple yes/no question as to use of the 1979 Atlas, an open question allows those who have used it to elaborate a little. Next, a list of potential topics for an atlas of British Columbia is presented to all adult respondents, who are invited to check whether they "definitely would use", "might use", or "would not use" each topic. Analysis of these selections forms the bulk of the content of this chapter. Space is also provided for additional desired topics to be written in.

7.2 FAMILIARITY (Table 7.1)

Only a quarter of all adults surveyed have ever used the 1979 Atlas of British Columbia. School pupils are even less well acquainted with it. Although deliberately selected as the age group most likely to use the Atlas in their study of the province, less than a tenth of Grade Ten pupils surveyed had used it. The highest percentage who had used the Atlas were geography alumni, at 38%.

7.3 USE

By far the most common use noted is "for school work", particularly for physiographic and resource information, and for base maps for projects. Next, in order of mention, are "location", especially of cities and parks, "general interest", and "for work".

A very few seek economic and historical information or use the atlas when planning holiday trips. Casual use, with no serious objective, is reflected in comment such as:

Table 7.1 Use of 1979 Atlas of British Columbia, by percentage

	ADULT					SCHOOL		
RESPONSE	ALL	General Public	History Alumni	Geography Alumni	Geography Students	ALL	Public	Private
Yes	27	22	26	38	22	8	13	2
No	73	78	74	62	78	92	87	98
Sample Size	154	36	27	45	46	119	61	58

"Just to see what it contained".

"... to peruse for personal interest..."

"...to settle the odd beer-swilling dispute..."

Rather than restricting their comment to what they use the atlas for, several respondents take the opportunity to provide unsolicited observations which suggest a degree of dissatisfaction with the product:

...I find it sort of boring."

"I have worked in government drafting offices for 12 years and have yet to see someone use the Atlas. When first published it was passed around. I found the maps too small, too complex... In other words dull."

"The gazetteer is almost useless, and the gazetteer map does not show places named in the gazetteer."

7.4 TOPICAL CONTENT OF A NEW ATLAS FOR BRITISH COLUMBIA

7.4.1 Introduction

Adult respondents were presented with a list of potential general and specific topics for a British Columbia Atlas, and invited to indicate their likelihood of use of each, by checking columns headed "Definitely Would Use", "Might Use" or "Would Not Use".

The list is based on topics covered by the 1979 Atlas, supplemented by additional topics common to some other Canadian provincial atlases, such as income and urban plans. However, the Atlas of British Columbia alone covers 338 topics (see Table 3.2), an impossibly long list for a questionnaire, or for meaningful evaluation. The twelve general and 43 more specific topics selected for the questionnaire (see Appendix 3 and Tables 7.2, 7.4) were judged likely to be those of greatest interest to the majority of atlas users. Respondents indicated their use of both general topics (e.g. Agriculture) and more specific topics (e.g. Crop Types), and the two levels of information were analysed separately.

Topic names were deliberately kept succinct, which may have caused some interpretation difficulties. For example, respondents were apparently unaware that "Forest Administration" included Tree Farm Licences, which may have led to some under-reporting in the main analysis. Some of these misunderstandings became clear, however, when respondents took advantage of the opportunity to write in extra topics of their own choosing. These responses are discussed separately in Section 7.4.4.

General and specific topics were separately ranked by percentage of respondents reporting, as shown in Tables 7.2 to 7.5. Respondents who checked "Definitely Would Use" were taken to be "Definite Users". These were added to those who checked "Might Use" to give "Probable Users". An average of 127 respondents evaluated the general topics, and 145 evaluated specific topics.

It was tempting to include failures to respond in the "Would Not Use" category, but this idea was dismissed as there are other reasons for failure to respond than lack of interest in a specific topic, such as fatigue and inadvertent lineskipping. Also reducing totals were two respondents who, apparently inadvertently, missed the second page of the list of topics, and one who gave only general comment at the end of the question. Eighteen respondents gave a double response. These were all assigned to the central "Might Use" category. Maximum possible totals for public, history alumni, geography alumni and students were 37, 30, 47, and 47 respectively, but minimum actual responses for individual topics were as low as 23, 22, 35 and 39 respectively. Thus results must be considered as indicative of relative user preferences rather than entirely conclusive.

In order to establish the degree of association between the four user groups' assessment of the topics, correlation coefficients were calculated. If a general atlas is to appeal to many user groups, one could argue that there would need to be a strong correlation between the groups' choices of content.

In addition, "Mean Deviation" indices were calculated in order to identify variations in interest in individual topics between the user groups. Absolute differences in rank between each user group and the total are summed and divided by the number of user groups. For example, Mean Deviation for definite use of Transportation (on Table 7.2a) is given by $[|2-3| + |1-3| + |3-3| + |7-3|] /4 = 1.8$.

7.4.2 General Topics (Tables 7.2 and 7.3)

Twelve general topics were included in alphabetical order in the questionnaire. Tables 7.2a and 7.3a list them in order of overall ranking, giving each user group's percentage and ranking of each topic. There is a consistent grouping of topics by both Definite and Probable use. Highest ranked are Tourism, Physical, and Transportation. Next are Climate, People, History, and Forestry. Manufacturing is ranked consistently lowest, joined by Mining, Energy, Agriculture, and Fishing.

Table 7.2a Definite Users of B.C. Atlas General Topics, by percentage and rank

TOPIC	TOTAL	PUBLIC	HISTORY ALUMNI	GEOGRAPHY ALUMNI	STUDENTS	Mean Dev.
Tourism	71.7 (1)	74.1 (1)	82.6 (2)	68.4 (2)	66.7 (5)	1.5
Physical	67.9 (2)	48.2 (5)	63.0 (6)	81.0 (1)	72.5 (1)	2.3
Transportation	66.4 (3)	68.0 (2)	88.0 (1)	58.3 (3)	61.0 (7)	1.8
People	59.7 (4)	56.5 (3)	68.0 (4)	46.0 (6)	69.2 (2)	1.3
History	59.0 (5)	55.2 (4)	78.6 (3)	47.6 (5)	60.0 (9)	1.8
Climate	57.1 (6)	34.8 (8)	63.6 (5)	55.9 (4)	68.6 (4)	1.8
Forestry	50.0 (7)	37.5 (7)	50.0 (7)	37.8 (8)	69.2 (2)	1.5
Agriculture	44.9 (8)	33.3 (9)	50.0 (7)	29.7(10)	63.2 (6)	1.5
Fishing	43.5 (9)	38.1 (6)	41.7 (9)	39.5 (7)	51.2(10)	1.5
Energy	42.7(10)	21.1(10)	39.1(10)	37.8 (8)	60.5 (8)	1.0
Mining	33.6(11)	20.0(11)	28.0(12)	29.0(11)	48.8(11)	0.3
Manufacturing	27.3(12)	17.9(12)	32.1(11)	15.8(12)	40.0(12)	0.3
Mean Deviation						
from Overall Rank		1.0	1.1	1.1	2.3	

Table 7.2b Correlation Analysis for Definite Users of General Topics

Pearson Correlation Coefficients / Prob > |R| under Ho: Rho=0 / N = 12

	PUBLIC	HISTORY ALUMNI	GEOGRAPHY ALUMNI	STUDENTS
TOTAL	0.9014	0.9199	0.9185	0.7929
Prob	0.0001	0.0001	0.0001	0.0021
PUBLIC		0.9368	0.7241	0.5376
Prob		0.0001	0.0078	0.0714
HISTALUM			0.7338	0.6037
Prob			0.0066	0.0376
GEOGALUM				0.7235
Prob				0.0078

Table 7.3a Probable Users of B.C. Atlas General Topics, by percentage and rank

TOPIC	TOTAL	PUBLIC	HISTORY ALUMNI	GEOGRAPHY ALUMNI	STUDENTS	Mean Dev.
Transportation	96.9 (1)	96.0 (1)	100.0 (1)	91.6 (4)	100.0 (1)	0.8
Tourism	96.1 (2)	92.6 (2)	100.0 (1)	97.4 (1)	94.9 (9)	2.3
Physical	94.7 (3)	88.9 (3)	92.6 (7)	94.5 (2)	100.0 (1)	1.8
Climate	94.7 (4)	86.9 (4)	100.0 (1)	91.2 (5)	100.0 (1)	1.8
People	93.5 (5)	86.9 (4)	96.0 (5)	92.0 (3)	97.4 (7)	1.3
Forestry	91.8 (6)	79.2 (7)	95.5 (6)	89.2 (7)	100.0 (1)	1.8
History	91.4 (7)	86.2 (6)	96.5 (4)	85.7(10)	97.5 (6)	2.0
Fishing	87.1 (8)	71.4 (8)	79.2 (8)	86.9 (8)	100.0 (1)	1.8
Mining	84.0 (9)	68.0 (9)	76.0(12)	89.5 (6)	93.0(11)	2.0
Energy	83.8(10)	63.2(10)	78.2(11)	86.5 (9)	94.7(10)	0.5
Agriculture	81.1(11)	62.5(11)	78.6 (9)	78.4(11)	97.4 (7)	1.5
Manufacturing	73.4(12)	57.2(12)	78.5(10)	60.5(12)	91.1(12)	0.5
Mean Deviation						
from Overall Rank		0.3	1.5	1.5	2.7	

Table 7.3b Correlation Analysis for Probable Users of General Topics

Pearson Correlation Coefficients / Prob > \|R\| under Ho: Rho=0 / N = 12

	PUBLIC	HISTORY ALUMNI	GEOGRAPHY ALUMNI	STUDENTS
TOTAL	0.9616	0.8746	0.8828	0.6883
Prob	0.0001	0.0002	0.0001	0.0133
PUBLIC		0.9272	0.7574	0.5868
Prob		0.0001	0.0043	0.0449
HISTALUM			0.5796	0.5354
Prob			0.0482	0.0729
GEOGALUM				0.5453
Prob				0.0667

Correlation coefficients (see Table 7.2b and 7.3b) demonstrate a strong association ($r > 0.9$) between the overall totals and the general public, and both alumni groups, but a weaker ($r = 0.79$) though still significant association with the student group. History alumni and the general public were also very highly correlated with each other ($r = 0.94$). Only public and student groups failed to show a significant association at the 0.05 level.

Adding to the analysis those who "might use" the topics retained the high strength of association between groups, with strong and significant correlations for all but students with alumni.

The implication here that the student group differed from the others is reinforced by reference to the Mean Deviations calculated from overall rankings, as shown at the foot of Tables 7.2a and 7.3a. For definite users, the mean deviation for students (2.3) is double that of alumni (both at 1.1) or the general public sample (1.0). Differences are even greater for probable users (2.7 for students, versus only 0.3 for the general public).

Tables 7.2a and 7.3a also indicate that the students generally gave much higher and a much narrower range of responses than the other groups. For instance, though they agree in ranking manufacturing lowest, 40% of them would "definitely use" it compared to 18% of the public and 16% of geography alumni. All 100% of the students responded "would use" or "might use" for five of the twelve topics, with over 90% planning to use even their lowest-ranked topic, compared to only 57% of the public and 60% of the geography alumni.

Mean deviation calculations for definite use of individual topics show clearly the strong agreement in placing Mining and Manufacturing last. The high deviation for Physical reflects a sharp contrast between its high ranking by geography students and alumni on the one hand and low ranking of history alumni and general public on the other. Students' low ranking of Transportation and History and their high ranking of Forestry contribute to their relative high mean deviation. For probable users, there is minimal variation between groups for Manufacturing, Energy, and Transportation, at the two extremes of the rankings. Tourism's high deviation is entirely due to the students' low ranking. Students also rank Fishing and Forestry remarkably high. History alumni rank Physical remarkably low. Mining's wide deviation is a result of geography alumni's high ranking.

7.4.3 Specific Topics (Tables 7.4 to 7.6)

Despite preliminary culling to reduce the number of topics, forty-three specific topics were included in the final list. It was thus considerably more difficult to perceive groupings of topics by relative popularity than with twelve.

Transportation, Tourism and Physical themes continue to dominate but they are joined by Population and an assortment of resource topics in the leading group. Of consistently lowest interest are Livestock Types and Telephone Calls, with Agricultural Investment and Mine Production Value only marginally ahead.

For definite users, correlations between the groups remain significant for all but the public and student pairing, but they are slightly less strong than for general topics (see Table 7.4a and Section 7.5). For probable users, (Table 7.5a), again only the student group fails to show a significant association with other groups, notably the general public and history alumni, and the strengths of association are much reduced.

Mean deviations from the overall rankings of definite users identify both students (5.7) and history alumni (6.1) as ranking the topics more different from the overall than do the general public (4.5) or geography alumni (4.4). As with the general topics, students clearly show the highest deviation (8.5) from overall rankings when all probable users are considered.

There is a wide range of mean deviation in rankings when individual topics are considered, from 1 to 11 for definite users and 0.5 to 12.3 for probable users. Strongest agreement among definite users is shown for the highly ranked ground transportation topics, Parks, Precipitation and Temperature, middle ranked Indian Reserves and urban Street Plans, lower ranked Electricity and lowest ranked Mine Production Value, Agricultural Investment and Livestock Types. Probable users generally agree but add Frostfree Period to the mid-range, and Forest Administration to the low range agreements. Mine Production Value is the most consistently ranked overall.

GREATEST DEVIATIONS FROM OVERALL RANKINGS (Table 7.6)

In order to further investigate differences in emphasis between the user groups, individual rankings which deviate more than ten positions from the overall rankings are assembled on Table 7.6.

Table 7.4a Definite Users of B.C. Atlas Specific Topics, by percentage and rank

TOPIC	TOTAL	PUBLIC	HISTORY ALUMNI	GEOGRAPHY ALUMNI	STUDENTS	Mean Dev.
Parks	73.3 (1)	82.9 (1)	70.4 (5)	75.6 (2)	66.0 (4)	2.0
Rd_rlway_ferry	72.7 (2)	75.7 (2)	86.7 (1)	65.9 (5)	67.4 (2)	1.0
Relief	64.1 (3)	52.8(10)	55.2 (8)	85.4 (1)	59.6 (8)	4.5
Population	60.5 (4)	54.3 (9)	70.0 (6)	48.8(12)	69.6 (1)	4.3
Airports	60.3 (5)	64.7 (6)	73.3 (3)	53.7 (9)	54.4(13)	3.8
Skiing_&_boating	59.6 (6)	68.8 (3)	53.9(10)	68.3 (3)	48.9(19)	5.8
Precip_temp	59.5 (7)	65.5 (5)	62.1 (7)	59.1 (6)	54.4(13)	2.3
Water_use	57.8 (8)	60.0 (7)	44.4(23)	55.0 (8)	67.4 (2)	5.5
Water_quality	54.8 (9)	55.9 (8)	51.7(13)	47.4(13)	62.2 (6)	3.0
Geology	54.6(10)	47.2(12)	55.2 (8)	68.3 (3)	47.8(21)	5.5
History_people	53.6(11)	47.2(12)	79.3 (2)	43.9(17)	51.1(16)	5.3
Summr_road_traf	51.8(12)	66.7 (4)	46.2(20)	47.4(13)	47.8(21)	6.5
Hist_economic	48.9(13)	39.3(19)	72.0 (4)	44.4(16)	45.7(26)	7.8
Street_plans	47.9(14)	40.0(16)	44.8(22)	56.8 (7)	47.8(21)	6.0
Native_ind_res	47.7(15)	38.2(20)	48.3(15)	45.0(15)	56.5(10)	2.5
Migration	47.6(16)	40.0(16)	51.7(13)	41.5(19)	55.6(12)	2.5
Education	46.3(17)	41.2(15)	41.4(27)	36.6(28)	62.2 (6)	8.0
Income	45.7(18)	38.2(20)	48.3(15)	36.6(28)	57.5 (9)	6.0
Forested_land	44.7(19)	17.7(33)	53.3(11)	40.9(23)	63.6 (5)	10.0
Soils	44.2(20)	23.3(29)	43.5(26)	52.5(10)	51.1(16)	7.3
Ethnic_origins	43.7(21)	44.1(14)	40.0(28)	36.6(28)	52.2(15)	6.8
Camp_attendance	42.1(22)	51.6(11)	38.5(30)	41.5(19)	38.3(33)	8.3
Agric_land_res	41.4(23)	25.0(27)	48.3(15)	40.0(24)	50.0(18)	4.5
Biogeoclim_zones	40.9(24)	25.0(27)	48.2(18)	48.9(11)	40.0(31)	7.3
Salmon_fishspawn	40.6(25)	32.3(22)	44.0(25)	41.5(19)	43.5(28)	3.0
Comm_tree_specs	39.5(26)	17.1(35)	53.3(11)	31.8(31)	55.8(11)	11.0
Fossil_fuels	37.1(27)	20.0(32)	33.3(38)	39.0(25)	48.9(19)	6.5
Electricity	36.8(28)	23.3(29)	37.0(34)	39.0(25)	43.5(28)	2.5
Labour_force	36.1(29)	26.5(26)	37.0(34)	31.7(32)	46.7(24)	4.0
Energy_consumpn	35.9(30)	17.2(34)	34.5(37)	39.0(25)	45.7(26)	5.0
Fish_catch	35.4(31)	29.0(23)	44.4(23)	30.2(35)	39.1(32)	4.8
Frostfree_period	34.9(32)	26.7(25)	48.2(18)	42.2(18)	25.0(41)	11.0

(continued...

Table 7.4a Definite Users of B.C. Atlas Specific Topics, by percentage and rank (continued)

TOPIC	TOTAL	PUBLIC	HISTORY ALUMNI	GEOGRAPHY ALUMNI	STUDENTS	Mean Dev.
Saw&paper_mills	34.1(33)	13.8(39)	45.8(21)	28.6(37)	46.5(25)	7.5
Pipelines	32.0(34)	16.7(36)	37.5(33)	41.0(22)	31.7(38)	4.8
Fresh_sport_fish	31.9(35)	28.1(24)	28.6(41)	30.8(33)	37.8(34)	4.8
Health_services	31.5(36)	39.4(18)	32.1(39)	22.5(42)	33.3(37)	7.0
Crop_types	30.6(37)	6.9(42)	39.3(29)	29.6(36)	41.3(30)	5.3
Mines&smelters	28.6(38)	16.1(37)	28.0(42)	30.8(33)	35.6(35)	3.0
Forest_admin	28.3(39)	13.3(40)	37.9(31)	25.6(40)	34.9(36)	3.3
Mine_prod_value	25.4(40)	12.5(41)	27.3(43)	27.8(38)	29.6(39)	1.8
Agric_investment	23.8(41)	14.8(38)	34.8(36)	22.9(41)	24.4(42)	2.3
Phone_calls	23.6(42)	20.7(31)	37.9(31)	16.7(43)	21.7(43)	5.5
Livestock_types	23.2(43)	3.6(43)	29.6(40)	27.3(39)	27.9(40)	2.5
Mean Deviation from Overall Rank		**4.5**	**6.1**	**4.4**	**5.7**	

Table 7.4b Correlation Analysis for Definite Users of Specific Topics

Pearson Correlation Coefficients / Prob > |R| under Ho: Rho=0 / N = 43

	PUBLIC	HISTORY ALUMNI	GEOGRAPHY ALUMNI	STUDENTS
TOTAL	0.9008	0.8194	0.8797	0.8274
Prob	0.0001	0.0001	0.0001	0.0001
PUBLIC		0.6761	0.7421	0.6218
Prob		0.0001	0.0001	0.0001
HISTALUM			0.6237	0.6226
Prob			0.0001	0.0001
GEOGALUM				0.6109
Prob				0.0001

Table 7.5a Probable Users of B.C. Atlas Specific Topics, by percentage and rank (continued)

TOPIC	TOTAL	PUBLIC	HISTORY ALUMNI	GEOGRAPHY ALUMNI	STUDENTS	Mean Dev.
Rd_rlway_ferry	97.4 (1)	97.3 (4)	100.0 (1)	92.7 (6)	100.0 (1)	2.0
Parks	97.3 (2)	100.0 (1)	100.0 (1)	92.7 (8)	97.9(10)	4.0
Precip_temp	96.6 (3)	100.0 (1)	93.1 (8)	95.5 (3)	97.9(10)	3.5
Airports	94.7 (4)	97.1 (5)	100.0 (1)	87.9(15)	97.9(10)	5.3
Population	94.4 (5)	91.4 (6)	100.0 (1)	85.4(18)	97.9(16)	7.3
Summr_road_traf	93.7 (6)	100.0 (1)	92.4(10)	89.5(13)	93.5(27)	9.3
Geology	93.4 (7)	86.1(11)	86.2(21)	97.6 (2)	100.0 (1)	7.3
Biogeoclim_zones	91.2 (8)	87.5(10)	81.5(28)	91.1 (9)	100.0 (1)	7.5
Water_use	91.1 (9)	84.0(12)	88.8(16)	87.5(16)	100.0 (1)	6.3
Salmon_fishspawn	90.9(10)	77.5(22)	92.0(11)	92.7 (6)	97.9(10)	4.3
Skiing_&_boating	90.4(11)	90.7 (7)	88.5(17)	95.1 (4)	87.2(41)	11.8
Relief	90.2(12)	80.6(19)	79.3(29)	97.6 (1)	97.9(10)	9.3
Comm_tree_spec	90.1(13)	82.8(15)	86.6(20)	88.6(14)	100.0 (1)	5.5
Forested_land	90.0(14)	79.5(21)	83.3(26)	93.2 (5)	100.0 (1)	10.3
Water_quality	89.7(15)	88.3 (9)	89.6(14)	79.0(33)	100.0 (1)	9.8
Education	89.3(16)	82.4(16)	93.1 (8)	82.9(25)	97.8(17)	4.5
History_people	88.9(17)	83.3(14)	96.6 (5)	85.4(18)	91.5(33)	8.0
Ethnic_origins	88.7(18)	82.4(16)	93.3 (7)	82.7(28)	95.7(20)	6.3
Native_ind_res	87.9(19)	82.3(18)	86.2(22)	85.0(22)	95.6(21)	2.3
Soils	87.7(20)	73.3(26)	78.3(33)	90.0(10)	100.0 (1)	12.0
Frostfree_period	87.0(21)	80.0(20)	85.2(24)	84.4(23)	95.5(25)	2.5
Street_plans	85.9(22)	90.0 (8)	86.2(22)	78.4(34)	89.1(36)	10.0
Pipelines	85.8(23)	73.4(25)	83.3(26)	89.7(12)	92.7(31)	6.0
Migration	85.5(24)	70.0(32)	96.5 (6)	78.1(35)	95.6(21)	10.0
Fossil_fuels	85.3(25)	70.0(32)	85.2(25)	85.3(20)	95.6(21)	4.0
Hist_economic	85.2(26)	75.0(23)	92.0(11)	83.3(24)	89.2(35)	7.3
Saw&paper_mills	84.8(27)	69.0(34)	87.5(19)	81.0(30)	97.7(19)	6.5
Income	84.1(28)	64.7(38)	89.7(13)	80.5(31)	97.9(10)	11.5
Labour_force	83.7(29)	64.8(37)	88.9(15)	82.9(25)	95.6(21)	8.5
Energy_consumptn	83.5(30)	68.9(36)	79.3(30)	85.3(20)	93.5(27)	4.5
Agric_land_res	82.8(31)	71.9(29)	72.4(38)	82.2(29)	97.8(18)	6.0
Electricity	82.6(32)	73.3(26)	74.0(37)	82.9(25)	93.5(27)	5.8

(continued...

Table 7.5a Probable Users of B.C. Atlas Specific Topics, by percentage and rank (continued)

TOPIC	TOTAL	PUBLIC	HISTORY ALUMNI	GEOGRAPHY ALUMNI	STUDENTS	Mean Dev.
Fish_catch	82.3(33)	74.2(24)	77.7(34)	79.2(32)	93.5(27)	4.0
Camp_attendance	82.1(34)	83.9(13)	88.5(17)	75.7(37)	83.0(42)	12.3
Mines&smelters	82.1(35)	70.9(31)	76.0(35)	87.2(17)	88.9(37)	6.0
Fresh_sport_fish	81.3(36)	71.9(29)	67.9(41)	89.8(11)	88.9(37)	9.5
Crop_types	78.9(37)	69.0(34)	64.3(42)	72.8(39)	100.0 (1)	11.5
Forest_admin	77.3(38)	63.3(39)	75.8(36)	74.4(38)	90.7(34)	1.8
Health_services	76.7(39)	57.6(40)	78.5(32)	77.5(36)	88.9(37)	3.3
Mine_prod_value	73.0(40)	54.2(42)	68.2(40)	69.5(40)	88.7(40)	0.5
Agric_investment	72.2(41)	48.1(43)	69.6(39)	68.6(41)	92.7(32)	3.3
Livestock_types	71.8(42)	57.2(41)	59.2(43)	65.9(42)	95.3(26)	4.5
Phone_calls	70.0(43)	72.4(28)	79.3(30)	52.8(43)	76.1(43)	7.0
Mean Deviation from Overall Ranking		**4.9**	**6.8**	**6.1**	**8.5**	

Table 7.5b Correlation Analysis for Probable Users of Specific Topics

Pearson Correlation Coefficients / Prob > |R| under Ho: Rho=0 / N = 43

	PUBLIC	HISTORY ALUMNI	GEOGRAPHY ALUMNI	STUDENTS
TOTAL	0.8701	0.7748	0.8398	0.5892
Prob	0.0001	0.0001	0.0001	0.0001
PUBLIC		0.7073	0.5965	0.2634
Prob		0.0001	0.0001	0.0879
HISTALUM			0.4475	0.2249
Prob			0.0026	0.1471
GEOGALUM				0.5363
Prob				0.0002

Table 7.6 Greatest Deviations from Overall Rankings

Group	Ranked Relatively High	Ranked Relatively Low
Public	camp attendance (22,11)* (34,13)+ fresh sport fishing (35,24)* health services (36,18)* phone calls (43,28)+ street plans (22,8)+	forested land (19,33)* salmon fishing (10,22)+
History Alumni	frostfree period (32,18)* commercial tree species (26,11)* saw and paper mills (33,21)* history, people (17,5)+ history, economic (26,11)+ ethnic origins (18,7)+ migration (24,6)+ income (28,13)+ labour force (29,15)+ camp attendance (34,13)+ phone calls (42,31)* (43,30)+	biogeoclim.zones (8,28)+ forested land (14,26)+ geology (7,21)+ relief (12,29)+ soils (20,33)+ water use (8,23)*
Geography Alumni	biogeoclimatic zones (24,11)* frostfree period (32,18)* relief (12,1)+ pipelines (34,22)* (23,12)+ mines and smelters (34,17)+ fresh sport fish (36,11)+	education (17,28)* population (5,18)+ str.plans(14,7)*(22,34)+ migration (24,35)+ airports (4,15)+ water quality (15,33)+
Students	agric. land reserves (31,18)+ crop types (37,1)+ livestock types (42,26)+ soils (20,1)+ forested land (19,5)* (14,1)+ commercial tree specs.(26,11)* (13,1)+ education (17,6)* income (28,10)+ water quality (15,1)+	geology (10,21)* history, people (17,33)+ population (5,16)+ street plans (22,36)+ camp attendance (22,33)* sumr.road traff. (6,27)+ skiing & boating (6,19)* (11,41)+

* Definite Users
\+ Probable Users
(overall ranking, group's ranking)

While not all differences between the groups are simple to evaluate, some trends can be noted:

1. The general public are more interested than most in street plans, students and geography alumni less.
2. History alumni are more interested in historical topics and less in physical topics than most.
3. Geography alumni want a higher level of physical topics than most.
4. Students are more interested in agriculture and forestry topics than most and less interested in tourism.

7.4.4 Additional Topics Suggested By Respondents

Space was provided on the questionnaire under each general heading for additional topics to be written in if desired. Total numbers of comments are noted in brackets. Topics are listed in alphabetical order.

Agriculture (10 comments)

Relatively few topics are suggested. Three mention limits to crop growth, both climatic and land type, and irrigated areas. There are single notations for organic farming areas, use of fossil fuel in pesticides and fertilizers, areas of public grazing, employment, and land values.

Climate (11)

Multiple mentions are made for hours of sunshine, average snow cover and windspeeds, both average and maximum. Others included storm tracks, solar degree days, and "comparisons to indicate global warming effects".

Energy (14)

Hydro-electric dams (which are in the 1979 Atlas but not separately in our list) received six requests. Apart from single calls for tanker routes and fuelling depots, and exports, all other suggestions are connected with alternative energy sources, including locations of suitable sites, solar radiation, and hog fuel use.

Fishing (14)

Requests include fish migration patterns, total estimated fish stocks, access to sport fishing areas, native fishing zones, closures, and fish farms.

Forestry (36)

There is a strong call for more information on harvesting and stock replenishment. Tree Farm Licences are specifically mentioned by six respondents, obviously unaware that these are included under Forest Administration (which may, therefore, be misleadingly low in the overall rankings above). Several want maps of clearcuts and reforestation areas, with dates and success rates, of NSR (Not Sufficiently Restocked) and land no longer capable of reforestation, and regions of old growth forests. Some want to see areas affected by fire, disease and pests, and individual respondents call for a breakdown of forested land by species and age, whether commercial or not, mill towns and effects of forest industry, and gross income by Tree Farm Licence.

Historical (30)

A wide range of over 20 different topics is suggested here. Most often mentioned are early settlements, migration routes and transportation/trade routes. Locations of historical events, archeological sites and forts are also suggested, as well as land administration.

Manufacturing (14)

Other than calls for specific industries which the 1979 Atlas does cover, only ownership is specifically mentioned.

Mining (7)

Most requested are locations of claims, which are in the 1979 Atlas. Others include access routes to mines, land leases by mining company, markets, and mine closures.

People (15)

A variety of topics is suggested. These include traffic accidents, crime, and substance abuse, strikes, and job injuries, per capita income, date of creation of Indian Reserves, settlement patterns, relative real estate costs, and population projections.

Physical Features (27)

Many topics in the 1979 Atlas but not specified on our list are mentioned, including hydrology, physiographic regions, and geothermal areas. Wider coverage of wildlife is called for by several respondents, especially of endangered and introduced species of both plants and animals. Some want lake depths added, and offshore geology

and biology. The tourism theme is hinted at by calls for "interesting and spectacular features" and "physical environments of special interest".

Recreation and Tourism (22)

Several respondents want specific locations of commercial and Forestry campsites, hiking trails, backroad access by status of road, beaches, and tourist attractions. Individuals call for government tourist offices, obstacles in navigable rivers, shipwrecks, and tourist spending by region.

Transportation (10)

Individuals call for coastal navigational aids, the Inside Passage, weather hazards affecting transportation, including avalanches, patterns of travel by volume, television/satellite/radio, and detailed highway maps. Even ferry schedules and costs are requested.

Water (16)

Comment centres on water quality issues: treatment practices, contaminants and invaders e.g. milfoil, fluoridation, and changes over time.

Other (34)

Additional topics suggested fall under three general categories:

1. Concern for the environment, and waste management. Respondents want maps showing sewage treatment plants and outfalls, solid and nuclear waste disposal sites, as well as air pollution statistics and acidity of precipitation and lakes.
2. Electoral boundaries, both federal and provincial.
3. Regional maps giving more detail of place names, and greater detail still for major urban areas. Native names for areas are also suggested.

A complete list of all additional topics suggested is available.

7.5 SUMMARY AND DISCUSSION

The foregoing analysis has identified topics of greatest and least interest to the various user groups. In applying the findings to a decision to implement a new atlas for British Columbia, two standpoints can be addressed. Either one designs to satisfy all requirements of all groups, or one recognises that this is not a practical position given

size and cost constraints, and thus designs to satisfy the majority of views. Both possibilities are explored here, noting topics of greatest interest to each user group, then searching for ways of accommodating those which represent the maximum agreement between groups.

Tables 7.2 to 7.6 suggest that an atlas for the general public should concentrate on the general topics of Tourism, Transportation, Physical Geography and People, downplaying resources and economic themes. Specifically public interests concentrate on Parks, Travel routes at all scales, and Water Use and Quality.

History and geography alumni agree with the selection of Tourism and Transportation, but history alumni bring historical themes into their top choices rather than physical. For specific topics, historical themes replace water themes in their top group. Geography alumni want Street Plans and Forested Land, as well as Relief, Geology, and Salmon Fishing, rather than travel topics.

An atlas for students would contain somewhat different topics. As well as agreement with other groups as to transport and physical themes, our entire sample select the general topics of Forestry and Fishing rather than Tourism or People. Specific themes most favoured include Parks, surface travel, and water themes. Although students do not rank the general "People" topic highly, they do favour several specific themes within this topic, including Population, Education, and Income, as well as several forest themes, Soils and Crop Types.

Table 7.7 summarizes the correlation coefficients between all adult user groups for both general and specific topics. Although the vast majority of the correlations are highly significant, there is considerable variation in the strengths of association. History alumni's substantial agreement with the general public for general topics is confirmed, with correlation coefficients of over 0.9, dropping to 0.7 for specific themes, similar to geography alumni's correlation with the general public. History and geography alumni agree with each other more on definite than probable use, in which the correlation coefficients drop below 0.5.

As study of Tables 7.2 to 7.6 suggests, the student group is most clearly different in interests. Only for definite uses of specific topics is there significant association with the other groups, and even these correlation coefficients are not above 0.6. Perhaps the clearest recommendation to emerge, therefore, is a compromise.

Table 7.7 Summary of Correlation Coefficients Between User Groups

	General Public	History Alumni	Geography Alumni	Students
TOTAL	.901 .962 .901 .870	.920 .875 .819 .775	.918 .883 .880 .840	.793 .688 .827 .589
General Public		.936 .927 .676 .707	.724 .757 .742 .596	(.538) (.587) .622 (.263)
History Alumni			.734 (.580) .624 .447	(.604) (.535) .623 (.225)
Geography Alumni				.723 (.545) .611 .536

Cell Key: Definite Use of General Topics
Probable Use of General Topics
Definite Use of Specific Topics
Probable Use of Specific Topics

( ) = not significant at the 0.01 level

The needs of our four user groups could be satisfied by two atlases, one for the general public and both alumni groups, and another for students. However, this is not to say that only users' "top ten" selections should be included in a general atlas. Manufacturing and Mining, the consistently lowest ranked general topics, still have a place (30% overall would definitely use them, and nearly 80% probably would). The roles of such relatively lowly ranked topics would merely be relatively small. Specific topics of consistently low rank, e.g. Telephone Calls, could, however, be reviewed for potential elimination. In addition, it must be repeated that our conclusions are based on rather small samples in some cases. They are also only valid for the 55 topics considered in the analysis, and cannot be extrapolated to other topics not included.

CHAPTER EIGHT
CONCLUSIONS AND RECOMMENDATIONS

8.1 INTRODUCTION

The foregoing chapters have investigated a considerable range of background material of relevance to an initiative for a new provincial atlas. The atlas user survey questionnaire also established a base of information regarding general atlas use by several disparate groups.

This final chapter first summarizes the general atlas use aspects of the survey. Secondly, it collates findings leading to recommendations for content which should be considered for inclusion in a new general provincial atlas for British Columbia, based on the study of existing provincial atlases in Chapter 3, what reviewers recommend (Chapter 4), and what atlas users want (Chapter 7). Thirdly, it addresses ways in which such content should be packaged, by incorporating both users' (Chapter 6) and experts' (chapter 4) opinions on atlas design. The reality (Chapter 2) and user perceptions (Chapter 6) of the limitations and advantages of traditional versus electronic delivery formats are also summarized. Finally, some suggestions are made for steps leading towards implementation of a new provincial atlas.

8.2 GENERAL ATLAS USE

The vast majority of the general public of Victoria owns an atlas, most likely a general world atlas. Road atlases are far less popular than a British survey found, a discovery no doubt related to the relative simplicity of the North American road network. University of Victoria Geography alumni own significantly more atlases overall than any other group surveyed, and are the only group in which more than one person actually owns a provincial atlas. Most people refer to an atlas a little more than once a month, most often for its gazetteer and topographic components, locating places in the news or to visit, on business, as tourists, or as armchair travellers. Only a quarter of users seek specific thematic information, led by population and climatic aspects.

8.3 CONTENT

8.3.1 Thematic Coverage

Chapter Three showed that existing provincial atlases deviate little from the basic national atlas thematic content as it originated a century ago. Physical, economic, and social themes are, however, far less balanced than in national atlases, with primary economic (resource) themes tending to dominate, especially in atlases for the western provinces. In general, provincial atlases are not at all complex, and tend to lack synthesis of information: Half of them have consistently one map of the entire province per page, and they average less than two topics per map or maps per sheet.

Only one general provincial atlas, that for Ontario in 1969, has dared to deviate substantially from convention in its assumption that the user would have access to the national atlas for physical and gazetteer information which could therefore be excluded from the provincial atlas. The trend that this atlas editor hoped to set appears not to have found followers. Socio-cultural themes have been increasing since Stephenson and Galneder's study in 1969, which is widely acknowledged to be a valuable trend.

Reviewers are not satisfied with pedantic encyclopedic coverage, however (Chapter 4). A provincial atlas should identify and map the province's unique characteristics, both positive and negative, using synthetic approaches in which relevant data are logically integrated and ordered.

Atlas user groups surveyed agreed that the general topics of Tourism, Physical and Transportation were of greatest interest to them, with Manufacturing least. These choices may well reflect their connections with Victoria, an island city with a strong reliance on tourism. It would be informative, therefore, to extend the study to a wider British Columbia population before recommending that any of the twelve general topics in the analysis be eliminated.

As for the many specific topics rated, resource themes rose high in the rankings, especially by students. Write-in requests were made for a wide range of topics, reflecting increasing interest in the condition of the environment. Both these concerns echo the reviewer experts' recommendations that a province's unique characteristics be recognised.

8.3.2 Organisation

Both reviewers and users found organisation of thematic content of atlases to be rather poor. School pupils summed up their opinions rather succinctly: atlases are too cluttered, too confusing, too crowded, too cramped, and too complicated.

Most reviewers are satisfied with the traditional ordering succession through physical, economic and social themes. The key to them is that the organisation should be logical and, if unorthodox, at least explained. Many users are more eager to see regional grouping of data (a view reinforced by library personnel). But this presupposes a breakdown of the province into regional maps, which is by no means common in existing provincial atlases.

A solution to the difficulty of satisfying diverse organisational requirements is offered by the HYPERTEXT concept, as outlined for atlas applications by Raveneau (1991). This computer technology imitates mental processes by allowing for non-linear reading of information, in which the user may access any portion of a complex matrix rapidly.

8.3.3 Text, Graphs, and Other Contents

Although a minority of provincial atlases omit text entirely, most reviewers and users want it retained. University students are the most strong advocates, school pupils the least. Text pertaining to specific distributions should be analytical rather than descriptive, and located as close as possible to the relevant maps. The I.G.U. recommendations for National Atlases also advocate this close juxtaposition (Fremlin and Sebert, 1972; p.73) but, totally contrary to current practice, suggest use of the back of the map sheet. Salichtchev here also confirms the need for an introduction to every atlas to explain its mandate and special features.

All groups recognise the need for a good index and gazetteer, but school pupils are far more eager that an atlas contain photographs than are adults. Rationale for their use must be made clear to counter the scepticism of some reviewers and adult users. statistical tables and graphs can date an atlas too quickly. Diagrams representing trends and synthesized data could be of greater long term value.

8.4 DESIGN AND FORMAT

Early in the decision stages of producing a new atlas is the selection of overall dimensions which determines, to a considerable extent, the basemap scales to be used. Only two of the fifteen existing provincial atlases (Alberta's and Ontario's, both published in 1969) were found to conform to the I.G.U. recommendations of an ideal format for National Atlases of "40-50 cm by 60-70 cm when opened" (Fremlin and Sebert, 1972; p. 34). Reviewers also failed to agree on an optimum size, though the portrait (vertical) format is preferred to the landscape (horizontal) unless dictated by a particularly linear-shaped province. Landscape format was thus appropriately used for Nova Scotia and the North West Territories, but arguably so for Ontario and British Columbia. Users tend to prefer a shape and size similar to a conventional book.

Scales used should be the largest rounded scale to accommodate the entire province conveniently on one sheet of the predetermined dimensions. The base of 1:1,000,000 recommended by Salichtchev (Fremlin and Sebert, 1972 p.37) is too large for most Canadian provinces, but adoption of the National Atlas's 1:7,500,000 and 1:2,000,000 scales would seem reasonable for British Columbia.

In addition, a digital topographic provincial atlas initiative has recently been announced by the Ministry of Lands and Parks, using the same 1:2,000,000 as well as 1:250,000 and 1:20,000 scales, the smaller-scaled two scheduled for completion by March 1992 (Yazdani and Quakenbush, 1991). The first, and perhaps the second, could provide excellent base map data for a digital thematic atlas.

In order to accommodate a range of scales and sizes, and to permit rapid publication of individual themes, several national atlases are now made available in looseleaf format. As yet, this binding option has not been adopted by any provincial atlas. While school pupils in particular appreciate the option for shared map use, and many others acknowledge the ease of updating and lower costs, the majority far prefer bound volumes. Users agree with librarians that the high potential for damage, loss, and misplacement outweigh any advantages.

8.5 ELECTRONIC OPTIONS

8.5.1 User Survey Indications

Despite the massive surge in development of mapping software for microcomputers in recent years, very little is in use by the general public, and only very few digital regional atlases have been produced. Assessment of potential users' interest in the possibility of a digital atlas for British Columbia took the form of very general questioning on knowledge of and attitudes towards various electronic options.

Over half of those surveyed had seen maps on a computer screen, mainly in educational situations. Most approved of the idea, particularly school pupils. However, their rationale, that access to information is far faster and more efficient with a computer atlas than a book atlas, lacks a basis in actuality at present. There still exists concern that the map quality possible both on screen and printed output is far below that possible with conventional printing presses.

Atlas attributes which would be aided by use of an electronic format include those related to data currency, rapid scale changing, and personally-directed overlay mapping. A strong majority recognized the value of all but overlays (a finding of potential relief to researchers struggling with the considerable difficulties of overlaying data with nonconforming boundaries).

The format of the questioning permitted the recognition of a large proportion with minimal understanding of the various electronic technologies. Undoubtedly this will change, as access to CD-ROM players approaches the acceptance level that personal computers have today.

Of the possible delivery formats evaluated, use of floppy discs was favoured by fully 90% of computer users and even 40% of others. Adding to this the finding that one third of adults would actually prefer an electronic to a book atlas, even though there are few models to follow, suggests that a computer atlas for British Columbia would be well received.

8.5.2 Available Options

A thematic electronic atlas for British Columbia would require access to digital base map information. This should soon be available from the Ministry of Lands and Parks. In addition, the National Atlas Information Service, sharing the 1:2,000,000 scale,

could assist with digital thematic data, though this scale may prove to be too small for the data compilation stage. Census of Canada data is also potentially available digitally, in much the same way as SUPERMAP is in New Zealand.

As for the software requirements, Raveneau's (1991) work using Hypercard for atlas information looks extremely promising, especially as the technology is being broadened for use on IBM-PC's as well as Macintoshes. The much larger data handling capacities afforded by CD-ROM and use of minicomputers expands the potential exponentially.

Not offered as a possibility to survey respondents, perhaps the real future for electronic atlases lies in the Multimedia realm hinted at by Guay (1990; See Section 2.3.7), whereby Hypertext technology would be used to access video and sound media interactively, with the options for use limited only by the creative imagination of the user.

8.6 THE NEXT STEPS

Clearly, there is user interest in both the traditional and the electronic atlas. The major user enthusiasm for topographic aspects of an atlas suggests that a relatively inexpensive general atlas in book form would be of immediate interest. Current computer owners are very enthusiastic about the electronic atlas concept, and as their number increases, so will the potential for the electronic atlas.

No general provincial atlas is produced without co-operation and considerable public subsidy. With this in mind, a cooperative initiative has commenced between faculty of the three university Geography Departments in British Columbia (University of Victoria, University of British Columbia, and Simon Fraser University) to explore the possibilities of a joint venture to conceive, design and publish a new atlas of British Columbia in analog and digital form (Keller, 1991). It is hoped that this study may be of help when planning for such an endeavour.

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APPENDIX 1: PRELIMINARY TELEPHONE QUESTIONNAIRE

Is this the _____ residence?

My name is Diana Hocking. I am a student at the university involved in a study on the use of atlases by the general public. We're hoping to be able to make recommendations for a new atlas for British Columbia.

May I ask you a few questions?

[Hesitation: It will just take two or three minutes]

1. What would you say an atlas is?
2. Do you own any?
3. How many?
4. Can you recall their names?

   [if not, suggest general world? school? special purpose?]
5. About how often would you use one?

   [once a week/month/year?]
6. What would you say you use it/them for?
7. What would you think of an atlas which could be read on a computer?
8. So we can group people's answers, would you mind telling me your age group and occupation?
9. Would you be willing to complete a longer mail questionnaire on the same topic? We'd get it to you in a few weeks.

Thank you very much. We really appreciate your help.

APPENDIX 2: LETTER TO PARENTS OF SCHOOL PUPILS

UNIVERSITY OF VICTORIA
P.O. BOX 1700, VICTORIA, B.C., CANADA V8W 2Y2
TELEPHONE (604) 721-7211, FAX (604) 721-8653

Department of Geography
721-7327

June, 1990

Dear Parents,

As part of a research project, we are eager to obtain students' views on the use of atlases, both at school and in the home. The ultimate goal of the research is to make recommendations for content and design for a future Atlas of British Columbia. Since your children are currently studying the province, their views are of particular interest to us.

Their participation will require approximately one period of class time, in filling out a questionnaire under supervision. I shall also be present to answer any questions they might have. If you have any atlases at home, we would appreciate students having their titles and publishers' names at hand.

No grade or mark is involved for participation. If you do not wish to have your child participate in the study, or if you are interested in participating in the study yourself, please contact Diana at 477-7624 or 721-7345.

Yours truly,

Dr. C.P. Keller and Mrs Diana Hocking
Asst. Professor and Research Associate

APPENDIX 3: GENERAL QUESTIONNAIRE

QUESTIONNAIRE ON THE USE OF ATLASES

If there is insufficient space for your responses, please attach an extra sheet.

Section 1 - General Atlas Use

1. In your opinion, what is an atlas?

_____
_____
_____

2. Do you own any atlases? YES ____ NO ____

if yes, please name them.

1._____
2._____
3._____
4._____

3. Do you use atlases that you do not own? YES ____ NO ____

if yes, please name them.

1._____
2._____
3._____
4._____

4. Where do you use atlases? (Check all that apply)

AT HOME _____
AT SCHOOL _____
IN PUBLIC LIBRARY _____
AT WORK _____
IN CAR _____
OTHER _____ (please specify)

5. How often do you use an atlas? (check only one)

MORE THAN ONCE A DAY _____
MORE THAN ONCE A WEEK _____
MORE THAN ONCE A MONTH _____
MORE THAN ONCE A YEAR _____
LESS THAN ONCE A YEAR _____

6. What do you use an atlas for?

1._____
2._____
3._____

7. How important is it to you that the information contained in an atlas be up-to-date?

VERY IMPORTANT	____
SOMEWHAT IMPORTANT	____
NOT IMPORTANT	____

8. How valuable do you find non-map parts of atlases?

	Very useful	useful	Not used
TEXT	____	____	____
INDEX/GAZETTEER	____	____	____
DIAGRAMS	____	____	____
PHOTOGRAPHS	____	____	____
STATISTICAL TABLES	____	____	____

Additional Comments:_____
_____
_____
_____

9. Do you have any general opinions concerning your experiences with atlas content, that is, the information which is displayed?

LIKES _____
_____
_____

DISLIKES _____
_____
_____

10. Do you have any general opinions concerning your experiences with atlas design features, that is, the ways in which information is displayed on maps, and the format of the atlas as a whole?

LIKES _____
_____
_____

DISLIKES _____
_____
_____

Section 2 - Content of an Atlas for British Columbia

11. The most recent general atlas of British Columbia was published in 1979. Have you ever used it?

YES ____
NO ____

12. If YES, for what purpose(s) do you use it?

_____
_____
_____
_____

13. Please indicate which of the following general topics you might find useful if included in a new B.C. atlas. Also add any other topics or subtopics you would wish to include.

	Definitely would use	Might use	Would not use
AGRICULTURE			
AGRICULTURAL LAND RESERVES			
CROP TYPES			
LIVESTOCK TYPES			
VALUE OF INVESTMENTS			
OTHER (specify)_____			
CLIMATE			
BIOGEOCLIMATIC ZONES			
FROST-FREE PERIOD			
PRECIPITATION AND TEMPERATURE			
OTHER (specify)_____			
ENERGY			
CONSUMPTION			
ELECTRICITY			
FOSSIL FUELS			
PIPELINES			
OTHER (specify)_____			
FISHING			
CATCH BY SPECIES			
FRESHWATER SPORT FISH			
SALMON FISHING AND SPAWNING			
OTHER (specify)_____			
FORESTRY			
ADMINISTRATION			
COMMERCIAL TREE SPECIES			
FORESTED LAND			
SAWMILLS, PAPER MILLS			
OTHER (specify)_____			

	Definitely would use	Might use	Would not use
HISTORICAL MAPS			
OF PEOPLE			
OF ECONOMIC ACTIVITIES			
OTHER (specify)			
MANUFACTURING			
SPECIFIC CATEGORY			
MINING			
MINES AND SMELTERS			
VALUE OF PRODUCTION			
OTHER (specify)			
PEOPLE			
EDUCATION			
ETHNIC ORIGINS			
INCOME			
HEALTH SERVICES			
LABOUR FORCE			
MIGRATION			
NATIVE INDIAN RESERVES			
POPULATION DISTRIBUTION			
URBAN STREET PLANS			
OTHER (specify)			
PHYSICAL FEATURES			
GEOLOGY			
RELIEF			
SOILS			
OTHER (specify)			
RECREATION AND TOURISM			
CAMPGROUND ATTENDANCE			
PARKS			
SKI AREAS, BOAT RAMPS			
SUMMER ROAD TRAFFIC			
OTHER (specify)			
TRANSPORTATION AND COMMUNICATIONS			
AIRPORTS			
ROADS, RAILWAYS, FERRIES			
TELEPHONE CALLS			
OTHER (specify)			
WATER USE			
QUALITY			
OTHER (specify)			

Please add here any other general or specific topics you would want included

_____ _____

_____ _____

_____ _____

_____

Section 3 - Alternative Formats

The next atlas of B.C. may not be published book form. The current National Atlas of Canada is sold in large, loose sheets, which are purchased singly or in boxed sets.

14. What is your opinion of this format? _____
_____
_____
_____
_____

Now please consider what the atlas might be like if it were not on paper at all.

15. Have you seen maps displayed on a computer screen?
YES ___
NO ___

16. If YES, where? _____

17. What is your opinion of them? [please circle] LIKE / DISLIKE

Comments:_____
_____
_____

18. Do you have access to a personal computer? (Please check, and add a "C" if it has a colour monitor)

	IBM Compatible	Apple Compatible	Other (please specify)
AT HOME	_____	_____	_____
AT WORK	_____	_____	_____
AT SCHOOL	_____	_____	_____

19. One potential advantage of an electronic (computer) atlas would be the ability to change the size of an image by zooming in for more detail. How important would this be to you?
VERY IMPORTANT ____
SOMEWHAT IMPORTANT ____
NOT IMPORTANT ____

20. Would it be important to you to be able to create your own map by selecting for yourself a number of topics for simultaneous display?

VERY IMPORTANT ____
SOMEWHAT IMPORTANT ____
NOT IMPORTANT ____

21. An electronic atlas could be updated as soon as new data become available. Would this be important to you?

VERY IMPORTANT ____
SOMEWHAT IMPORTANT ____
NOT IMPORTANT ____

22. There are several potential formats in which an atlas might be made available. Could you please indicate on the following table any methods which might appeal to you.

	floppy disk	CD ROM	video tape/TV screen
VERY INTERESTED	____	____	____
SLIGHTLY INTERESTED	____	____	____
NOT INTERESTED	____	____	____
DON'T UNDERSTAND THE TECHNOLOGY	____	____	____

23. Would you be willing to pay more for a computer atlas than for a book atlas? YES ___
NO ___

24. Approximately how much would you be willing to pay?
$_____

25. Would you be interested in an atlas accessible through a channel on your television set?

AT A SMALL MONTHLY CHARGE ____
ONLY IF IT WERE FREE ____
NOT AT ALL ____

26. Do you have any other ideas of your own as to how you might like to receive atlas information about British Columbia?

_____
_____
_____

27. If you had access to an electronic atlas, would you still want a book as well? YES ___
NO ___

28. If you could have only one format, which would you prefer?

BOOK _____
ELECTRONIC _____

Comments:_____

Section 4 - **Background Information**, for classification purposes.

Remember, all responses in this survey are confidential and no individual will be identified.

1. What age group are you in?

UNDER 21	____
21-30	____
31-40	____
41-50	____
51-60	____
61-70	____
OVER 70	____

2. What is your household income?

under $20,000	____
$20-30,000	____
$30-40,000	____
$40-60,000	____
$60-80,000	____
$80-100,000	____
over $100,000	____

3. Gender? [please circle] MALE / FEMALE

4. How many people are in your household? _____

5. What level of education have you completed?

GRADE 9	____
GRADE 12	____
SOME UNIVERSITY/COLLEGE	____
COLLEGE DIPLOMA	____
UNDERGRADUATE DEGREE	____
GRADUATE DEGREE	____

6. What is your occupation? (Please be as specific as possible)

_____

7. What are your occupational activities that may make use of an atlas?

_____

_____

8. What are your leisure activities that may make use of an atlas?

_____

_____

9. Is there anything else you would like to add?

_____

_____

Thank you very much for your participation.

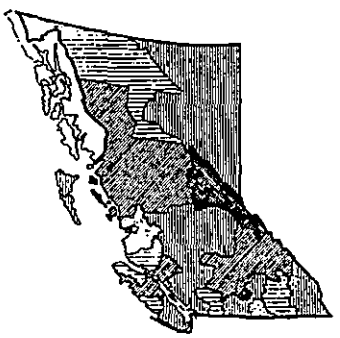
Don't forget to put your name and address on the back of the return envelope if you would like to be included in the draw for Volume 1 of the new Historical Atlas of Canada.

APPENDIX 4: COVERING LETTER

UNIVERSITY OF VICTORIA
P.O. BOX 1700, VICTORIA, B.C., CANADA V8W 2Y2
TELEPHONE (604) 721-7211, FAX (604) 721-8653

Department of Geography
721-7327

12 July, 1990



Thank you for agreeing by telephone to participate in our study on the use of atlases. Your name was one of a small number of people randomly selected to represent atlas users in the general public. Results of the study will help us to make recommendations for content and design for a new atlas for British Columbia.

If you wish to have your name entered in a draw for a copy of the recently published **Historical Atlas of Canada, Volume 1**, please put your name and address on the back of the return envelope. This will be separated from the questionnaire itself, which contains an identification number for mailing purposes only. Your responses will remain completely confidential, and results will be reported as aggregated information only.

If you have any questions or difficulties with the questionnaire, please write, or call Diana at 721-7345. We would appreciate your response within two weeks, if possible.

Thank you for your assistance.

Yours sincerely,

C.P. Keller and Diana Hocking
Assoc. Professor and Graduate Student

VITA

Surname: Hocking (nee Crane) Given Name: Diana

Place of Birth: Mansfield, U.K. Date of Birth: 3rd July 1940

Educational Institutions Attended:

University of Victoria	1989 to 1991
University of Southampton	1959 to 1962

Degree Awarded:

B.Sc.(Honours) University of Southampton 1962

Publications:

Hocking, D., C.P. Keller, and C. Peterson, (1991) "Thematic Content of Canadian Provincial Atlases," Cartographica 28(2), 38-50.

Crane, D. (1961) "Television Regions of England and Wales," Wessex Geographical Year 1960-1961, 19-21.

Conference Presentation:

Diana Hocking and C. Peter Keller, "Atlas Expectations: A User Perspective", Annual General Meeting of the Canadian Cartographic Association, St Catharines, Ontario, June 1, 1991.

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Title of Thesis: EXPLORATIONS INTO DESIGN AND CONTENT FOR A NEW PROVINCIAL ATLAS OF BRITISH COLUMBIA INCORPORATING DIGITAL TECHNOLOGY AND A USER SURVEY

Author: [redacted]

DIANA HOCKING

24 September 1991