

## A COLLABORATIVE INTERDISCIPLINARY UNIT ON WEATHER FOR ELEMENTARY EDUCATORS ON THE INTERNET

Dee A. Chapman<sup>1</sup>, Dawn E. Novak<sup>2</sup>, William L. Chapman<sup>3</sup>

1. National Center for Supercomputing Applications, University of Illinois at Urbana-Champaign
2. Champaign School District, Champaign, Illinois
3. Dept. of Atmospheric Sciences, University of Illinois at Urbana-Champaign

### 1. INTRODUCTION

Educators increasingly are looking to the Internet for resources and collaboration with colleagues as more schools have access to the network. To help meet the needs of these educators, we are developing an Internet-based Thematic Unit Archive (TUA) which will house thematic unit lessons accessible to and contributed by educators. A thematic unit is a collection of lessons spanning many disciplines utilizing a common theme or topic. In a thematic unit the focus is on a topic of interest to students rather than traditional school subjects such as reading, writing, and math [Gamberg, 1989]. The advantage of a thematic unit is that a topic can be studied in-depth, incorporating relevant lessons from traditional school subjects to approach the topic from a variety of perspectives. The intent of the TUA is to create a forum by which educators can share unit and lesson ideas among themselves and with "experts in the field" via the Internet. The asynchronous collaboration on lesson submissions and modifications creates an evolving educational resource which will grow in scope and quality.

We foresee the need to distribute text, images, occasionally sounds, and other multimedia elements as shared resources comprising the thematic units. We chose the application Mosaic which was developed at the National Center for Supercomputing Applications (NCSA) at the University of Illinois at Urbana-Champaign as the primary tool for the TUA. Mosaic facilitates the sharing of information on the Internet by providing a unified and intuitive interface to the various protocols, data formats and information available on the Internet [Andreesen, 1993].

The first thematic unit developed for the archive is a weather unit intended for elementary grade levels. The weather unit is a collection of Mosaic documents including classroom lessons on a variety of subjects, experiment descriptions, stories, student journal pages, literature reviews, games, extracurricular activities, and more. A user

accessing the weather unit through the TUA can post comments either within the archive to comment on the curricular material contained on the archive or within the weather unit to suggest modifications or additions to a particular lesson.

### 2. THEMATIC UNIT ARCHIVE

The thematic unit archive provides educators a forum to share knowledge, expertise, resources, and lesson plans. Lessons available on the archive can be evaluated as they are tried in the classroom. Through the comment board available in the TUA, the educators can make suggestions to improve the lessons. The Mosaic link to the TUA is:

<http://faldo.atmos.uiuc.edu/TUAHome.html>

Collaboration between educators will result in a continuous infiltration of new ideas providing tools to present the same concept through multiple teaching methods and from various perspectives. Because the TUA is an Internet tool, collaboration will include access to experts in many fields who may comment on the validity of the concepts explored in the lessons as well as suggest alternative teaching strategies. Internet access will provide educators, even in remote locations, the ability to use and contribute to the TUA. The TUA may particularly benefit those teachers with less experience through collaboration with experts and more proficient educators.

#### 2.1 TUA Structure

The thematic unit archive consists of a series of Mosaic documents which reside on a central computer server. Any of the text, images, or sounds contained in a document may act as a hyperlink connecting the document to information located anywhere on the Internet. The portion of text or image designated as a hyperlink is generally highlighted and can be activated by selecting with a mouse. When the hyperlink is activated, Mosaic automatically retrieves the remote document from its

origin on the Internet and displays the hypermedia using the appropriate display application. We utilize this functionality provided by Mosaic to simulate an archive by creating a centralized access point to the local as well as the remote information which comprise the thematic unit archive.

Figure 1 shows the structure of the TUA. The top level of the TUA contains a list of grade levels (preschool through twelfth grade) which are hyperlinked (solid lines) to lists of thematic units for that grade level. Each thematic unit is composed of several subject areas with lessons linked to the appropriate subject area(s).

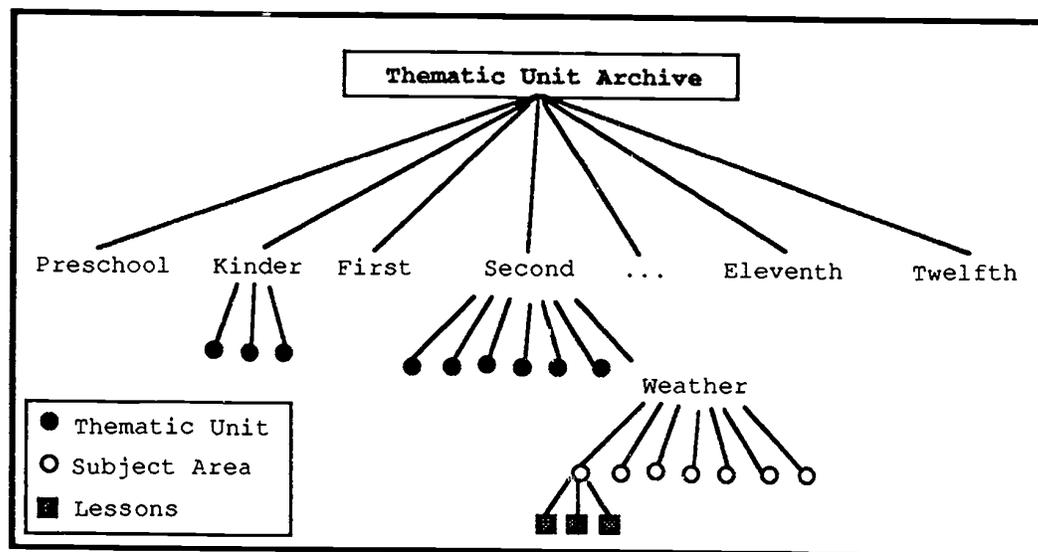


Figure 1. Structure of the Thematic Unit Archive

### 3. THE WEATHER UNIT

We chose weather as the subject of our introductory unit because it is well suited to the interdisciplinary concept of the thematic unit. In addition, weather has many math and science applications which are areas of national educational weakness [Fitzsimmons, 1994]. Students can easily relate to most of the concepts presented because they experience weather everyday and often enter the classroom with an interest in severe and unusual weather phenomena.

The weather unit currently is targeted for educators of second to fourth grade but concepts can be expanded or simplified for other grade levels. Our philosophy in developing this unit is that the basic concepts should be teachable to any grade level provided the appropriate techniques and language are used. The lessons encourage the students to explore and experience the concepts through "hands-on" activities, cooperative learning and personal discovery.

#### 3.1 Weather Unit Structure:

The weather unit is organized into twelve subject areas. The subjects are listed in Table 1, as are the number of lessons for each subject. Initially, there are a total of nineteen lessons written for the weather unit. The interdisciplinary lessons are cross-listed under multiple subject areas.

TABLE 1

| Subject           | Number of Lessons |
|-------------------|-------------------|
| Art               | 3                 |
| Classroom Props   | 1                 |
| Drama             | 1                 |
| Geography         | 2                 |
| Math              | 1                 |
| Music             | 2                 |
| Reading & Writing | 4                 |
| Resources         | 5                 |
| Science           | 13                |
| Social Studies    | 2                 |
| Trips             | 0                 |

Many lessons contain hyperlinks to other lessons. Often the links connect lessons contained in the same subject areas. For example, in the Science subject area the lessons Evaporation, Condensation, and Precipitation are connected to each other and to the unifying lesson of the Water Cycle. The connectivity between lessons is not limited to lessons in the same subject area, however. For example, the Water Cycle lesson (under Science) is linked to several lessons in other disciplines such as Art, Reading, and Physical Education. This interdisciplinary approach is favored by many

educators because the format provides a variety of educational perspectives on the concept.

Figure 2 shows the interdisciplinary nature of the weather unit. For every lesson which has one or more hyperlinks to another subject area, a thin line is drawn between the subject areas in the schematic to represent the link(s). In most cases, the links are found in the Prerequisites, Follow-Up, and Evaluation sections of the lessons.

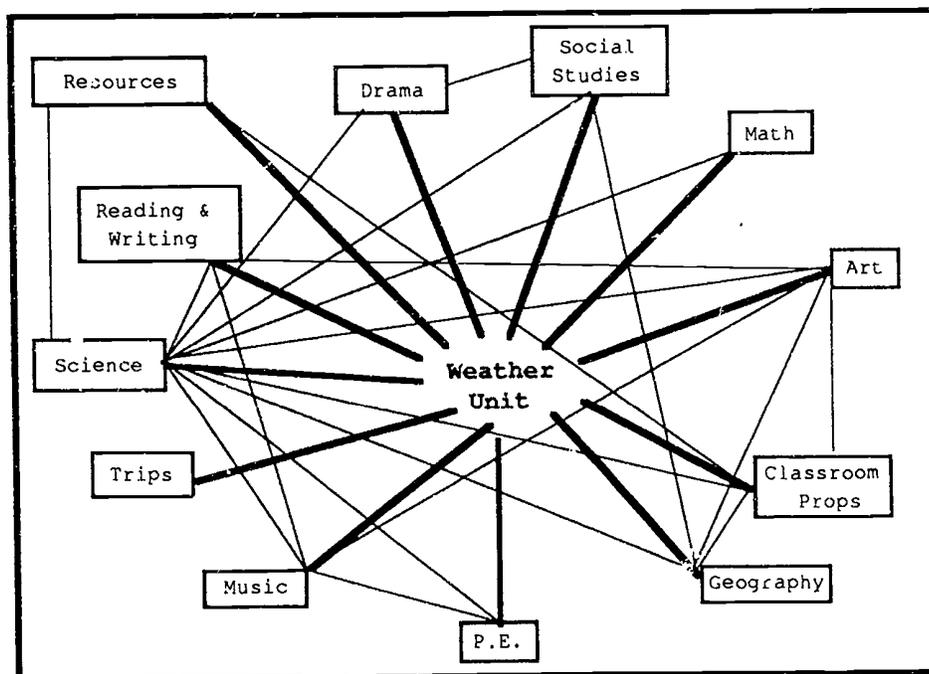


Figure 2. The Weather Unit Web

The web-like structure of the weather unit precludes any predefined starting and ending points to the unit. This makes it possible to extract and teach only portions of the unit when needed. For example, an educator working on a lesson on nocturnal animals may decide that an educational excursion into the explanations for night and day may augment the nocturnal animal lesson. He or she can enter the web structure directly to the night and day lesson. From here it will take only a short time to survey the prerequisites and follow-up lessons to determine what will be involved in teaching the night and day concept.

A student weather journal is included as part of the weather unit. The pages of the journal are

included as hyperlinked documents embedded within the lessons. The documents can be printed and distributed for the student's use. The journal provides a work area for students to record daily weather observations, experiment results, personal writings and illustrations. The weather journal can be reviewed periodically by the teacher as a portfolio assessment.

Another tool included in the weather unit is a Literature Review section found under Reading and Writing. The reviews consist of bibliographic information and a brief summary of each book. We provide personal opinions and ratings of the book content and illustrations as well as special notes when the accuracy of the book content is in question. The Literature Review section is intended to be

collaborative so that TUA users can submit summaries and opinions of books they have reviewed or used in their classes, as well as read the reviews and summaries of previously posted by others. As the Literature Review section grows it will facilitate access to books on specialized topics and provide some subjective guidance to the quality books.

The Resource section of the weather unit gives additional information about contacts which may assist in the teaching of the unit. Examples of resources include: locations to order supplies and materials, museums that have educational material available, experts in the field, and universities and libraries that can supply additional material and information.

### 3.2 Lesson Structure

For the weather unit lessons, we chose to utilize a standard lesson format. The section headings and descriptions for each lesson include:

**Prerequisites:** Includes concepts that prepare students for the ideas to be presented in the lesson. Some of these concepts are hyperlinks to lessons found elsewhere in the unit.

**Objectives:** Describes the educational goals of the lesson.

**Materials:** Lists the materials required for the lessons; some of these are hyperlinked to documents in the Resources section of the unit.

**Introduction:** Includes brief stories, discussions, or short experiments to engage the students in thought about the concept being taught.

**Body:** Contains the main experiments and demonstrations used to guide the students to an understanding of the concept.

**Conclusion:** Summarizes the concepts taught in the body through discussions, writings, and/or games.

**Follow-up:** Includes concepts which relate to the idea taught in the lesson. Some of the concepts are hyperlinks to other lessons in the unit.

**Evaluation:** Games, writings, tests, and/or discussions used to determine the student's understanding of the concepts taught.

## 4. COLLABORATION

The strength of the Thematic Unit Archive lies in the contributions and collaborations by the users. In August 1994 the Thematic Unit Archive and the weather unit were released to the public and

introduced to a group of thirty teachers attending an Internet Workshop at the National Center for Supercomputing Applications. After the attendees explored the archive we held a discussion and took a written survey of their comments. The initial comments regarding the thematic unit archive were positive and the users proposed a series of workshops for educators to submit and evaluate thematic units for the TUA. Also, the possibility of establishing a peer review process was discussed. The comments on the weather unit centered around the appropriate level of detail for the individual lessons and more stringent student evaluation techniques which may address state requirements.

Statistics were compiled for the first month after release to the public. There were a total of 1,153 accesses to the TUA and the weather unit during the month of August 1994. About 75% of the accesses were from the educational community. The remaining accesses were divided between governmental, commercial, and foreign users. The lessons on urban data visualization and the relationship between sunlight and temperature were accessed the most, perhaps because they were cross listed in several different subject areas and encountered more often by users traversing the unit web.

## 5. SUMMARY

The weather unit as it was released to the NCSA workshop was intended to be a prototype collaborative thematic unit. The workshop and the user comments to date have provided feedback which will help to improve the weather unit and the TUA. As the TUA continues to get exposure, we expect this collaboration to continue and the TUA to grow into a rich resource for the educational community.

## 6. REFERENCES

Andreesen, M., 1993: NCSA Mosaic Technical Summary 2.1. National Center for Supercomputing Applications, University of Illinois at Urbana-Champaign.

Fitzsimmons, S. J., L. C. Kerpelman, 1994: The National Perspective. *Teacher Enhancement for Elementary and Secondary Science and Mathematics: Status, Issues, and Problems*, pp. 1-22.

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