Development of a Hypermedia Template Using Whole Language Instructional Methods for the Preservation of Native American Languages

by

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Abstract

This developmental study addresses the problem of Native American language loss through the development of a new instructional model to teach indigenous languages to Native American learners. Whole language methods advocated in second language instruction incorporate observational learning strategies - strategies which are inherent in the Native American home, but often ignored in school. Instructional technology provides a mechanism for the development of curriculum materials which reflect appropriate instructional techniques. A template with embedded whole language methods to address culturally-specific learning strategies was created through the use of hypermedia. The design, development, and implementation of the project template is detailed. The thematic content framework of the template is local legends about the origins of celestial elements. A sample product using the Cherokee language was created from the template and pilot tested on a reservation in North Carolina. Pilot test data is discussed, as well as recommendations for future research in the use of technology for Native American language preservation. A Developer's Guide to Template Modification is appended to support the adaptation of the template for use with other Native American languages.

Acknowledgments

"This we know: All things are connected like the blood that unites us. We did not weave the web of life, we are merely a strand in it."

Chief Seattle

This document and the work that it reflects are the interwoven efforts of so many contributors, and could not have evolved without the assistance they provided. Each of the following people comprised a strand in the web of support for this project.

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Chapter 1

Building the Rationale for Template Development

The tribal cultures of Native America are suffering a tremendous loss--the gradual assimilation of their heritage into the American mainstream way of life. Native languages, of which there used to be hundreds, are becoming secondary to English, largely out of need to communicate with the majority culture which influences tribal economics (Downing, 1992). Many languages have died out completely. Hope exists, however, because many tribal officials believe that maintenance of tribal cultures is dependent on their young people learning to read, write, and speak their native languages (White House Conference on Indian Education, 1992). The ability to perpetuate native language learning was substantiated by President Bush in 1991 when he signed the Native American Languages Act into law. The bill provides funding for the creation of culturally relevant curricula to facilitate native language learning.

In examining the curricula which exist to teach indigenous languages to predominantly English speaking Native Americans, three major incongruities arise. First, these lesson plans typically incorporate non-contextualized second language learning techniques, such as auditory drill and practice sessions (Medicine, l981). While language acquisition may occur, a new model needs to be developed to assist these culturally-unique students in learning their native tongue. Native Americans, especially those non-urbanized, encourage learning strategies in the home which are not typical of the mainstream culture, especially the culture of the school. Unlike most Caucasians with whom verbal skills are

emphasized (i.e. repetition, direct instruction), indigenous children are largely taught through modeling and observation. Though this trait cannot be generalized to the entire population, Native Americans demonstrate this strategic learning preference across tribal systems and across geographic regions (Gilliland, l992; Kaulback, 1989; More, 1989; Pepper & Henry, 1989; Rhodes, 1989; Skinner, 1991; Swisher & Deyhle, 1989). It would seem logical to utilize this observational predisposition in instructional settings to more readily meet the needs of these students.

Second, Native American language lessons usually involve language fragmentation, or the teaching of words and phrases out of their natural context. Because native language instructional materials are typically developed by linguists instead of second language instructors, lessons tend to emphasize isolated language components instead of language in a usable structure. This procedure violates another Native American learning preference - that of holistic learning, acquiring knowledge according to its relevance in one's life. Indigenous learners have a strong belief system which holds that all of life and learning is interconnected, and so prefer an overall perspective of how new information fits into their existing frameworks (Locust, 1988).

The third problem to be examined exists in many Native American language classrooms. Skinner (l991) points out that the native language instruction is typically devoid of cultural context. Instructional materials tend to concentrate on vocabulary and grammar acquisition and not so much on the history, culture, and demographics of the group from which the language originates. In school, Native American students seldom learn their language in a socio-pragmatic setting.

These three issues, the lack of observational strategy incorporation in language instruction, the lack of holistic language learning, and the neglect of cultural context, can be collectively addressed through the development of a new model for Native American language instruction. This model must reflect appropriate instructional strategies by

providing both visual and aural forms of the target language in a relevant and culturally meaningful method. Instructional hypermedia systems have the potential to produce programming to teach these languages while meeting the aforementioned criteria. The following is a review of the relevant literature to exemplify the need for a new model of Native American language instruction.

The Need for Native Language Instruction

During the mid to late 1800's, the United States government adopted a policy of "extermination through education" in an attempt to civilize the indigenous people of this country. Before the arrival of Columbus, over 2000 languages were spoken on the North American continent. Currently, only 206 remain in existence, with over 50% of those facing certain death (Medicine, 1981). One may question the steep decline of entire communication systems, but one has merely to look at the history of colonial America for some answers.

> On December 14, l886, the policy forbidding the use of any Indian language was announced...The document states 'No books in any Indian language must be used or instruction given in that language. A Supplemental Report on Indian Education of December 1, l889 states 'Education should seek the disintegration of the tribes. Only English speaking teachers should be employed by the schools and only English should be allowed to be spoken'" (House Executive Document, p. 93-97 as in Skinner, 1991).

The efforts undertaken by the government to wipe out native languages were quite successful, as only few remain in extensive use today. The repercussions of this linguistic repression are quite evident, and are called upon to validate the necessity for native language instruction programs. First, the loss of a primary language, especially in this

case, leads to decreased academic ability (Flanigan, l983; Medicine, l981). This loss is exceptional because as English is attempted to replace the primary language, many patterns of former languages and dialects are interwoven into English, producing a variational communication system, but not a correct or fluent version of either language (Flanigan, l983). Non-use of a consistent linguistic structure undermines communicative efforts altogether.

A second, and more sweeping repercussion of language loss is its correlation with cultural loss. "It (prohibition of native language use) was aimed at the very matrix of expressive elements of culture, language (vernacular and ritual), music, song, dance, art, and other emotion-laden aspects, such as religion" (Medicine, 1981). Brooks (l992) points out the fact that elders who maintained their primary language also hold the key to a wealth of information about their tribal heritage. The inability and/or neglect to communicate with these valuable sources of information could result in the tragic loss of otherwise unavailable cultural history. Language maintenance could be heritage preservation as well through sustaining the customs, artistic endeavors, insights, and historical accounts of the past, keeping them alive for future generations.

The Need for New Instructional Methods

The current American trend toward multi-culturalism and cultural recognition has positively impacted the acknowledgment of language maintenance necessity. While the allocation of funding to develop Native language curricula promotes acceptance and utilization, problems are still inherent in the instructional design and development of indigenous language teaching programs. Existing models primarily support traditional second language teaching pedagogy which fails to address important cultural needs.

The need to address cultural learning strategies

Learning strategies are those steps taken by the learner to aid the acquisition, storage, and retrieval of information. Strategies are referred to as learning techniques, behaviors, or actions; or learning-to-learn, problem-solving or study skills. No matter what they are called, they make learning more efficient and effective. Language learning strategies (LLSs) are the behaviors used by learners to move toward proficiency or competence in a second or foreign language (Oxford & Crookall, 1989). Chamot (1993) indicates that some language learning strategies are observable, such as taking notes on new vocabulary words, or drawing diagrams to understand or remember conversational sequences. Other learning strategies cannot be observed because they are mental processes not necessarily accompanied by behavioral manifestations. Examples of purely mental learning strategies in a foreign language context are monitoring comprehension while listening, or activating prior knowledge during reading (Chamot, p. 308). In a review of the research on language learning strategies, Oxford and Crookall (1989) state that there is growing evidence of sex and ethnic differences in language learning strategy use. Special demands are placed on language learners by new writing systems, sounds, cultural values, and the need for highly "public" language performance in social settings. Different language learners use different strategies in response to these demands.

Educational research has found a distinct cultural influence on Native American learning practices (Gilliland, l992; More, l989; Rhodes, 1989; Swisher & Deyhle, l989). In Native American homes, teaching through observation and modeling strategies is dominant over verbal instruction (Fox, l992; Gilliland, l992). Also, Native American children are expected to abstain from public performance of a task until it can be performed competently (Kasten, 1992; Locust, 1988; Montgomery, 1982). Although these traits cannot be generalized to the entire American Indian population, their predominance has

been noted in all regions of the country (Gilliland, l992; Montgomery, 1982; More, l989; Rhodes, 1989; Swisher & Deyhle, l989).

Given the previous cultural learning preferences, some instructional design problems become evident between the Native American learner and grammar-based second language instruction methods. Regarding public language performance, Montgomery (1982) indicates that the "Indian code of behavior requires careful reflection before speaking, perhaps even silence until certain about one's performance. When students are required by their teacher to break a code of language behavior, the task of learning is obviously more complicated" (p. 245). The creation of second language instruction for this cultural group necessitates the acknowledgment of socio-cultural influences on learning.

The need to incorporate whole language instruction

A second instructional design incongruence arises when one examines the typical content breakdowns for teaching Native American languages. These "chunking" methods are developed to help the student acquire language by dividing its complexity into tasks and isolated segments. Even though these strategies are used to make a language more digestible, it is difficult for students to gain a comprehensive view of the language (Gale & Brown, l985; Shrum & Glisan, 1994).

In recent years, foreign and second language learning methodologies have moved away from grammar-based approaches to more naturalistic methods employing authentic materials and learning situations which are relevant to the learner. Such strategies are embedded in "whole language" theory (Goodman & Goodman, 1990), and are typically identified as "contextualized language instruction" (Shrum & Glisan, 1994). Whole language is defined as an approach to language instruction, through which students manipulate language to communicate thoughts by using higher level skills before attending to discrete language structures with the use of lower level skills (Shrum & Glisan, 1994, p.

25). Contextualized language instruction advocates presenting language in real situations that encompass all aspects of a conversational exchange: the physical setting, the purpose of the exchange, the roles of the participants, the socially acceptable norms of interaction, in addition to the medium, topic, tone, and register of the exchange (Hymes, as cited in Shrum & Glisan, 1994, p. 1). Goodman and Goodman (1990) explain how whole language draws heavily on the constructivist theories of Lev Vygotsky, as he was one of the first to propose that language learning occurs within the context of its use.

In reviewing the literature on effective instructional methods for Native American learners, common themes appear in terms of whole language strategies to meet specific learning needs as mandated by the culture. Several authors indicate strong parallels between Native American values and whole language teaching and learning. The following seven likenesses are presented by Kasten (1992) and are reinforced by other research in the field.

First, whole language teaching emphasizes process over product, valuing the process, even with mistakes as part of learning and risk taking (Kasten, 1992; Krashen, 1982). Native American culture is frequently characterized as a process-oriented culture that emphasizes life as a journey, and that the journeying is more important than the destination (Fox, 1992; Kasten, 1992; Rhodes, 1989).

Second, whole language emphasizes group, cooperative working, capitalizing on collaborative learning, and Vygotsky's notion of a "Zone of Proximal Development" (Goodman & Goodman, 1990; Kasten, 1992; Richard-Amato, 1988). Central to Vygotsky’s constructivist view is the acceptance that, above all, learning is a social process involving input from other sources (Language Development & Hypermedia Resource Group, 1992). Native American cultures tend to emphasize noncompetitive, cooperative living, with a strong sense of community and extended family (Kasten, 1992; Locust, 1988; Rhodes, 1989). Because of this emphasis, peer learning and modeling are primary

methods of learning in such communities (Gilliland, l992; Montgomery, 1982; More, l989; Rhodes, 1989; Swisher & Deyhle, l989).

Third, whole language learning suggests that the learning of reading and writing are parallel to the learning of oral language. Learning begins from the whole context, with language learners making hypotheses about how language works (Goodman & Goodman, 1990; Kasten, 1992). Native American cultures frequently provide learning in holistic settings through modeling by elders, including norms of social behavior and specific skills (Fox, 1992; Gilliland, 1992; Kasten, 1992; Rhodes, 1989).

Fourth, whole language learning places a high value on quality children's literature, including opportunities for culturally relevant literature, and literature related to topics being taught in other subjects (Kasten, 1992; Reyhner, 1992). In Native American culture, stories may be purposeful, relevant to the time of year, to events taking place, and are usually intended to teach a value or an important aspect of Indian life or history (Kasten, 1992; Reyhner, 1992; Rhodes, 1989).

Fifth, whole language learning is often taught through content area themes, into which various aspects of the curriculum are integrated (Kasten, 1992; Shrum & Glisan, 1994). Native American culture typically views all aspects of daily living as interrelated (Fox, 1992; Kasten, 1992).

Sixth, whole language teaching incorporates qualitative assessment either in place of, or in addition to, standard quantitative assessments (Goodman & Goodman, 1990; Kasten, 1992). In Native American cultures, being forced to choose from only a few solutions is seen as irresponsible decision making, as not all possibilities are fully entertained and there is often more than one possible solution to a problem (Fox, 1992; Kasten, 1992).

Finally, whole language learning typically involves projects that are student initiated, and involve in-depth critical examination instead of focusing merely on facts or

information (Kasten, 1992; Richard-Amato, 1988). Native American beliefs value the answer to "why" things are, instead of "how" things are (Kasten, 1992, Locust, 1988).

Successful examples of the integration of whole language strategies into Native American educational settings can be seen across the country (Fox, 1992). Perhaps the most widely acclaimed program is the Kamehameha Early Education Project, or KEEP, instituted by Katherine Au. The program emphasizes co-participation among peers and frequent instructional conversation with the teacher to facilitate the development of literacy (Gallimore & Tharp, 1990). Another example is the Miccosukee Indian School Miami, Florida. Their whole language approach is bi-lingual and bi-cultural, and stresses the interrelatedness of the curriculum. Improvements in student attitudes toward literacy and language learning have been found in the first year of the school's operation (Kasten, 1992). One final example is seen at the Rock Point Community School in the Navajo reservation in Arizona. Begun in 1967, this program graduates students who are fluent in both English and Navajo, having learned both in holistic approaches across content areas (Reyhner, 1992).

Much theoretical and practical evidence exists to advocate the use of whole language for second language learning. Sandra Fox, an Oglala Sioux, states emphatically of whole language, "There's an Indian way of teaching, and this is it" (Kasten, 1992, p. 118).

The use of whole language methods is grounded in a learning theory which acknowledges the influence of culture on learning: the socio-linguistic perspective (Goodman & Goodman, 1990). Russian psychologist, L. S. Vygotsky, originated the idea that social and cultural factors play a major role in the language development process (Thomas, 1979; Wilkinson, 1982). Vygotsky posited that learning patterns and levels of thinking are products of the activities practiced in the social institutions of the culture in which the individual grows up (Thomas, 1979, p. 331). Cook-Gumperz and Gumperz (1982) explain that when the linguistic culture of the school differs from the linguistic

culture of the home, then communication suffers, as well as the acquisition of knowledge. Whole language methods perpetuate the socio-linguistic paradigm by embracing the language of the home, and by encouraging learning through authentic social language transactions (Goodman & Goodman, 1990).

The Need for Culturally-Relevant Instructional Materials

Finally, another disadvantage associated with the use of de-contextualized second language teaching methods is the systematic elimination of cultural context. "Language is an inseparable part of group identity and a defining characteristic of ethnic and cultural distinction" (Haviland, l990, as quoted by Downing, l992, p. l03). Grammar-based language instruction creates non-experiential learning, clearly non-associative with the heritage from which the language is derived. Montgomery (1982) emphasizes the point that linguists typically develop the instructional materials for Native American languages. Using their traditional perspective, the linguists concentrate on syntactic constructions and lexicon, producing materials which cannot provide a real language experience that conveys any relevant cultural information.

Model Development through Hypermedia

While the preceding contentions mandate the need for native language instruction to be more pervasive, they also demonstrate the need for a new model of instruction for these culturally-specific learners. If correctly designed, developed, and implemented, educational technology may supply a prototype to meet these needs. Computer-based hypermedia can provide a format for the production and integration of culturally-relevant instructional programs which utilize observational strategies and assist to perpetuate the culture of the Native American learner. In order to understand the feasibility of these

systems to create such programming, one has first to recognize the characteristics of these technological tools.

Definitions

Hypermedia maintains two characteristics which make it a unique form of instructional technology (Yang, 1994). First, the content within a hypermedia product has the capacity to be accessed in non-linear patterns. Users interact with the system by choosing their own pathways through the collection of information. Also, a computerized hypermedia system has the potential to accommodate text, still images, graphics, video and sound. Figure 1.0 is an example of database nodes connected by links to different characters in a second language learning program (Gay & Mazur, 1989).

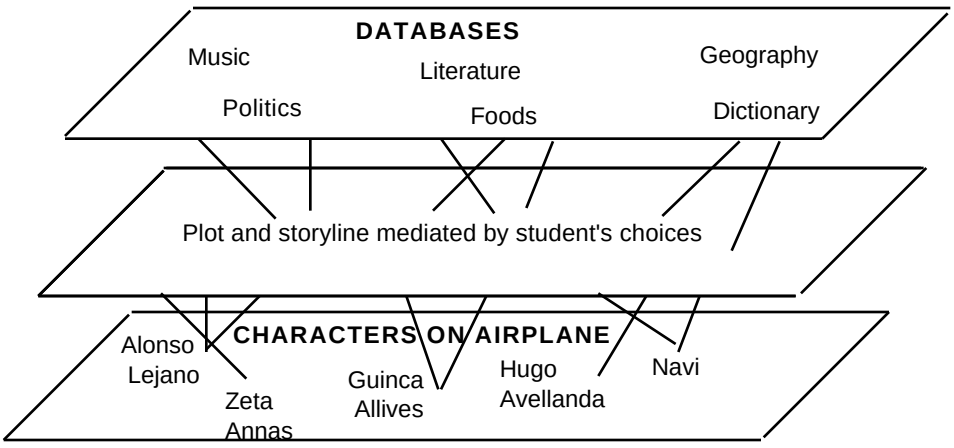

Figure 1.0. Hypermedia program design for second language learning.

Authoring programs such as HyperCard™ by Macintosh or ToolBook by IBM are used to develop instructional programming to take advantage of the following instructional possibilities.

Instructional Advantages

Experts in both the fields of instructional technology and second language learning theorize that hypermedia capabilities, if used effectively, can contribute significantly to second language learning (Gay & Mazur, 1989; Herron & Moos, 1993; Language Development & Hypermedia Research Group, 1992). However, when the attributes of hypermedia are brought into focus by recent evaluation research, the findings are limited and inconclusive (Gleim & Harvey, 1992; Yang, 1994). Therefore, the instructional advantages presented here are anecdotal in form, and thus justify further research for validation purposes.

First, the ability exists to place the learner in an interactive, contextualized learning environment. The student can encounter realistic problem situations and choose pathways and strategies to problem resolution. Such learner-centered instructional programming changes the role of the student from passive recipient of information to active learner choosing instructional resources and methods. Leaner control of the program can give users a feeling of ownership and control while maintaining their attention. Also, when learners are allowed to navigate a hypermedia program, they maintain the ability to construct their own knowledge through the associative qualities of the program (Jonassen, 1988; Marchionini, 1988; Nelson & Palumbo, 1992, Spiro & Jehng, 1990).

Another instructional advantage postulated in the literature is that the hypermedia user is able to see the interrelatedness of knowledge (Ambrose, 1991; Nelson & Palumbo, 1992). Kearsley (1988, as cited in Ambrose, 1991, p. 53) contends that hypermedia improves learning by focusing attention on the relationships between ideas rather than isolated facts.

The multi-format capacities of hypermedia also present potential advantages. Hypermedia can take on many media attributes, such as motion, sound, animation, etc., which could, depending on the content relevance, prompt more effective learning (King,

l990). Spencer (l992) states that hypermedia provides "the opportunity to blend art, sound, and language." The benefits can be powerful for all students. This could be the means of encouraging Native American students to explore their own languages, to examine their own cultures (p. 164-165).

The learner-centered characteristics of hypermedia collectively produce another instructional advantage. "Individualization of pace, content, sequence, and style may be combined through the use of hypermedia systems to a degree that is unimaginable without them" (Fletcher, 1992, p. 4). As educators search for ways to meet the needs of the individual learner, hypermedia technology is evolving to meet such needs.

Programming of appropriate instructional methods

Through the analysis of the aforementioned instructional design problems (the failure to teach native languages using observational/modeling strategies with delayed oral production, in a holistic and culturally relevant manner), the potential to call upon hypermedia to create an effective mechanism to address these issues becomes apparent. Students could benefit from programming which allows them to revisit instructional material until they feel comfortable and competent enough to perform. Also, as previously recommended by Fox (l992) and Kasten (1992), whole language learning, rather than segmented, non-contextual curricula, is more effective for Native American learners. Hypermedia can provide experiential learning by requiring learner participation with authentic materials. The user can be asked to write stories in the specified language, and to add his or her own visuals and recorded narration or sounds. This example merely touches on the possibilities for the development of whole language programs.

Capacity for culturally-relevant materials

Berg and Ohler (1991) emphasize the fact that "hypermedia can present lessons within a familiar cultural context. The fulfillment of this potential, however, awaits the development of culturally-based instructional materials" (1991, p. 9). The ability exists through these innovative technologies to create culturally relevant native language programming using methods which would satisfy Native American learning preferences. Liu (1995) promotes hypermedia for second language learning because

> [It] can make good use of graphics, text, sound, and animation, in order to present a target language as naturally as possible in real and varied communicative situations. By immersing students in the natural and enriched environment created by the computer, students are exposed to the target language with high frequency and efficiency. Moreover because hypermedia-assisted instruction is capable of meeting learners' different needs and varying abilities, such instruction should be highly motivating and stimulating (p. 303).

The author seeks to incorporate these advantages in the creation of a hypermedia template, a format which will be usable by any Native American nation to input their own materials with which to teach their own people. A prototype will be developed and will represent the type of programming which is necessitated by the theoretical foundations of this proposal.

Chapter 2

Template Design and Development

Project Overview

The process for the creation of a hypermedia template for Native American language instruction involved a sequence of events. First, a design model for template development was chosen and modified. After the model selection and adaptation was complete, the template was created according to model guidelines in order to accommodate the given instructional needs. This chapter details each phase of template development. Also, this chapter highlights the requirements for modification of this template for use in a different instructional setting. For explicit directions about how to customize this template, see Appendix A, The Developer's Guide to Template Modification. Chapter Three details the creation and implementation of a prototype which used the authoring template outlined in this chapter.

Project model selection

In an effort to develop an instructional product, a design model was chosen as the conceptual framework for project development. In order to decide which design model to follow for the creation of this project, this author used Gustafson's taxonomy (1991) of instructional design models to narrow the choices. The taxonomy divided models into three areas: classroom focus, systems focus, and product development focus. This project easily fit into the product development arena. In order to narrow the choices even further, this author referred to another conceptual framework for comparing models provided by Edmonds, Branch, and Mukherjee (1994). They recommend that a model be chosen regarding its type or orientation, type of knowledge or learning tasks involved, and the

expertise required to use the model. From these guidelines, this author determined that the project was prescriptive in orientation, as it emphasized how a learning environment can be altered or constructed in order to produce the desired outcome (Edmonds et al., 1994). Also, this model was intended to support procedural tasks, as it directs activities to reach a specific goal.

With the framework for model selection clarified, the ability to choose the appropriate model from Gustafson's product development category was simplified. The model which met most of the aforementioned qualities was the Bergman and Moore Developmental Model. One attribute which made it the appropriate choice was that its focus was on the production of interactive computer-based products. Also, the model was prescriptive in nature and explicitly procedural in that it clearly defined each step necessary for the design, production, and implementation of the instructional product.

The Bergman and Moore Developmental Model

The Bergman and Moore Developmental Model contains six major steps delineated by a certain activity (Bergman & Moore, 1990). The six activities are: Analysis, Design, Develop, Produce, Author, and Validate. Each activity operates on an input/output basis. More specifically, the model takes relevant data and, through the designated activity for that step, creates a deliverable, or "output" (see Figure 2.0). This author combined the Design and Develop phases into one Design phase, as both call for basically the same deliverable, a well-documented solution to the instructional problem. The Bergman and Moore model assumes that a team consisting of an instructional designer, content expert(s), media producers, computer programmer(s), and evaluation personnel conduct work on separate phases of the project. Regarding this template development, the author served as project manager and carried out each phase with input and advice from relevant sources.

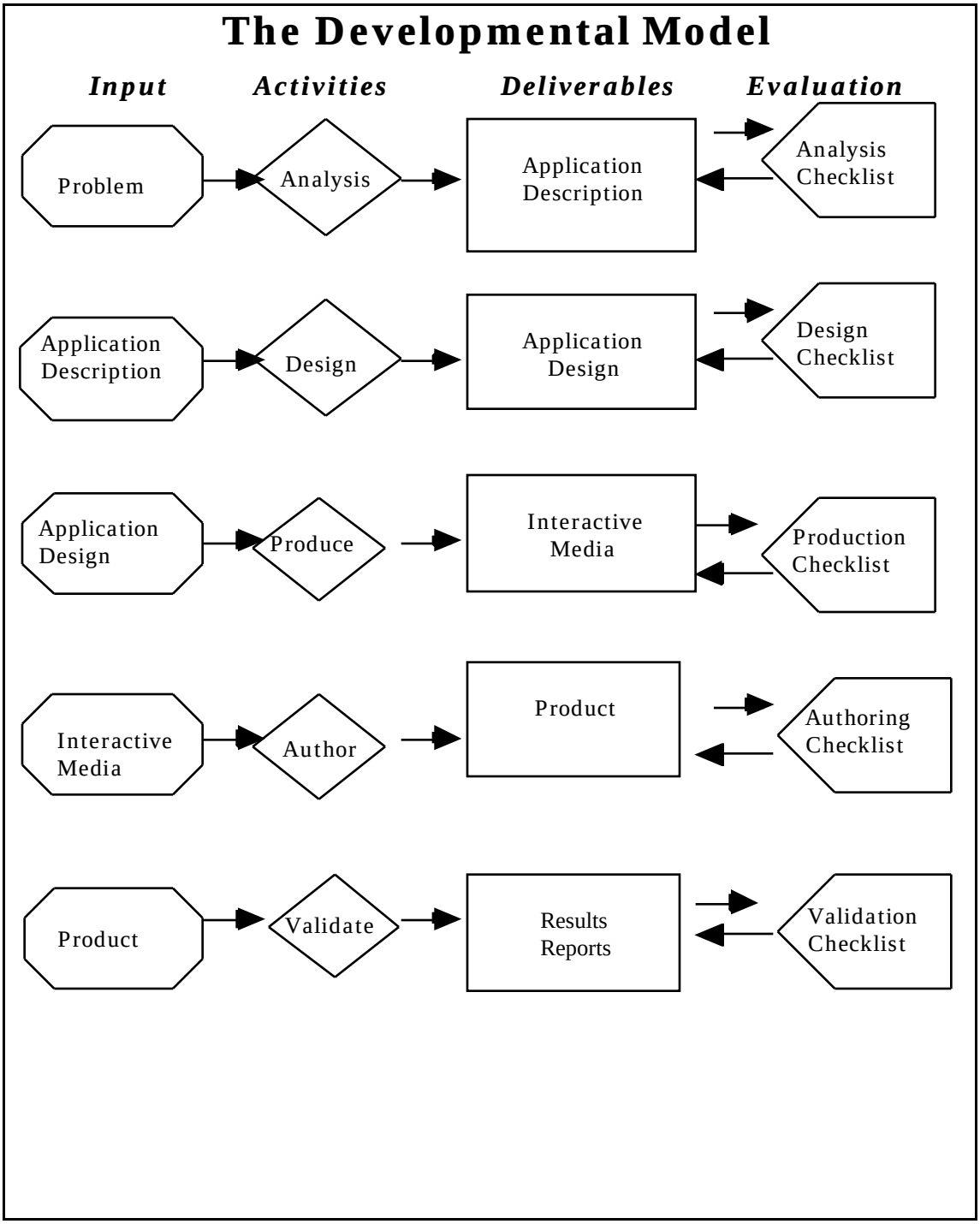

Figure 2.0. The Bergman and Moore Developmental Model used for template development.

Also, the model incorporates formative evaluation in every phase of production. Bergman and Moore provide extensive checklists for each phase in their book Managing Interactive Video/Multimedia Projects (1990). While helpful and extremely thorough, the checklists presumed that the product was being developed for adult learners. Because the audience for the Native American languages program was elementary school-age, the checklists were modified to reflect the appropriate concerns (see Appendix D for project checklists).

Template Development

The following is a description of each phase of template generation using the revised Bergman and Moore Developmental Model. The general requirements of each phase are described, as well as the specific template development activities.

Analysis

As in most other instructional design models, Bergman and Moore (1990) encourage the designer to perform a thorough preliminary analysis, examining a variety of aspects involved in product development. Their model suggests four areas of analysis to define objectives and development requirements. Those are:

1) Problem Analysis-**Why** are we doing this?
2) Audience Analysis-**Who** are we serving?
3) Task/Needs Analysis-**What** are they doing?
4) Environment Analysis-**Where** will this be used? (1990, p. 44).

Problem analysis.

The primary goal of this project was to develop a hypermedia template for use as an instructional tool to facilitate Native American language learning among Native American

learners. In order for this authoring framework to be effective, it had to meet the needs previously indicated in the literature regarding Native American learning strategies, contextualized language instruction methods, and curriculum materials for cultural preservation. In concordance with these needs, this product would meet the primary goal by demonstrating the following characteristics:

1. The program had to allow the learner to encounter the target language in an observational manner. The student had to be able to hear and see examples of the second language on an introductory basis without being required to publicly produce the language. This approach accommodated the specific Native American learning strategies of modeling and observation.
2. This product had to allow students to encounter the target language in a contextualized passage. Donato and Adair-Hauck (as in Shrum & Glisan, 1994) recommended beginning a lesson with meaningful examples of the language, such as a folktale or tape-recorded authentic listening segment.
3. The template had to provide examples of the target language in a culturally-relevant manner to satisfy the need for instructional materials which represented the target audience and the target language.

The final product needed to exhibit each of these necessary attributes for the primary project goal to be achieved.

Audience analysis.

The end-users for this template are Native American elementary school children, ages nine through twelve. The target audience should reflect second language characteristics of novice proficiency delineated by the American Counsel on the Teaching of Foreign Languages (ACTFL) proficiency guidelines (see Shrum & Glisan, pp. 284-290).

Also, students are required to have some beginning computing skills, such as basic typing and the ability to use a mouse.

Task analysis.

The students are to interact with a hypermedia program to gain exposure to their indigenous language. Users should be able to take advantage of the multimedia attributes of hypermedia by hearing and seeing the language in its aural and textual forms. Visuals that accompany the language should engage learners in thinking about the meaning of the target language on each screen. In order to integrate whole language methods advocated in second language literature, the target language should be presented in contextual phrases. Students are to create interpretations of each target language phrase.

Programs developed from the template are intended to be used on an individual basis. If so, students can take advantage of the self-pacing attribute of hypermedia. Some students may work straight through the program without revisiting any screens or replaying any speech segments, while some may traverse through the frames repeatedly to look for additional information to assist them with their task.

Environment analysis.

A suitable physical environment in which to utilize the program is a school computer lab. Many students can work simultaneously during a given class period. Because the Macintosh platform represents the most abundant type of computer in public schools, the template was created to operate in this environment. Programs developed from the authoring shell should take into consideration the memory capacities of the host machines. Support personnel are needed to install and monitor the use of the software.

Deliverable: Application description.

As Yang (1994) indicated, a software template is a content-free model which can be used to facilitate the development of hypermedia products with minimal effort. Developers can take the programmed skeleton and insert their own content to create an instructional product. This author sought to re-define the meaning of a software template for the purposes of the cultural preservation goals of this project. A program for Native American language learning can both revitalize a dying language as well as perpetuate valuable tribal myths and legends in the same attempt. Thus, the template created for this study suggests a general content framework of legends regarding the origins of celestial elements, and each tribe can fill in the template with relevant stories in their own language. Many Native American legends relate to celestial elements, so the author envisioned a hypermedia program that would present students with an opportunity to encounter a local legend about a stellar body.

Template scope.

The objective of this project is to expose Native American learners to their original language in a second language learning environment in a manner which is culturally appropriate. As research has indicated that indigenous people learn to predominantly acquire knowledge through modeling and observation, this program sought to provide an example of language instruction which met these learning needs.

This template was created to provide students with exposure to their original language, not to produce mastery of the target language. The content of the program is constrained by the given framework of legends pertaining to origins of celestial elements. This constraint is implemented to serve as an idea guide for potential users, and as a mechanism for cultural history preservation.

Design

The Design activity takes the application description developed in the Analysis activity, and breaks it into two levels. The "High-Level Design" activities include sequencing the major segments of the program and defining their treatment. The "Detailed Design" activities include specification of motivational elements, interaction strategies, potential contributions of various media, and assessment methodologies (Bergman & Moore, 1990).

Deliverable: Application design.

Information acquired in the Analysis Phase was transformed into hard-copy blueprints for the product's lay out. The next two steps in the Design Phase produced the macro-level and micro-level plans for the final template.

High-level design.

Upon deciding the thematic content framework for the template, the next step was to determine the architecture of the program. A structure was developed which would provide as many as four opportunities for students to use the program and encounter a different legend each time (see Figure 2.1). For an example of a student's path through a legend, see Figure 2.2.

The author envisioned a title screen which would serve as a main menu. Graphical elements on the screen are components of the sky, such as the sun, the moon, the wind, and the Milky Way (see Figure 2.3). These graphics were designed as clickable objects so that a student can click on any of them and engage in a legend about that particular heavenly body.

When students click on one of the sky graphics, they are taken to a second card which asks their name and presents a set of directions to assist them with program use (see

Figures 2.4-2.6). From this point, the hypermedia path is constrained so that students work through the legend in a linear manner. This programming restriction was implemented in order to maintain the story line of the legend. Thus, users cannot select from a variety of activities, but they can pace the instruction according to their individual needs. Students can move forward and backward as many cards as they wish, however, they cannot traverse between different legends. In addition to limiting freedom of movement for story purposes, the navigational path is largely pre-determined to prevent users from getting lost and frustrated, a factor to consider with the target age group (Yang, 1994).

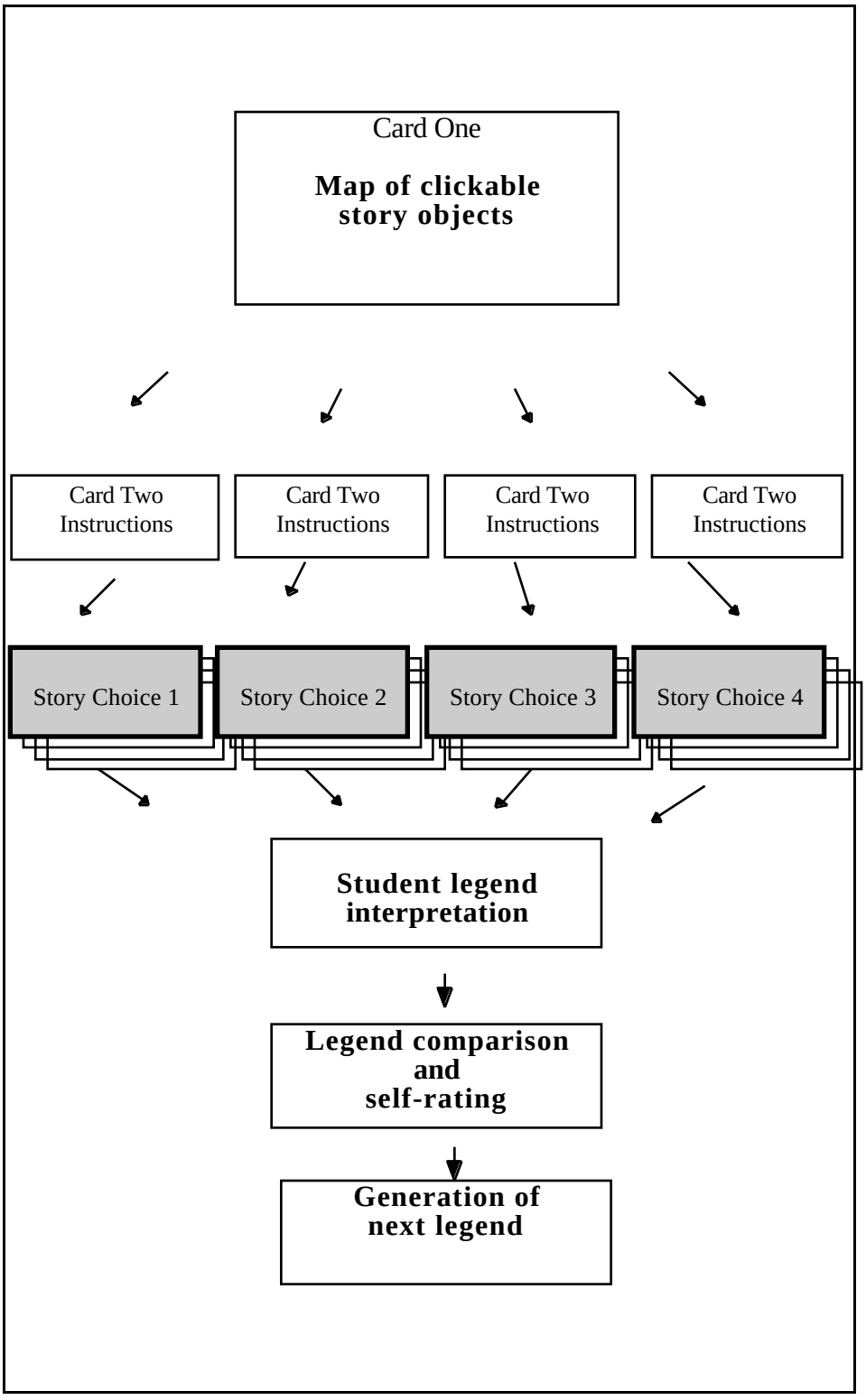

Figure 2.1. Structure and sequence of the hypermedia template “Legends of the Sky”.

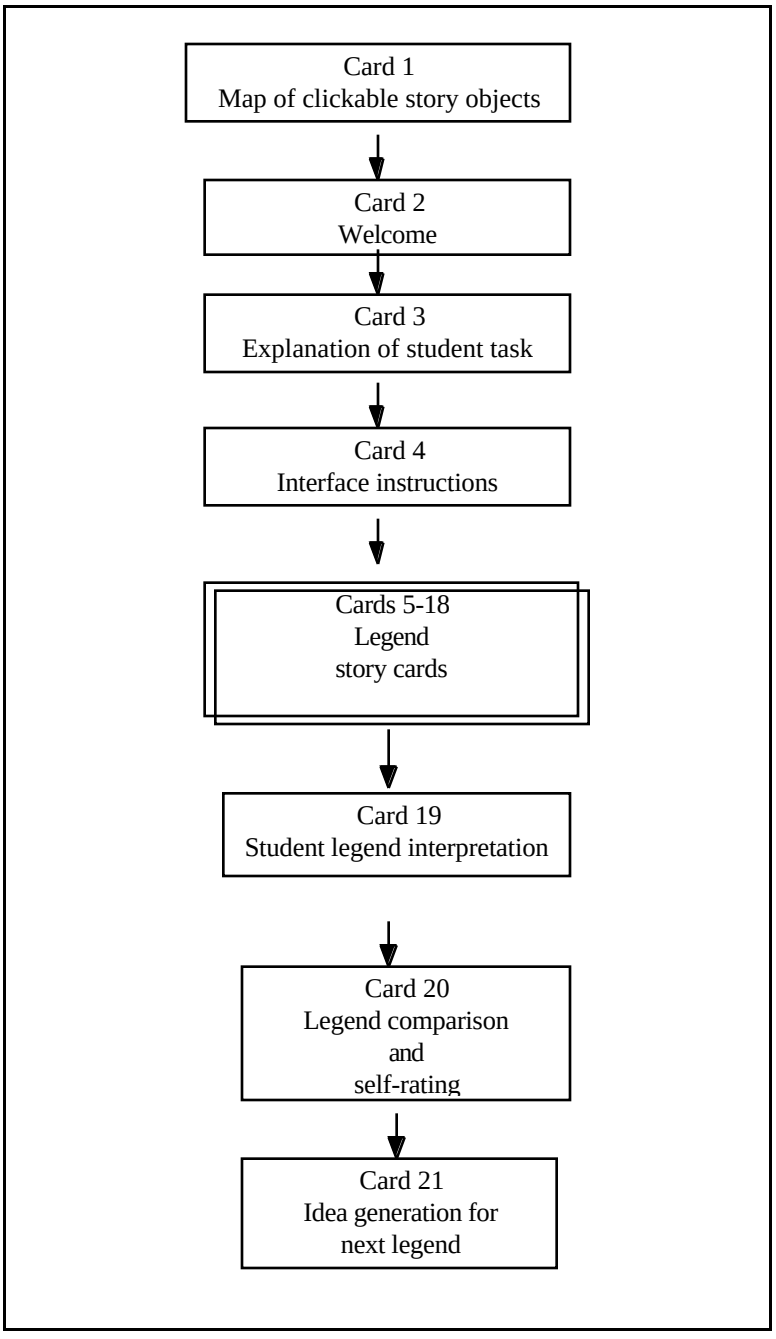

Figure 2.2. Sample of a program path.

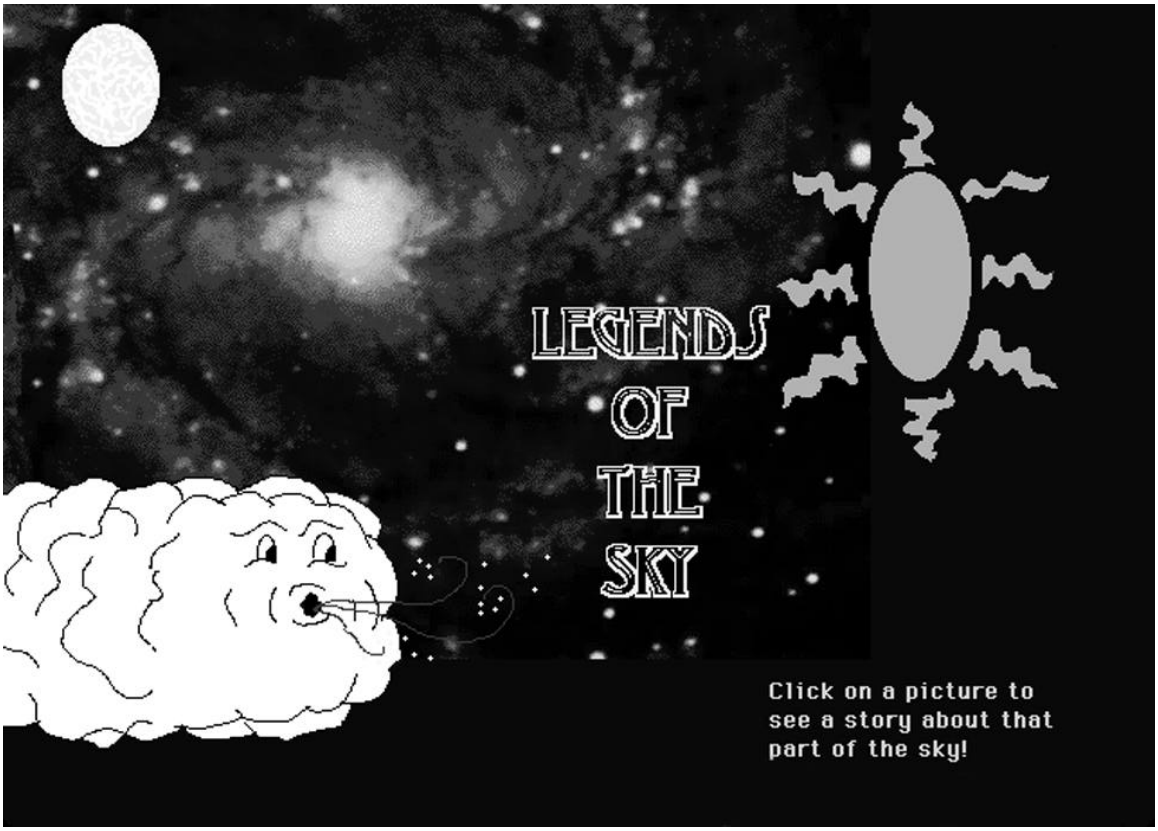

Figure 2.3. "Legends of the Sky" title card which displays four clickable objects: the moon, the cloud, the sun, and the Milky Way.

Figure 2.4. "Legend of the Milky Way" welcome card.

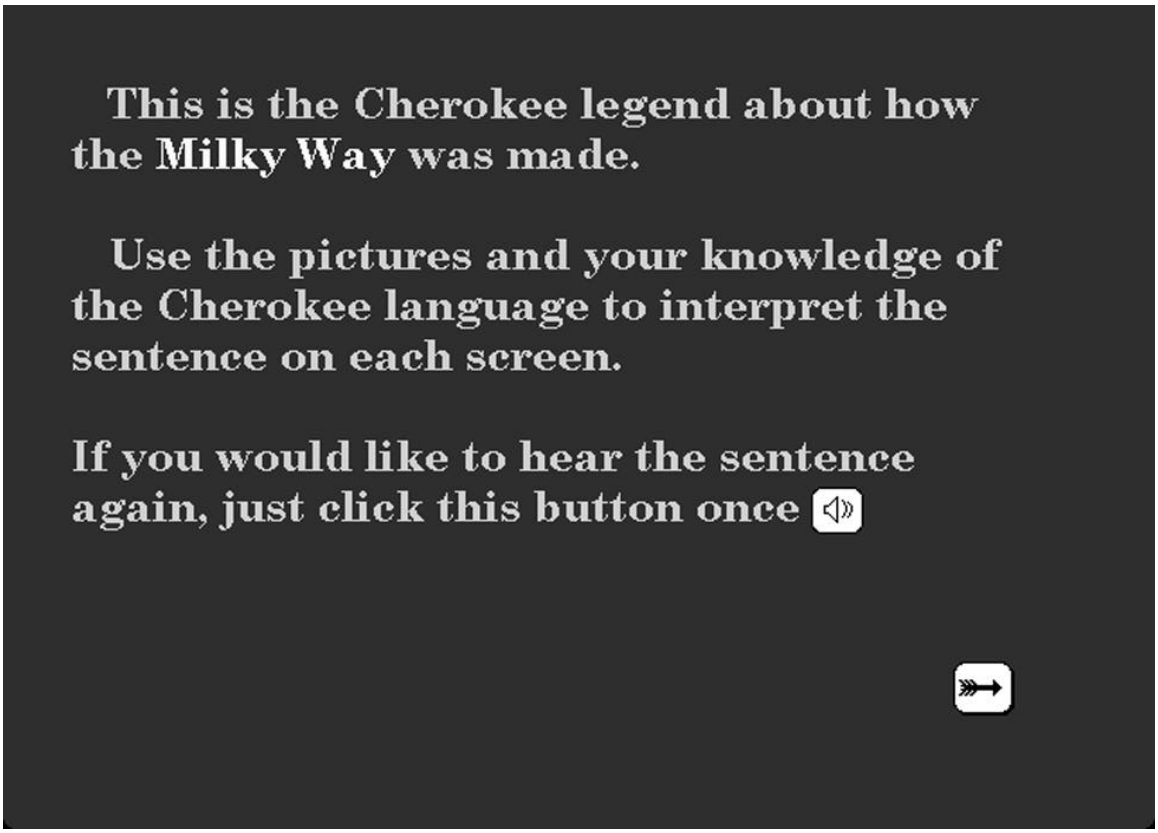

Figure 2.5. "Legend of the Milky Way" introduction card and explanation of student task.

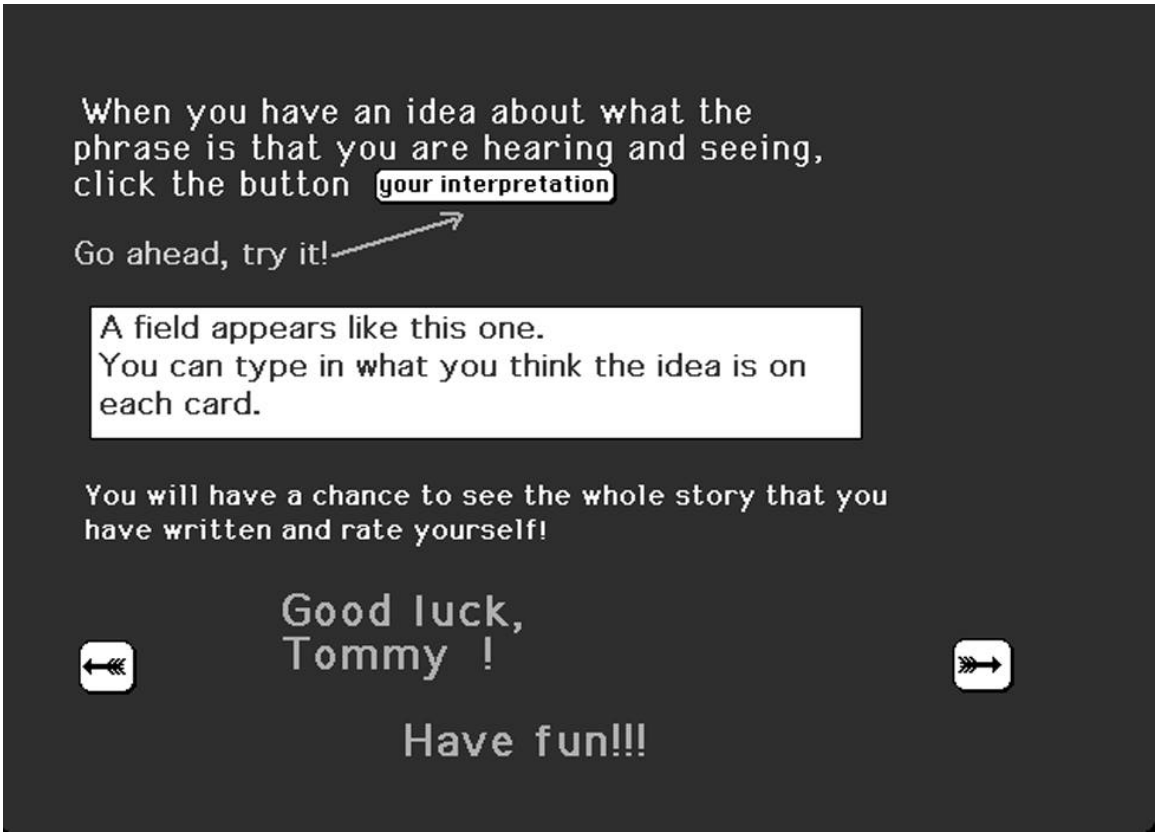

Figure 2.6. Legend of the Milky Way user interface instructions.

When students complete the instructions, they move to the set of story cards which represents the legend they chose. The next section regarding detailed program design describes the instructional activities and evaluation strategies incorporated into the language template.

Detail design.

As users work through the legend, they encounter a sentence or phrase on every frame which describes the line of action. They see the language in text and hear a native speaker read the phrase. Presenting the language in context reflects the whole language methods incorporated in the template. The sample program outlined in the next chapter also displays the syllabary of the Cherokee target language. Not all Native American languages utilize a different alphabet, however; the template accommodates one if the font is available to the developer. An illustration of each phrase accommodates the text and narration. The program images can be created within the software authoring program, or they can be scanned drawings or photographs imported into the template. Regarding activity sequence, upon opening each frame, the learner is presented with visual cues first, such as an animation or illustration, and the narrative segment follows. A button is available on each frame for the user to replay the speech component if so desired. Figure 2.7 represents a prototype story card which exhibited all of the aforementioned components.

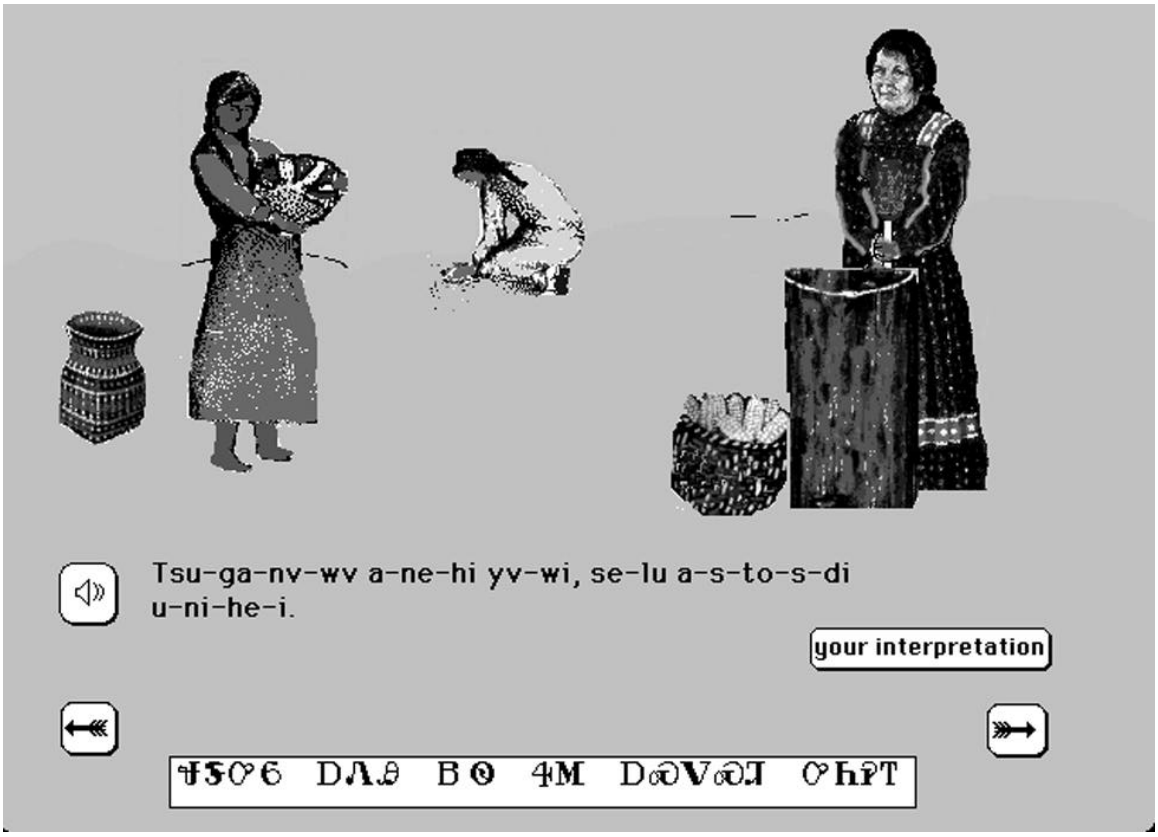

Figure 2.7. Legend of the Milky Way story card.

As stated in the program directions, students are asked to interpret the language on every frame. The instructions tell the users to click on the button "your interpretation" when they have an idea about what the phrase means. When they click on that button, a field appears and they can type in their response (see Figure 2.8).

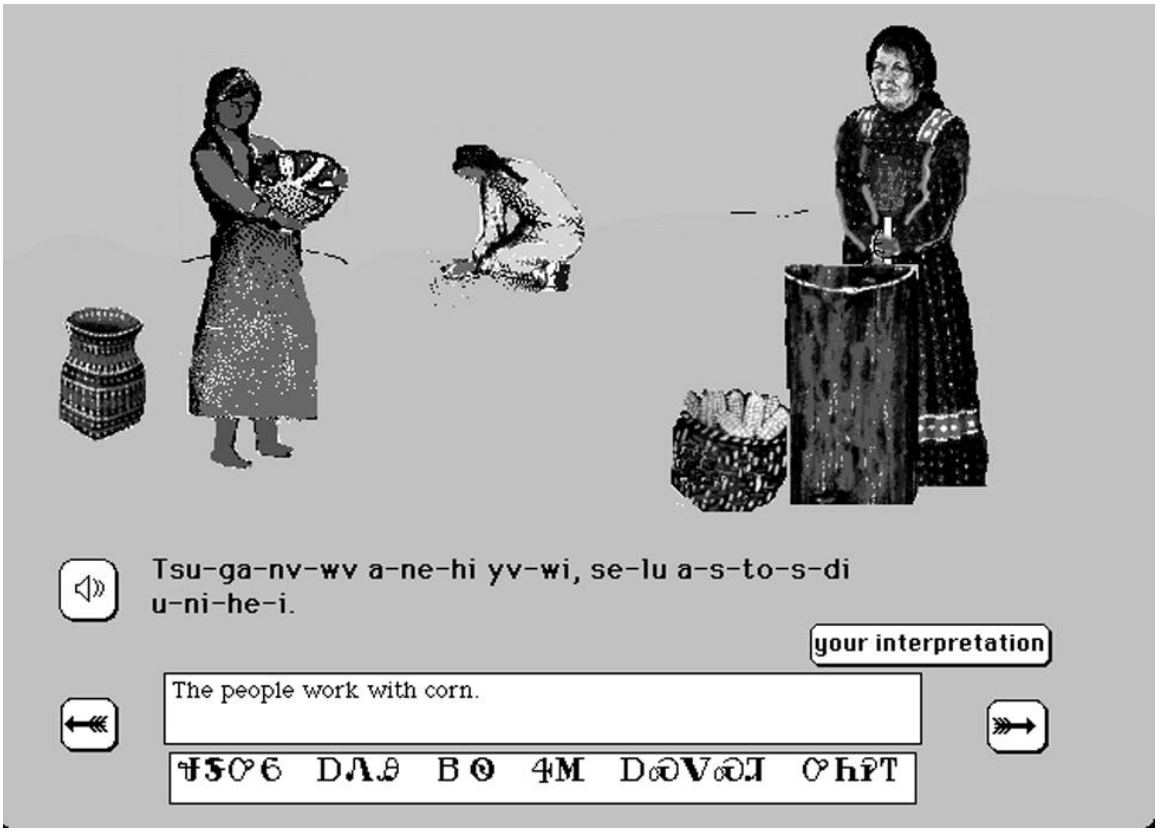

Figure 2.8. Legend of the Milky Way story card displaying student interpretation field.

After typing their interpretation, students click on the forward arrow button to move to the next card of the legend. They may also move backward to review what they have written on previous cards, or they may move forward to seek information on future screens. Requiring users to submit interpretations helps to maintain interest and a sense of challenge, and requires intellectual participation as opposed to thoughtless paging through the presentation. As previously mentioned, the level of user control is appropriate to the application, and especially to the audience. The program is designed so that students are able to work through it on their own without technical assistance from a source other than the program.

Feedback is an important component to provide information to users regarding appropriateness of their responses. After working through all of the story cards, students

are able to view the legend that they have written (see Figure 2.9). Instructions are given as to how to change input, if students wish to do so.

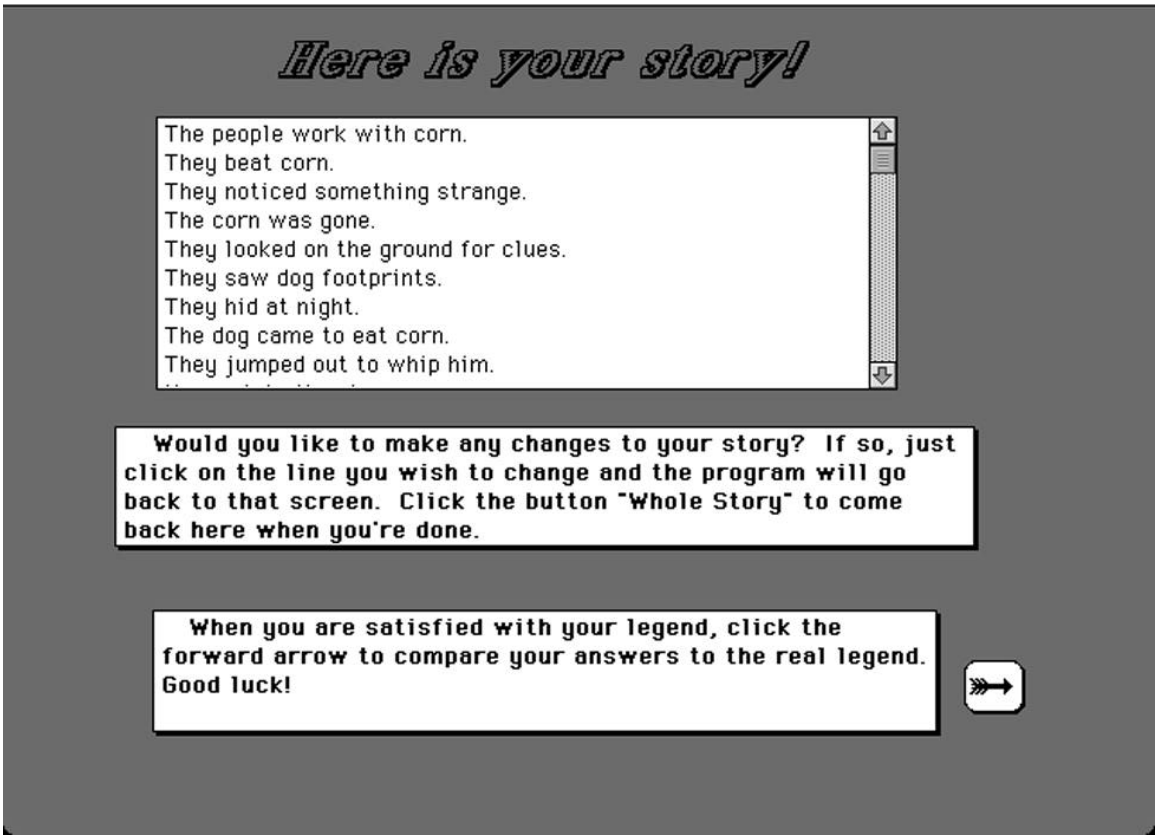

Figure 2.9. Legend of the Milky Way student legend interpretation card.

When they are satisfied with the legend that they have created, users advance to the next card which juxtaposes their version of the legend next to the accurate version (see Figure 2.10). Students are asked to read the two legends and then give themselves a rating as to how the two legends compare.

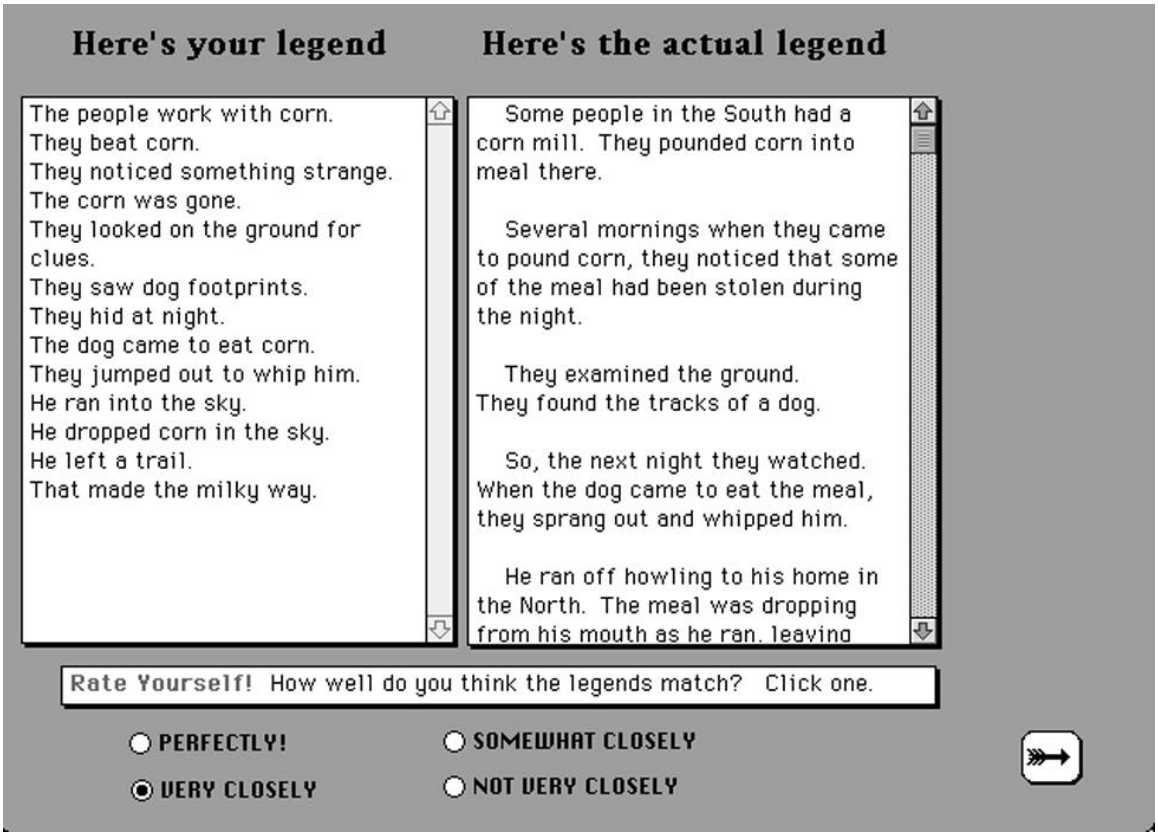

Figure 2.10. Legend comparison and self-rating card.

Upon completing this task, users move to the last card of the program (see Figure 2.11). This card asks them to imagine that they had just heard this legend at a tribal ceremony. They are asked to contemplate another legend that they would like to tell about a celestial body. The instructions tell them to give their legend a title and to type in the first sentence that they would say. The rationale behind this activity is to promote thinking about students' heritage and to create ideas for future language classes. In a follow-up session, the instructor could have students expand on their new legend, using as much of the target language as they know and negotiating unknown meanings with the instructor .

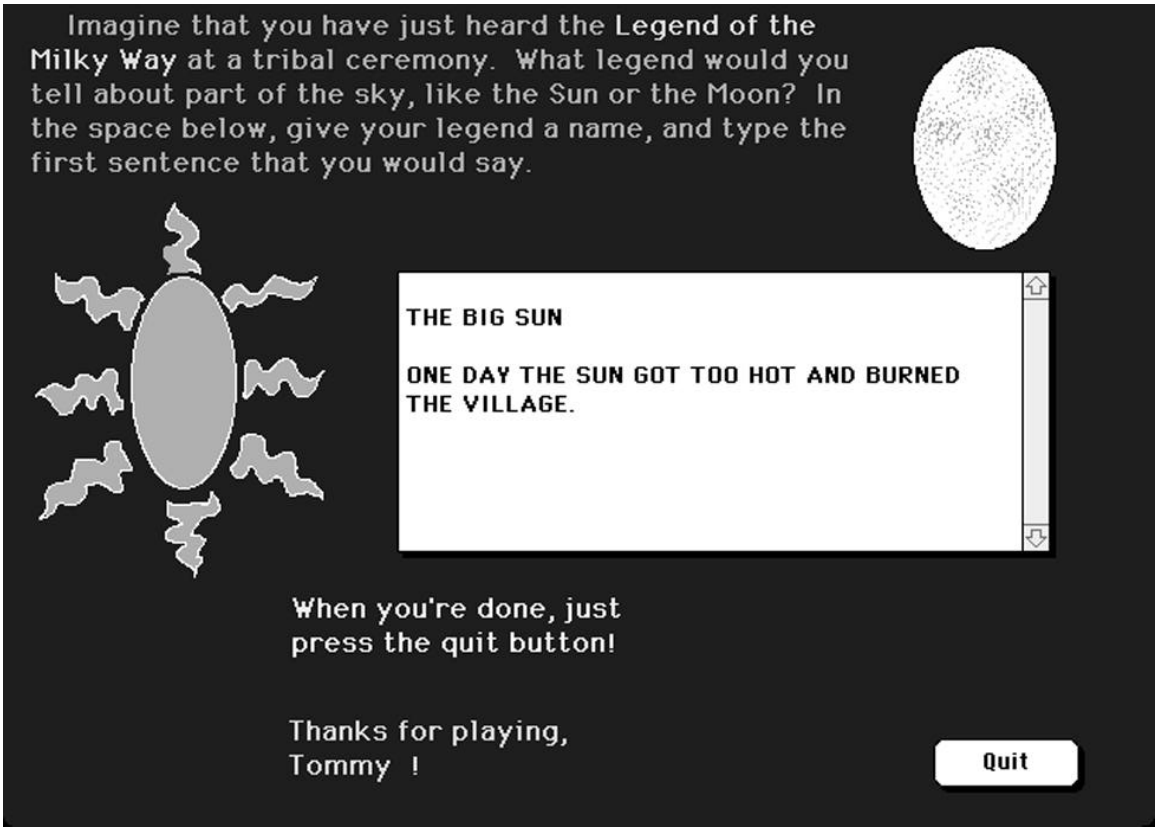

Figure 2.11. Final program card. This card prompts student generation of a new legend.

All student input into the program is collected as a resource for the language instructors, and for the program author as well. If responses for particular frames are consistently incorrect, the graphics may need to be changed to more accurately reflect the text and speech segments.

Visual components.

A great deal of effort was expended on the graphics and animations to make sure they explicitly reflect traditional dress and tribal-specific customs, as well as accurately convey the meaning behind the legend. Artists may be necessary to create culturally-appropriate visuals.

Audio Components.

Audio plays a significant role in the hypermedia program to address the project goal of holistic exposure to authentic native language. Narration of the legend provides speech production in the local dialect. To produce the narration, recorded speech from a native speaker was digitized using a software package called SoundEdit Pro®. Then, short portions of the story's narrative statements were be assigned to each frame of the template so that the learner encounters the language in a comprehensible manner. Music is used on the introductory screen of the template to gain attention. The selection should originate from heritage of the implementing tribe and copyright restrictions must be taken into consideration.

Produce

The Production Activity involves the translation of the paper documents from the Design phase into the various components that will contribute to the final product. For example, if authentic materials were to be integrated into a program for language learning, the original materials would have to be digitized in this stage to prepare them for the next step.

Deliverable: Digital media.

After completion of the Production Phase, all of the components of the program; the digital narration segments, music, illustrations, and animations, were ready to be assembled into the final hypermedia template. Next, in the Authoring Phase, the development of the actual programming code served to create the template's structure and events. The digital media were then integrated to make the sample program.

Author

In the Authoring Activity the digital media deliverables from the preceding phase are integrated into the product's software skeleton which was created using an authoring software package. The author chose to use SuperCard® 2.5 for the development of this project. The software was licensed to the lab and loaded on five of the higher-end Macintosh production computers. The implementing school will not need to purchase the SuperCard® application because the prototype will be made into a standalone file, a feature of the SuperCard® software. A charge does not exist for creating standalones, but the author must acknowledge the use of SuperCard® for program creation in text at the beginning of the prototype. SuperCard® has the ability to create a user interface that is appropriate for the needs of this project.

Bergman and Moore (1990) describe six different types of authoring systems. The relevant system for the development of a Native American languages program is the hypermedia application generator. In general, three activities take place in this phase:

1) coding-to integrate media elements, application logic, and transition techniques into a series of presentations.

2) testing-to try the application from an end user's perspective, uncover errors, and correct them.

3) tuning-to smooth and refine the presentations, logic, and interactions into a seamless and professional product (1990, p. 101).

Bergman and Moore (1990) emphasize the fact that the authoring package needs to be decided upon in one of the first two phases because the decision will have implications for details of the project in all stages. Anyone wishing to modify the template will need a copy of the full SuperCard® application, version 2.5.

Authoring facility selection.

The authoring facility for actual template production was the Education Technology Lab at Virginia Tech. The necessary software, hardware, and technical support were readily available. Lab operating hours were extensive, an important benefit which contributed to machine accessibility. Contributing to the support for this project would be instructional technology professors and graduate students, and also the staff of the Educational Technologies office, a division of the university's Information Systems component.

For a description of hardware and software needs for template adaptation, see Appendix A "The Developer's Guide to Template Modification".

Deliverable: Product.

The template, embedded in the sample program detailed in the next chapter, was complete after approximately ten months of development. The design of the program was continually refined during the Authoring Phase to ensure that the final product met the needs of its target audience. See Appendix B for the final template's programming code and Appendix C for screen shots of every card in the sample program.

Validate

As the final phase the Validation Activity brings together the product, the intended audience, and the eventual environment under the auspices of an observer who can determine the success of the product or its need for alteration. Bergman and Moore suggest three steps for this last activity:

1) preparation for validation-organizing the questions, securing the test audience, constructing the environment.

2) conducting the validation-observing the application, interviewing the audience, recording.

3) assessing the results-analyzing and organizing the validation findings into a formal report for review and possible action (1990, p. 117).

While research on hypermedia is in its infancy (Moore, Burton, & Myers, 1994), the body of experimental results is not without problems. Gleim and Harvey (1992) point out that when the attributes of hypermedia are brought into focus by recent research, findings are often limited (1992, p. 2). They contend that such research efforts may be flawed because of the choice of experimental investigative methods. "...the major characteristic of hypermedia, the ability for the learner to traverse the application in a multitude of ways, makes each learner's experience unique. Browsing and navigation, inherent in hypermedia, decrease the ability to control the experimental condition" (Gleim & Harvey, 1992, p. 3).

To acquire tracking information about how the student moves through the program and what types of responses they submit, an audit trail was built into the template (see Figure 2.12).

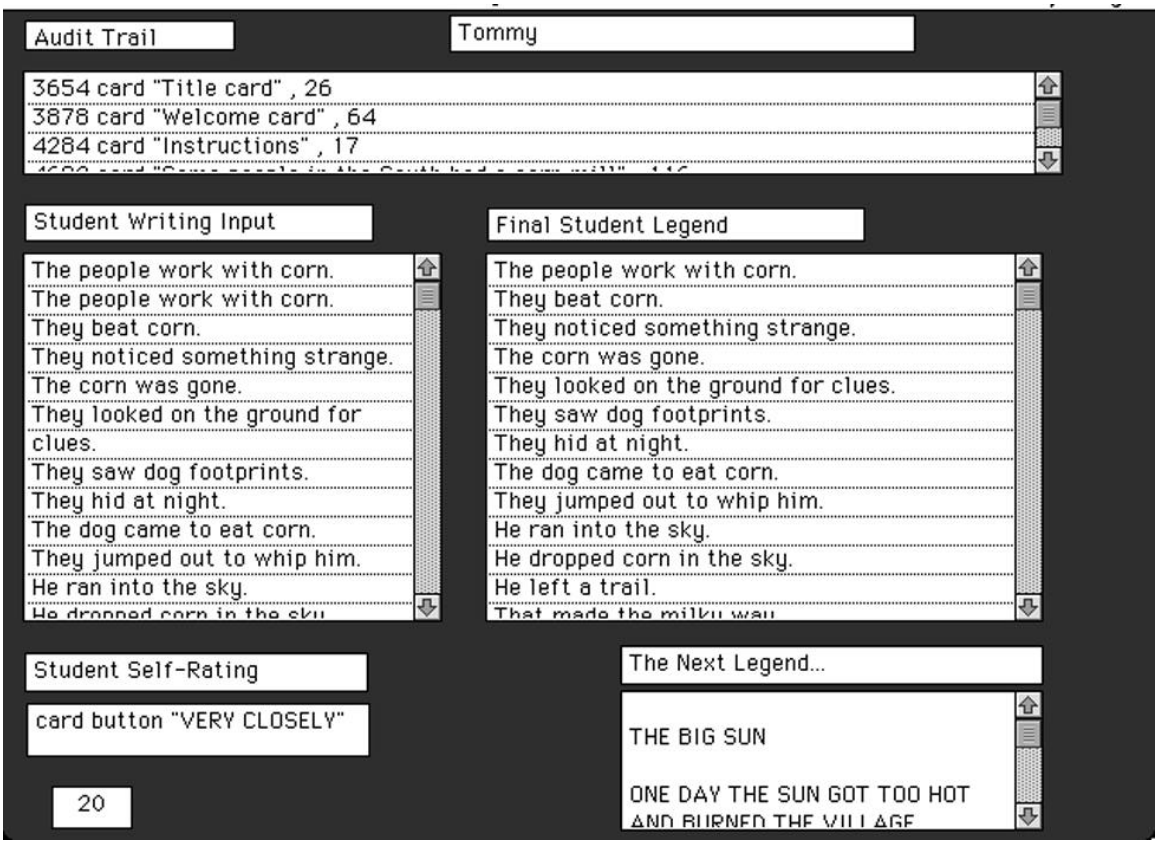

Figure 2.12. Template audit trail.

The audit trail collects information such as the student's name, the sequence of cards as the students encountered them and the time spent on each card, all submitted interpretations and the students' final legend interpretation, the students' rating as to how closely their legend matches the correct version, and the title and first sentence that the student submitted as the next legend they would tell. Such a tracking system would be advantageous, as Herron and Moos (1993) explain, because "comprehensible input would no longer be an issue of rough tuning, since the students themselves could provide numerical feedback about the difficulty and ease of comprehension" (p. 484). If a segment is replayed an excessive number of times, then an instructor might determine that the input is at a level beyond the student's comprehension. Also, the template creates a text file named with the student's name and writes all of the collected information to that file. This design provides the instructor with a permanent record of student activity within the program.

To produce a sound investigation which positively contributes to research in the field of hypermedia, Gleim and Harvey (1992) suggest that naturalistic inquiry methods be used. Observations of student/program interactions, follow-up interviews, and audit trail data collection can be used to determine if the program meets the goal of the developer: to provide multi-channel exposure to the second language in a contextual manner, without requiring the student to publicly produce the language.

Formative feedback about the template and sample program validation was also acquired from the implementing instructors. Teachers who will integrate this program into their instructional setting can provide vital information during all phases of development because of their insight into student abilities and needs.

Deliverable: Results

After data collection is complete, the naturalistic paradigm calls for the data to be analyzed for common themes. Responses from the variety of resources tapped for information about the sample program developed with the template structure are recognized in the following chapter. Similarities in opinion and feedback, as well as differences, are exemplified.

Chapter 3

Prototype Production and Implementation

The Prototype Project

In order to provide a concrete example of the software template for Native American language preservation, the author contracted with language instructors at an elementary school on the Cherokee reservation in western North Carolina to produce a sample program which would accommodate their needs as well as reflect the theoretical contentions of this document. Assisting as part of the project team were a local language expert and three language teachers. The language expert was a teacher at the elementary school who was on sabbatical to coordinate the Kituhwa Dialect Preservation Project, an effort to further the cause of native language maintenance on the Cherokee reservation. Her primary resource, and also an additional resource for this project, was her father, an 80-year old tribal elder and lifetime scholar of the Cherokee language. His expansive knowledge of both English and Cherokee grammar systems make him a valuable component in the effort to preserve the language for future generations. Because the restoration of Cherokee as a living language is a primary concern of the team's contributors, their cooperation with the prototype development was tremendous.

Summary of the Development Process

The sample program was developed according to the template framework and the guidelines provided by the Bergman and Moore Developmental Model described in the previous chapter. Prototype development activities are detailed with regard to each phase of the instructional design model.

Analysis Phase

To conduct a thorough needs analysis, the author met with the Cherokee language instructors for the first time in April, 1995. Details of the Analysis Phase were collected during that visit.

The reservation language experts were already well aware of the problem of Native American language loss. They, too, were actively seeking solutions to stop the assimilation of the Cherokee language. These instructors were working to develop their own curriculum for language instruction because of the lack of existing materials. Coincidentally, language instruction is a component of a course on Cherokee culture. On the days when language was not taught, students learned traditional crafts, recreated tribal ceremonies, and listened to storytelling. Thus, the combination of storytelling and language learning provides an additional opportunity for the students to encounter their native language.

This prototype addresses the needs of the Eastern Band of Cherokee children, specifically fifth and sixth graders enrolled at an elementary school on the reservation in western North Carolina. Regarding previous experiences, these students have had Cherokee language lessons since kindergarten as part of the aforementioned course in Cherokee culture. Exposure to the language is typically limited to interactions with school personnel since only about 10 percent of the reservation's population speaks Cherokee as a first or second language, and most of those speakers are over sixty-years old. Thus, the generation to which these students' parents belong is largely only fluent in English. The current capabilities of this audience register in the Novice-Mid to Novice-High range of the ACTFL proficiency guidelines (Shrum & Glisan, 1994). Of the four language competencies of speaking, listening, reading, and writing, these learners are strongest in speaking Cherokee because communicative speech is emphasized by their language instructors. By the fifth grade, the students at the elementary school are expected to

recognize a majority of the characters of the Cherokee syllabary and their related sounds. They are also aware of person and simple verb usage. They can use numbers and recognize a variety of nouns.

The physical facility for which the sample application was developed was the school's computer lab, an open area in the library. The lab contains 28 Macintosh computers which run System 7.0. Although the application was developed on machines which run System 7.5, the software is still compatible. The computers are located in connected carrels in four straight rows. Because of the proximity of the computers, headphones are necessary. Regarding personnel and scheduling, the computer lab area is coordinated by a library media specialist. Instructors who wish their students to use the lab must submit a lesson plan to her and she will conduct the class session. Language instructors at the school will develop the coordinating lesson plan for her to implement.

The use of technology for teaching is not a new idea at this elementary school. Students of all ages regularly use the computing facilities in the library for a variety of purposes. Several computers throughout the school have internet connections. Every classroom at the school has a computer, and the language classroom has two. The language teachers use a program developed by a tribal member to create handouts for class. The user can type a phonetic sound and the correlating syllabary character will be printed.

Design Phase

In order to collect, analyze, and validate the content for this program, the author needed not only subject matter experts, but input from the stakeholders-those who wish to perpetuate the language and those students who are in the process of learning it. The local language instructors provided insight as to appropriate motivational appeals for their students.

High level design.

With feedback from these colleagues during the design phase, the author was able to further develop application treatments and strategies. During the summer of 1995, the author worked on her own to transform the given legend into detailed storyboards with a narrative script, which became the documentation for production. This author agreed to manage the production process, and evaluate the application upon completion.

Detail design.

The author wanted to choose an appropriate celestial legend to accommodate the template framework, and given advice from the programmer for the Kituhwa project, she referred to Moody's anthology of Cherokee legends, perhaps one of the most revered sources of folktale history for the tribe. The sample program was the story which would be presented when the student clicked on the picture of the Milky Way. To incorporate whole language methods, the legend would be encountered in the Cherokee language, aurally and textually. The text would need to appear in two versions--the phonetic version and the syllabary version. The content presentation matches analysis phase requirements by taking advantage of the multimedia capabilities of SuperCard® to create a program in which the students can encounter text of the language in phonetic and syllabary formats, hear a spoken version of the text, and see correlating still images and animations which accurately reflect their culture. Thus, the content presentation meets the program's objectives by providing exposure to native language in a holistic and non-threatening way.

Production Phase

The next step was to compile the resources necessary to accurately recreate the legend in a multimedia format. In order to make a detailed storyboard, the author needed to investigate what visuals to use to convey the meaning behind the story. Also, the cultural appropriateness of the images was extremely important. Therefore, the author relied on tribal history books, illustrated anthropological writings, old photographs, and artifacts at the Museum of the Cherokee Indian located on the reservation. The summer of 1995 was spent creating the storyboards which would become the blueprints for developing the program.

Upon completion of the roughed out graphics and story idea segments, the author visited Cherokee again in August 1995 to obtain formative feedback about template development. During this session, one of the language teachers translated the legend of the Milky Way into phonetic Cherokee and provided the recorded narration for the program. Also, all language instructors provided valuable advice about the graphics. For example, the author was unsure about the technique used for grinding corn, an important component of the story. They provided sketches and verbal explanations which helped visualize what the final illustration should resemble.

Audio components.

After the instructor translated the English version of the legend into Cherokee phonetic print, the author then used a cassette recorder to tape her speaking the legend in English and Cherokee. Later, the author digitized the narration and created a Cherokee speech segment for each frame of the program. Because the instructor is one of the primary language instructors at the elementary school, the narration reflected a dialect to which the students were accustomed. The spoken segments were attention-getting and correlate well with the visual material.

Computer graphics.

Perhaps the greatest time investment in the program's production phase was in creating the visual images which depict the given legend. All screens must consistently reflect images which are true to the local culture. Everything from the baskets, dress, and cornmeal preparation techniques was duly investigated. Information was obtained not only from the language instructors, but also from the local tribal museum and historical photographs. The Macintosh system's 256-color palette provided an adequate selection of hues for creating appropriate illustrations and animations. After the first version of the program was rendered, the author had the content experts check the visuals for cultural accuracy.

In order to exemplify whole language methods, the text on each frame was presented as an idea segment, not necessarily a whole sentence. This technique keeps the textual information on each screen limited. The spelling and grammar of both the phonetic and syllabary versions were checked by all language instructors. The Cherokee syllabary font was acquired copyright-free from a NetScape site for Native American languages. This font must be installed into the Macintosh's system folder in order for the syllabary to display. All program font sizes and styles were chosen to be easily read on the computer screen.

Regarding user interface issues, steps were taken to make the program user-friendly for its intended audience. After the title card, users are presented with a welcome greeting and a query which asks "What is your name?". The next two cards provide a brief statement about the goal of the program and a simple set of instructions as to how to work through the program. The instructions provide an interactive example about how users submit their interpretation of each frame's language segment. At the end of the second instruction card, the computer presents a personalized good luck statement.

Buttons and icons were few and were explained in the instruction portions of the program. Students always have access to a move forward arrow and a move back arrow to allow them to move through the program and revisit previous cards if they wish. When students are ready to provide an idea as to meaning of the Cherokee language segment, they simply click the button which says “my interpretation”. A blank field appears for user input.

Authoring Phase

The author spent the fall of 1995 developing the actual program. The intended authoring program was to be HyperCard™ 2.2 because of its advertised animation capabilities. The author purchased the 2.2 version update, and proceeded to attempt program development. Creating the animations for the stack was extremely problematic, as the program was not functioning according to specification. The author sought assistance locally. When the problems could not be solved with local expertise, the author posted the difficulties to a HyperCard™ usergroup listserv and found that animation problems were common in this new version of HyperCard™. Because a fix was not available at the time, the author decided to change authoring programs. SuperCard® was chosen because of its established animation capabilities, in addition to its programming similarity to HyperCard™, a language with which the author was already familiar.

Programming advice and feedback was obtained from the variety of sources previously mentioned. Assistance was also provided by Allegiant’s™ on-line help desk. This service provided information about technical issues which local programmers had not previously encountered. The issue which was most problematic was the attempt to translate AIFF sound files into SuperCard® program resources. Allegiant™ provided insight about the problem and it was resolved locally.

Validation Phase

To assess the effectiveness of the sample program, a pilot test was planned to gain feedback from end-users. Student feedback was to be gained through several mechanisms. First, the author planned to observe student/program interactions and to acquire information through follow-up interviews after program use (for interview questions see Appendix E). Also, the program's audit trail was designed to provide an additional validation tool. A variety of data could be collected through this device, such as the card path which the student chose and the amount of time spent on each card, how many times the student played each speech segment, all student interpretations, the student's final version of the Cherokee legend, the student's self-rating, and the student's next legend choice. The combination of observations, interview responses, and audit trail data would provide the validation responses necessary to assure program quality and usefulness, especially since the sample audience directly represented the program's target audience.

Results.

The last week in February a pilot test was conducted with two children, a ten year-old fifth grade female and an eleven year-old sixth grade male. Due to time constraints, the author had the female participant work through the first half of the story and the male participant work through the second half. When the female reached the first card of the story, she listened to the text and stared at the screen for about one minute. The author asked if there was a problem. The student stated that she did not know what the sentence meant. The author asked her to look at the picture for meaning and also at the text to see if any familiar words might help her. The author also told her not to worry about getting it exactly right, that she should just concentrate on the main idea. The female participant stated that it looked as though the women were working with corn. The male added that they were probably making corn meal. The female said to her male peer that he was

probably right because the word “corn” was in the sentence. They agreed upon the interpretation to type into the program and the female student typed it. The students continued working through the program together. The female student re-read the first two phrases outloud. She also replayed the narration segment on the second card. Also, she and the male student pointed at words they knew in the phonetic text field. After approximately 15 minutes the author asked the male student to trade places with his female colleague at the keyboard. He continued collaborating with the female student to determine an interpretation of each screen. Both students continued indicating which words they knew and discussing the visuals on the screen to determine their interpretation. The author had to terminate the session at the end of almost 30 minutes, and the students were not able to complete half of the program. This outcome served as an important indication to the author, as class sessions at the school are 40 minutes and the program would need to be altered to fit into that particular time constraint. Interviews could not be conducted with the students who participated in this pilot test due to time constraints. However, audit trail data was available to indicate student interactions with the program.

The following segment is the audit trail from this session. The name of the card is also the English translation for that particular story segment. Next to the card name is the amount of time the user spent on that screen. The bold text items are the user’s interpretations of the given phrase. All student input is presented exactly as the student submitted it. If no bold text appears below the card title, the student had not yet submitted an interpretation for that screen. One can analyze the amount of time spent on a card with no student response to indicate whether the student was looking for information or just traversing through the program.

Audit trail

card "Some people in the South had a corn mill" , 4:09
making cornmeal

card "They pounded corn into meal there" , 3:39
beating corn

card "Several mornings when they came to pound corn" , 1:40
Come back next day the corn is gone

card "they noticed that some of the meal had been stolen during the night" , 1:18
All the corn is gone

card "They examined the ground." , 3:22
They are looking for the corn on the ground

card "They found the tracks of a dog" , 1:37
They saw dog prints on the ground

card "So, the next night they watched" , 2:07
They saw the dog

card "When the dog came to eat the meal," , 2:15

card "So, the next night they watched" , 1:16

Here is the legend the students created in its cumulative form:

making cornmeal
beating corn
Come back next day the corn is gone
All the corn is gone
They are looking for the corn on the ground
They saw dog prints on the ground
They saw the dog

While the students seemed to make progress with the program in the time allotted, the format of the program definitely needed to be altered in order to match the time constraints of the instructional setting at the elementary school. Interviews with the language instructors provided helpful recommendations as to how the program could be altered to suit the instructional setting at the elementary school. The implementing instructor suggested condensing the story to make it shorter, as some screens were repetitive. He found the audit trail feature of the program helpful, and said that he could use it to monitor to student progress with the language. When asked about how he could fit the program into his class curriculum, he said that many classroom activities could be conducted with the program topic even after the students initially used it in the computer

lab. Printing out the screens and working through the interpretations in successive classes was one potential activity he suggested.

The author consulted with the language instruction expert on her committee for advice as to how to condense the program while maintaining its whole language methods. Eliminated from the program was the portion in which the students worked through the legend again, frame by frame, and compared their response to the accurate interpretation. This shortened the program by thirteen frames. The elimination of this activity would reduce the interaction time with the program, while keeping the original instructional goals of the project intact.

Two more students supplied feedback during a second pilot test in March. These participants were not constrained by time, and provided varied responses and valuable information. The participants used the program individually and both sessions were audiotaped in their entirety. The first participant was an eight-year old female in the third grade. Although the target audience was fourth through sixth graders, she did exceedingly well in proving that the program was acceptable for her age group as well. The following section is the audit trail data from her session.

Audit trail

card "Some people in the South had a corn mill" , 1:39
this is how the milky way is made

card "They pounded corn into meal there" , 3:09
this ishow the corn ismade

card "Several mornings when they came to pound corn" , 2:27
it looked like the corn was gone

card "they noticed that some of the meal had been stolen during the night" , 2:03
thay look sad becouse something had ben ther

card "They examined the ground." , :40
a big foot print

card "They found the tracks of a dog" , 1:03
It looks like a gint dog

(Here, the student clicked the forward button several times because the screen seemed like it was not changing. She quickly returned to the last screen on which she was working.)

card "So, the next night they watched" , :01

card "When the dog came to eat the meal," , :02

card "they sprang out and whipped him." ,:02

card "When the dog came to eat the meal," ,:02

card "So, the next night they watched" , :02

card "They found the tracks of a dog" , :03
It looks like a gint dog

card "So, the next night they watched" , 1:48
thay set a trap to see what was stilling ther corn

card "When the dog came to eat the meal," , 1:16
so thay hid and saw it

card "they sprang out and whipped him." , 1:28
then juoped out and whiped it

card "He ran off howling to his home in the North." , 1:23
then it jouped up in the sky

card "The meal was dropping from his mouth as he ran," , 1:13
to this day the miky way is in the sky

card "leaving behind a white trail (where we now see the Milky Way)." , 2:06
you can see the stars shaped like the mliky way

card "Where the dog ran." , 3:00
a dog spred corn in the sky and that is what maded the milky way

The following text is her final legend in its cumulative form:

this is how the milky way is made
this ishow the corn ismade
it looked like the corn was gone
thay look sad becouse something had ben ther
a big foot print
It looks like a gint dog
thay set a trap to see what was stilling ther corn
so thay hid and saw it

then juoped out and whiped it
then it jouped up in the sky
to this day the miky way is in the sky
you can see the stars shaped like the mliky way
a dog spred corn in the sky and that is what maded the milky way

This button was the student's self-rating as to how her story compared to the actual legend:

card button "VERY CLOSELY"

This user input was the student's choice for the next legend that she would tell:

HOW THE CHEROKEE'S FIRST GOT CORN
A little boy had a grandma who could get corn out of her side,

The follow-up interview with the participant helped confirm the author's beliefs about several student/computer interactions. In the following transcription, the letter "B" is used to represent the interviewer and the letter "S" is used to represent the participant.

First, the student suggested that the illustrations in the program helped contribute to her understanding of the legend.

B: Tell me what you learned from this program.

S: That the legend of the milky way, that um, that when they first learned what was stealing their cornmeal was that dog cause it left big footprints in their cornmeal that,...they hadn't ever seen footprints like that before cause they hadn't discovered the dog yet.

B: Okay, how did you understand the meaning of what you saw on each screen?

S: because they were making cornmeal in that old thing, where they were mashing down on the corn to make it, and on that one it showed the big footprints on there.

B: So how did the pictures affect the program?

S: it told you, like it had a dog on it and people mashing corn and stuff

When asked about the good features of the program, the student mentioned the ability to compare her story to the actual legend and then referred back to the illustrations again.

B: Okay, so what do you think were the good features of the program?

S: Whenever you got to figure out if you got the answers right or not.

B: You liked that okay?

S: Shook head “yes”.

B: What else?

S: The pictures in it

B: How did the pictures contribute to the program?

S: They matched it and they let, helped you figure out what it means.

In addition to the pictures assisting meaning, the student indicated that the narrator choice was also an important one.

B: “Okay, how did hearing Myrtle help you?”

S: “It was someone who I was used to hearing teach me.”

B: “Did that help?”

S: Shook head “yes”.

When asked about any difficulties with the program, the participant stated that sometimes trying to interpret the sentences was hard because they had not learned all of the words yet. The student had definite ideas about how to improve the program.

B: Okay, how do you think I can change this program to make it better?

S: Um, like after you, after those kids type their legend in, you could let ‘em, if you could leave the color out, at the end they could fill in the color.

B: That sounds like fun! What a great idea! Do you have any more ideas?

S: Um, you could like after you let’em paint that you could just let the screen clear off and let’em create a picture of their story.

The student also indicated that other students would probably enjoy using computer technology to learn the Cherokee language.

B: How do you think programs like this would affect you learning Cherokee?

S: I think it helps...cause sometimes those kids just sit around and draw on their folders and stuff.

B: You think they would like to use computers?

S: Yeah and we like to paint and stuff, cause they let us paint sometimes down in the computer lab whenever we did about five or ten lessons without repeating them.

Finally, the participant's responses to questions regarding the use of Cherokee legends to teach the language demonstrated an appreciation for an activity that was culturally-relevant and contextual in nature.

B: How did you feel about this particular story?

S: It made me feel good that there are stories goin' on about the Cherokees.

B: Okay, so do you think Cherokee legends would be a way to help learn Cherokee?

S: Yeah, for other people who haven't quite learned it yet that are in other schools cause they don't even--they may know how to say corn or dog or somethin in Cherokee, but they need to learn how to speak sentences.

The fourth participant, a nine-year old male in the fourth grade, took advantage of the lack of time constraints and spent a great deal of time traversing through the program looking for clues to assist him with creating the best interpretation. During his use of the program, he made several similar statements which reflected his desire to gain as much information as possible to compose the most accurate responses. Such statements were "I better go back to see what I wrote on the last screen" and "I believe I will look at the next page for clues". One can see from the following audit trail that this participant was dedicated to submitting appropriate interpretations.

Audit trail

card "Some people in the South had a corn mill" , 4:01
Once there was people who churned corn.

card "They pounded corn into meal there" , 4:12

card "Some people in the South had a corn mill" , :18
Once there was people who churned corn.

card "They pounded corn into meal there" , 3:52
Every time they churned corn a big dog would steal it.

card "Several mornings when they came to pound corn" , :23

card "They pounded corn into meal there" , :50
Every time they churned corn a big dog would steal it.

card "Several mornings when they came to pound corn" , 3:55
They would get mad when they went to churn corn.

card "they noticed that some of the meal had been stolen during the night",1:17
They would corn left.

card "They examined the ground." , 3:15
The next day they were determind to find who it was.

(Notice how the next response changes after the user returned to the previous card to look at his response.)

card "They found the tracks of a dog" , :45
The dog left trails chured corn.

card "They examined the ground." , 2:05
The next day they were determind to find who it was.

card "They found the tracks of a dog" , 4:53
The dog left foot prints and trails of churned corn.

card "They examined the ground." , :28
The next day they were determind to find who it was.

card "They found the tracks of a dog" , : 28
The dog left foot prints and trails of churned corn.

card "They examined the ground." , :09
The next day they were determind to find who it was.

card "they noticed that some of the meal had been stolen during the night" , :09
They would corn left.

card "Several mornings when they came to pound corn" , :12
They would get mad when they went to churn corn.

card "They pounded corn into meal there" , :39
Every time they churned corn a big dog would steal it.

card "Some people in the South had a corn mill" , :08

Once there was people who churned corn.

card "Instructions" , :02

card "Welcome card" , :31

card "Instructions" , :02

card "Some people in the South had a corn mill" , 1:09
Once there was people who churned corn.

card "They pounded corn into meal there", 1:46
Every time they churned corn a big dog would steal it.

card "Several mornings when they came to pound corn", :23
They would get mad when they went to churn corn.

card "they noticed that some of the meal had been stolen during the night", 1:27
They would have no corn left.

card "They examined the ground.", :15
The next day they were determind to find who it was.

card "They found the tracks of a dog", :48
The dog left foot prints and trails of churned corn.

card "So, the next night they watched" , 3:17
The to women stood behind the tree.

card "When the dog came to eat the meal,", :38

card "they sprang out and whipped him.", 2:16

card "When the dog came to eat the meal,", 4:05
The big dog came to steal some more corn.

card "they sprang out and whipped him.", :22
The big dog got wipped.

card "He ran off howling to his home in the North.", :06

card "The meal was dropping from his mouth as he ran,", :41

card "He ran off howling to his home in the North.", :27

card "The meal was dropping from his mouth as he ran,", :16

card "He ran off howling to his home in the North.", :09

card "they sprang out and whipped him.", 3:49
The big dog got wipped.

card "He ran off howling to his home in the North.", :57

card "The meal was dropping from his mouth as he ran,", :36

card "He ran off howling to his home in the North.", :29

card "The meal was dropping from his mouth as he ran,", :02

card "He ran off howling to his home in the North.", :02

card "they sprang out and whipped him.", :11
The big dog got wipped.

card "He ran off howling to his home in the North.", :32

card "they sprang out and whipped him.", :10
The big dog got wipped.

card "He ran off howling to his home in the North.", 3:22
As the big dog began to jump to the sky it began to slober and made milk.

card "The meal was dropping from his mouth as he ran,", :20

card "leaving behind a white trail (where we now see the Milky Way).", :14

card "The meal was dropping from his mouth as he ran,", 4:13
As he began slober he was disolving.

card "leaving behind a white trail (where we now see the Milky Way).", :12

card "Where the dog ran.", :32

card "leaving behind a white trail (where we now see the Milky Way).", 5:16
It started blowing wind out of it's mouth.

card "Where the dog ran.", 1:52
It began to circling around.

This text is the fourth participant’s final legend in its cumulative form:

Once there was people who churned corn.
Every time they churned corn a big dog would steal it.
They would get mad when they went to churn corn.
They would have no corn left.
The next day they were determind to find who it was.
The dog left foot prints and trails of churned corn.
The to women stood behind the tree.
The big dog came to steal some more corn.
The big dog got wipped.
As the big dog began to jump to the sky it began to slober and
As he began slober he was disolving.

It started blowing wind out of it's mouth.
It began to circling around.

This button was the student's self-rating as to how his story compared to the actual legend:

card button "VERY CLOSELY"

This user input from the last card of the program was the student's choice for the next legend that he would tell:

THE BIG SUN
The sun got to hot and burnt the villge.

The follow-up interview with this participant yielded similar responses to the third grade female previously mentioned. Although the student did not specifically indicate what he learned from the program, he also expressed a positive attitude about working toward accurate responses. The letter "B" represents the interviewer and the letter "R" represents the participant.

B: Tell me about the things that you learned from this program.

R: I thought it was fun and I liked it. I like when you can compare your stories to the truth.

B: Okay, tell me about how you thought the program worked overall.

R: I think it would be pretty good for other kids. I'd like to help them if they couldn't figure it out.

Because the participant had prior knowledge of the legend, he suggested that one of the problems with the program was that one of the pictures did not correlate with anything he associated with the story. He went on to state that the rest of the illustrations assisted him with interpreting the legend.

B: Okay, what parts of the program did you find difficult to use?

R: One of the pictures I thought was not part of the story.

B: So it was hard to figure out?

R: Yeah.

B: Tell me what you thought about the rest of the pictures. How did they work with the rest of the program?

R: They were neat and you could understand what they meant and you could look to the next page for clues.

This student also found that other multimedia features such as audio and animation contributed to his understanding of the language.

B: Okay, tell me what you think about using a computer to help learn the Cherokee language.

R: I believe it would be all right for the other people who don't know it cause they could hear the sounds.

B: Okay, any special features of the program that you think help to learn the language?

R: Yeah, where they made the body parts move and everything.

B: How did that help?

R: you could understand what they were doing.

B: Anything else?

R: No.

Also, the student indicated that having his instructor as the narrator for the program was helpful because it was someone he was used to hearing speak the target language.

B: Tell me about the audio parts--like Myrtle narrating the program. How did that affect the program?

R: I thought it affected it kinda good instead of somebody who I couldn't understand. It was good.

The student did not specifically answer the inquiry about the use of authentic legends, he responded with a general approval of the program. He also condoned the format of the existing program, without recommending any changes.

B: Tell me what you think about using Cherokee legends like this one to learn the language.

R: I think its a pretty good program because other people who didn't know the language could learn it.

B: How would you suggest changing the program to make it better?

R: I wouldn't suggest anything. I thought it was fun.

B: You wouldn't change anything?

R: No.

Many similarities exist between the observations of student/program interactions. All participants searched for information on different screens to assist with their interpretation of the legend, although the degree of traversing varied greatly by participant. Also, all participants elected to hear at least one of the narration segments again by pressing the speech button. The occurrence of this activity also varied among users. No patterns appeared as to which speech segments the students chose to replay. The first two participants each replayed one phrase, the third participant replayed two different phrases, and the fourth participant replayed seven phrases so he could "get a better understanding as to what Myrtle was saying." All students exhibited a tremendous amount of enthusiasm in using the program. The first two students were upset that not enough time existed for them to finish the program. The fifth grade female asked if the author could come back and let them use the program again. The final participant, the fourth grade male, asked the author to create another program and come back the following weekend so he could evaluate it. All students also pointed at words on the screen with which they were familiar and would re-read the Cherokee phrase on some screens. Again, no pattern existed between which screens the students chose to read aloud. Although the two students who completed the program used different techniques and submitted responses which varied from the actual legend, both rated themselves positively upon completion of the program. Another factor to regard is the interest in which the parents of the participating students took in the program. All parents either looked on as observers or commented about the benefits of their children learning the target language.

Another element which was common among users was the fact that all of them knew the legend of the Milky Way before using the program. The author feared that this knowledge would interfere with the users' interactions with the program, causing them simply to look at the images for meaning instead of contemplating the language of the program. In actuality, the students paid a great deal of attention to the language, both aural and textual. If anything, the opposite seemed true. Students seemed almost too engaged with trying to figure out the text without looking to the pictures for assistance. However, interviews revealed that the visuals were important in deriving interpretations for the text.

The similarities between student responses to interview questions are also of interest. Both students who were interviewed expressed concurrent views about how the program images contributed to their understanding of the legend. Also, they both agreed that having their instructor narrate the program was beneficial because they were accustomed to her dialect. The interviews yielded a variety of indicators that the students enjoyed using computers and were interested in how the author created this particular program.

Chapter 4

Discussion

This chapter looks at the contributions of this study to the fields of instructional technology and second language learning. Also, factors for consideration are provided for future authors who will recreate and implement the template into their specific learning environment. Finally, recommendations for future research based upon this study are suggested.

Contributions of This Study

This study was instigated by the urgent need to stop the loss of Native American languages. A review of the literature revealed the need for a new model to teach indigenous languages to Native American learners (Berg & Ohler, 1991; Medicine, 1981). Observational learning strategies acquired in the home were recommended for use in the design of language instruction (Fox, 1992; Montgomery, 1982). Whole language methods provide a culturally-relevant format to introduce Native students to their original language in a contextual and non-threatening manner (Fox, 1992; Goodman & Goodman, 1990; Kasten, 1992; Shrum & Glisan, 1995). Such methods support the use of tribal legends to supply authentic curriculum materials (Montgomery, 1982; Shrum & Glisan, 1995). An instructional mechanism which would satisfy these learning needs was developed using hypermedia computer technology.

Hypermedia with its multimedia attributes and its capability to program a variety of instructional methods (Liu, 1995) served as the vehicle with which to create instructional materials to meet the aforementioned learning needs. The Bergman and Moore

Developmental Model (1990) was the design framework used to guide the project evolution. This model was chosen because it is an established instructional design model created specifically for the purpose of interactive multimedia development. A sample template was developed within the context of an authentic environment to demonstrate the ability of this technology to accommodate the needs of the described population.

Perhaps the most significant contribution of this study is the fact that an instructional tool was developed which can be shared by any Native American group to assist with language preservation efforts. Any tribe wishing to implement their own stories into the template can use "The Developer's Guide to Template Modification" (Appendix A, p. 76). This user's manual was created to methodically lead one through the steps of new content integration into the existing software framework. The guide details the requirements for template modification, such as necessary software, hardware, and skills. The template and guide are electronically distributable and have been requested by several tribal organizations across the country.

Analysis

This study demonstrated that the success of Native American language preservation efforts will rely on many factors. The use of the proposed hypermedia template as an instructional tool could benefit the language maintenance movement; however a variety of stipulations must first be addressed.

Design Issues

Interface.

The user interface needs to remain simplified in order to maximize usability by the target audience, fourth through sixth graders. When the instructions are altered to

accommodate a new legend, they should continue to reinforce the idea that students are not expected to translate the second language verbatim.

Cultural relevance.

Recreation of the template will primarily involve replacement of the graphics and language, both audio and textual, to represent a different legend about celestial elements. Future authors are strongly encouraged to integrate audio and visual materials which are specifically relevant to their particular tribe (Spencer, 1992).

Design model.

For the most part, the Bergman and Moore Developmental Model

Development Issues

If another tribal organization was interested in the development of programs from the given software template, the availability of time, staff, and technology are primary considerations. The Cherokee project was successful because of the accessibility of all three resources.

Time.

The author had one year to complete the project--from needs analysis to evaluation. A replication of this program would not require such extensive time allotments since the program design and scripting is already done.

Staff.

The assistance of many people also contributed to the success of the sample product. The author called upon the expertise of Virginia Tech faculty, staff, and students for support in the areas of instructional design, second language instruction, graphics creation, learning strategies and theories, and technical issues. Equally as valuable was the

time, support, and content knowledge provided by the three elementary school language instructors on the Cherokee reservation, as well as the Kituhwa Dialect Preservation Project team.

Technology.

Finally, the availability of instructional technology at Virginia Tech was crucial to the completion of this project. Because the author had access to a variety of computers, the software could be performance-tested from high-end to low-end Macintosh models to ensure program functionality between machines. Such testing is recommended for future recreations of this program as well.

Authoring software technologies have evolved to allow development of instructional computer programs without the need for expert programming skills. The authoring package necessary for template re-development is SuperCard® 2.5. The newest version, 3.0, (which has not yet been released) will have the ability to save the template as a Windows application, an advantage for those schools operating in a PC environment.

Implementation Issues

In order to implement a hypermedia program authored from this template, several additional factors must be considered (Bergman & Moore, 1990). First, is the appropriate hardware available? The appropriate machines must be available, as well as sufficient memory to run the program. Working environment is another important element. Will the program be used in the classroom or in a self-paced lab setting? The maintenance of software and hardware is crucial to the implementation of this program. Administrative control may often dictate what programs may operate on which machines.

Degree of exposure to the target language is always of primary concern (Krashen, 1982; Shrum & Glisan, 1995). If students only encounter the hypermedia program once,

with no additional reference to the legend for language learning purposes, then the impact of the program will be minimal.

Also, the contextualized language instructional method must be maintained in program follow-up lessons in order to perpetuate culturally-specific learning strategies. The purpose of the program from a language learning perspective is to facilitate reading comprehension and interpretation rather than discreet word-for-word translation (Shrum & Glisan, 1995). Instructors implementing the program should realize that students are not expected to demonstrate mastery of the target language because of program use, but learners are to use the program as an introduction to the language in its natural context.

So many factors will affect the success of the design, development, and implementation of programs which emerge from the provided template. The experience in creating the sample project was valuable in discovering the variety of forces which impact the entire development process.

Future Investigations

This study has provided several topics for future research inquiries. The author took advantage of an unplanned occurrence in the first pilot test setting, the presence of two learners simultaneously instead of one, to see if students would seek peer assistance or continue to work individually as the author instructed at the beginning of the session. The Native American education literature (Fox, 1992; Kasten, 1992; Montgomery, 1982) indicates that peer learning is another dominant learning strategy within the culture and suggests that, given the opportunity, students will work together to create meaning for second language activities. As seen in the "Results" section of Chapter Three, the pair of pilot test students did just that. No matter which student was in control of the keyboard, he or she continued to consult the other for opinions as to the correct interpretation of the second language. The potential for research and development of collaborative materials for

Native American language instruction provides a venue to build upon the development activities conducted in this investigation.

Also, the template created in this study has been requested by the Ojibwe tribe of Wisconsin for use as an asynchronous learning tool. Because of SuperCard's® ability to interface with the World Wide Web using a helper application called Marionette®, the program will serve as a prototype as to the kinds of Native American language preservation modules that students can access without the constraints of place or time. Such expansion of template use will provide another avenue for future research and instructional development efforts.

Summary

This study has drawn from research in the fields of second language learning and instructional technology to address the problem of Native American language loss. A new model using whole language methods to address culturally-specific learning needs was created through the use of hypermedia. The design, development, and implementation of the project template will hopefully continue to serve as a catalyst for curriculum development in Native American language preservation. The revitalization of these languages can be assisted by the creation of effective instructional materials and the implementation of culturally-relevant methods through the use of innovative technologies.

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Appendix A

The Developer's Guide to Template Modification

This instructional product addresses the problem of Native American language loss through the development of a new instructional model to teach indigenous languages to Native American learners.

Theoretical framework for template development

Whole language methods advocated in second language instruction incorporate observational learning strategies - strategies which are inherent in the Native American home, but often ignored in school. Instructional technology provides a mechanism for the development of curriculum materials which reflect appropriate instructional techniques. A template with embedded whole language methods to address culturally-specific learning strategies was created through the use of hypermedia. The thematic content framework of the template is local legends about the origins of celestial elements. A sample product using the Cherokee language was created from the template and pilot tested on a reservation in North Carolina.

If you are interested in adapting this hypermedia template for use with a Native American language, this guide will provide the necessary instructions to assist you in the process. However, first consider the requirements for template modification:

Technology necessary for template modification

Hardware

This template can be modified on the Macintosh platform. A high-end machine is not necessary for program modification, but the computer should have at least eight megabytes of RAM. Most of the multimedia development for the template was done on a PowerPC 6100/66. The program components were assembled to form the final template on an LC 575. The extension RAM Doubler was used to increase operating speed by simulating 16 megabytes of RAM. Since several software programs will be necessary to complete the adaptation of this template, a machine with the ability to run multiple programs is certainly helpful.

Software

SuperCard®, an authoring package by Allegiant Technologies, will be necessary to modify this template. Upon completion of the new program, the developer can create a standalone application with the SuperCard® application so that SuperCard® is not required to run the updated program. Otherwise, SuperCard® Player or the full SuperCard® application will be needed to run the final product.

In order to digitize the new audio for the program, such as narration or music, a sound production software program such as SoundEdit 16® or SoundEdit Pro® will be necessary to create standard AIFF files for program use.

Adobe Photoshop™, an image enhancement program, is not necessary if all illustrations will be created using the paint tools of the SuperCard® package. However, if external PICT file images such as photographs or drawings need to be scanned or modified, Photoshop™ is definitely recommended to do so.

Skills necessary for template modification

Multimedia development skills

While the authoring shell for this program has already been created, personnel who wish to undertake the adaptation of the template must have certain multimedia development skills. First, to incorporate visuals which are specific to the your legend, the images for the program must be digitized. Digital illustrations can be created from scratch in SuperCard® using its built-in paint and draw tools, or they can be scanned and imported into the program.

Anyone wishing to add animation to the program will need to create those animations in SuperCard®, the authoring software package, or in MacroMedia Director®. If animations are created in Director®, the developer will need to understand the integration of such animations into the SuperCard® shell.

The audio capabilities inherent in the Macintosh will be utilized in program modification. Familiarity with sound recording and digitizing is necessary. The narration and music implemented in the sample program were digitized using SoundEdit 16.

SuperCard® authoring skills

While the program design is built into the SuperCard® template, the developer will need to have basic SuperCard® scripting knowledge to incorporate new images and sounds into the updated program. SuperTalk is the scripting language of SuperCard®. SuperTalk is quite similar to HyperTalk, the language used for HyperCard™ development. If the developer is familiar with HyperCard™ and HyperTalk, the transition to SuperCard® will be an easy one.

The template adaptation can begin if the aforementioned resources and skills are available. This guide will take the developer through modification events on a step-by step basis, according to the Bergman and Moore Developmental Model used for template creation. Before beginning the alterations, read the following description of program operation and outline of necessary changes.

Program Operation and Changes

Currently, the software template is programmed so that the following activities take place within program operation. First, learners choose the authentic tribal legend with which they will encounter. Users double-click the icon "Legends of the Sky" to start the program. Then, the program opens by displaying a screen containing four elements of the sky: the sun, the moon, the clouds, and the Milky Way. A field on the card tells students to click on any item to see a legend about that element. Music plays as users make a choice.

Students are to use the program's visuals and their prior knowledge of the target language to interpret the meaning of the Native American phrase on each screen. Upon clicking on a graphic, users are taken to the legend about that celestial element. The cards that students see next are instructions as to how to interact with the program. They are told that they will encounter a legend by seeing it in text, hearing it spoken, and seeing illustrations which accompany the story. When they decide what the language segment means, they click the button "my interpretation" and a blank field appears. They are to type in their interpretation. Then, they click the forward arrow button to advance to the next card. They work through the program providing interpretations for each screen, and when they reach the end of the story, they will see their compiled interpretations. They can decide to change any of the phrases, or they can continue to the next part of the program.

Students then move to the self-assessment task after they are satisfied with their responses. The next screen they see juxtaposes their legend interpretation next to the accurate version of the legend. They are asked to read the two legends and then to rate how closely the two legends compare by clicking one of the following radio buttons: Perfectly, Very Closely, Somewhat Closely, and Not Very Closely.

Finally, learners engage in exploring ideas for the use of other legends relevant to them for future language lessons. They move to the last screen of the program which asks them to imagine that they had just heard this legend at a tribal ceremony. They are to think of the next legend about the sky that they would like to tell. They are asked to give it a name and type in the first sentence that they would say. After they complete this task, they click the "Quit" button and leave the program.

Upon quitting, the program compiles all of the data which has been collected as the students interacted with the legend. The audit trail built into each legend will provide you with information as to the student path through the program, all student input, the legend that the student created to represent his or her final interpretation choices, student self-rating, and the next legend that the student begins. The "next legend" is intended as idea generation for future language classes.

Below you will find instructions as to how to work through the sample program and replace its contents with yours. The program will continue to run exactly as described above, just with your legend. You will be required to modify the instructions, the program's textual, audio, and visual components. Instead of providing you with a blank template, the sample program was left intact to serve as a model for your consideration. Appendix B contains all of the code for the template and sample program if you need it as a reference or for troubleshooting purposes.

Finally, for instructional design assistance during your project, refer to Appendix D, the formative evaluation questionnaires for the Bergman and Moore Developmental Model. They will provide thought-provoking questions for you to consider during all phases of program production.

Template Modification

Analysis Phase

As a developer, your first task is to decide which legend to use that will represent one of the celestial graphics on the menu card of the template. The theme embedded in this template is origins of celestial elements. Topics are constrained to this framework to serve as idea generation for instructors and students. Topics can include stories about the sun, the moon, the clouds (or wind), or the Milky Way.

Your second task is to ensure that the legend you have chosen is appropriate for your target audience. This program was designed for use with Native American elementary school children in the fourth through sixth grades. If younger children have the necessary computing skills to interact with the program, then they may be included in the target audience. Consider your audience's language skill level (both first language and target language) when choosing the legend to incorporate into the template.

Design Phase

After selecting the legend with which your students will interact, you will need to create a storyboard by using large index cards to sketch out your ideas and design program screens before production. On each card, decide what sentence or phrase will appear in the target language on that screen and what visuals will be needed to illustrate that text.

Secondly, regarding audio for the program, you will need to decide on a narrator for the program. A native speaker is recommended, preferably one with whom the audience is familiar. While this recommendation may seem extremely specific, pilot test results showed that the students believed they understood the language better because they were accustomed to the narrator's speech. If this recommendation is not feasible, then be sure to consider potential dialect differences among your target audience.

Production Phase

In this phase, you will create new audio, and if you wish, new images for the program. A factor to consider before you begin is the computing power of the machines on which your final product will be used. If the computers do not have much RAM or disk storage space, they will not be able to accommodate large sound, image, or animation files that you may want to incorporate into the program. Be conservative. Keep these multimedia files reasonable in size using whatever constraints necessary without sacrificing the quality of the product.

You may record the narration directly into the computer, or you may tape record the speaker and then digitize the audio segments. Whichever you choose, you will need to break the narration into separate speech files for each screen. For example, if the text on the first screen is "A long time ago, the people had a corn mill", then digitize the spoken form of that language and save it as a separate standard AIFF file. You should title the file to indicate the meaning of the narration. For example, title the previous example "A long time ago, the people had a corn mill". This tactic may sound extreme, but it will help you keep organized in the Authoring Phase of this project. Put all of your narration segments into a single folder and title the folder "Legends Sounds". If you wish to use music in the program, now is the time to digitize it and save it in the same folder.

If you intend to use photographs or images created outside of the SuperCard® authoring system, digitize and enhance them at this stage in the project. Save the illustrations as PICT files and put them in a folder called “Legends Images”.

Authoring Phase

Template adaptation will begin with altering the script for the music on the menu card so that when users open the program, they will be hear a musical introduction from their own tribal culture. Begin by opening the SuperEdit application within SuperCard®. Open the project “Legends of the Sky”. The window will look like Figure A1.

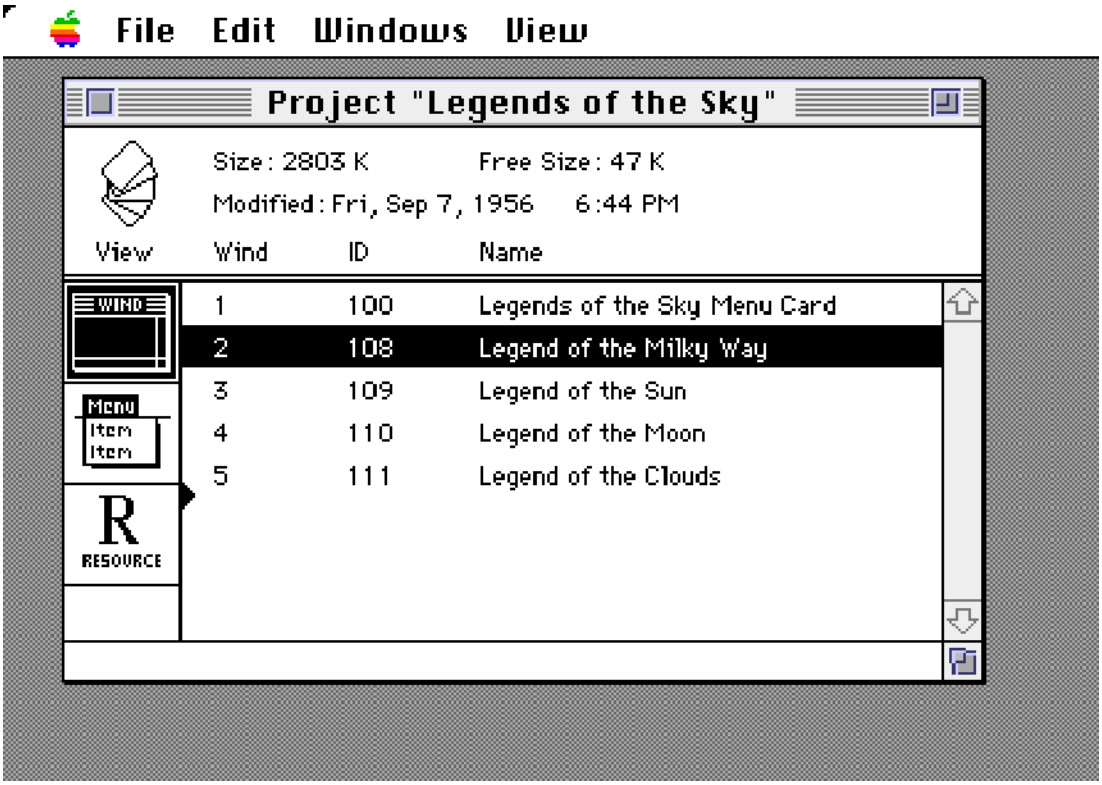

Figure A1. Project window for project “Legends of the Sky”.

Double click on the window “Legends of the Sky Menu Card” to open that card window. Once open, that window will display the name of only card in that window, “Menu Card”. Double click on “Menu Card” to open it in the editing environment (see Figure A2).

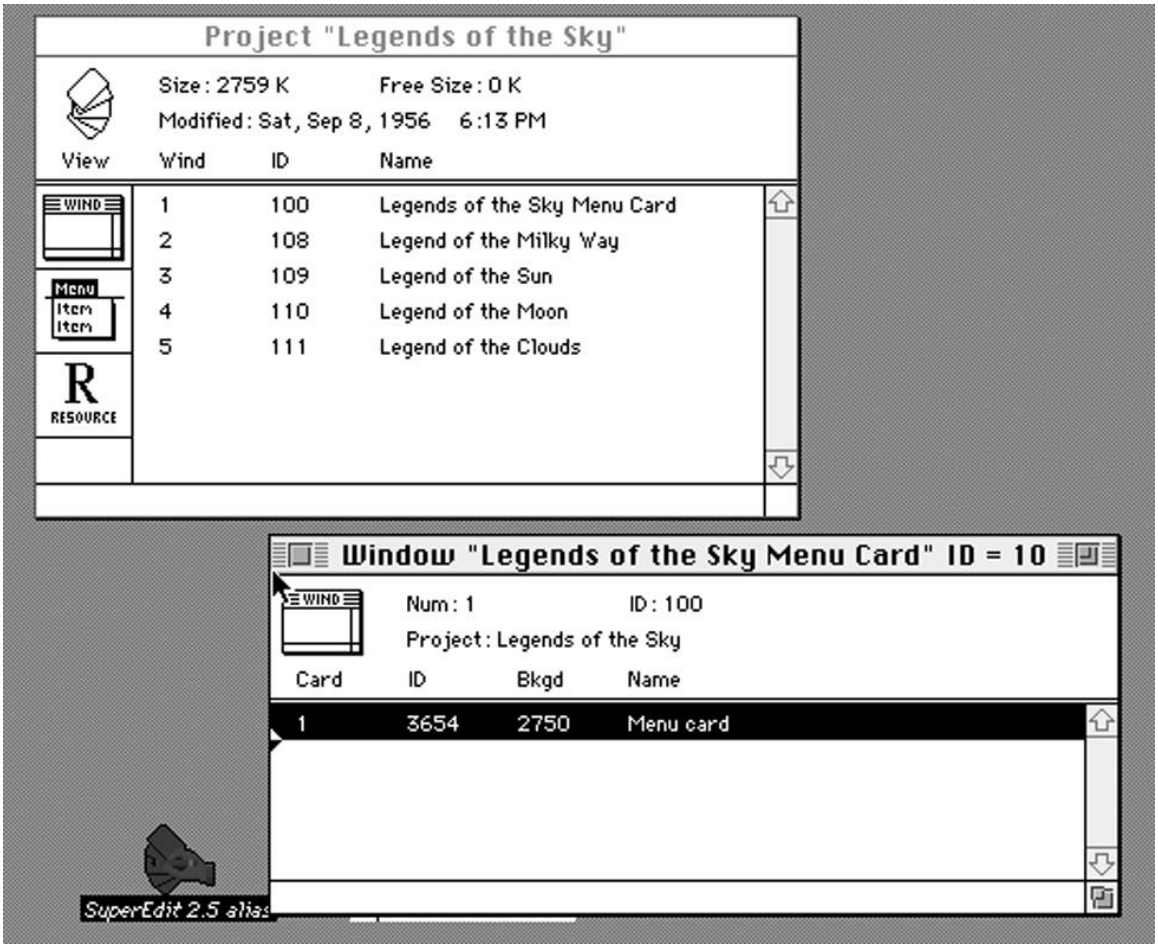

Figure A2. Window for “Legends of the Sky” menu card.

When the menu card is open, access its script by going to the “Edit” menu heading in SuperEdit and selecting “Card Script”. The script window for that card will open and will contain the script displayed in Figure A3.

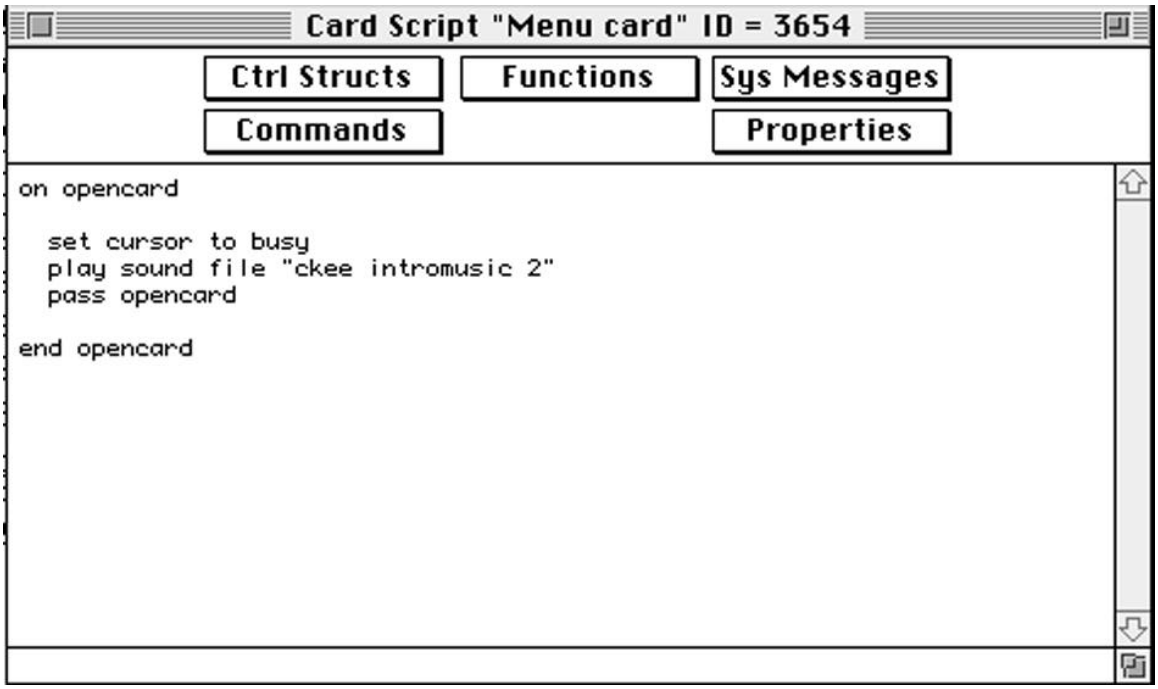

Figure A3. Card script for “Legends of the Sky” menu card.

Replace the sound file “ckee intromusic 2” with the name of the music file which you made in the Production Phase. If you do not wish to include music in this program, then you will need to eliminate the music script on the menu card. Just highlight the entire script in this window and delete it. Close the script window and the card window and save your changes.

Next, you will begin replacing the text, images, and sounds in the sample program with the components that you developed in the Design and Production Phases of this project. Get your storyboard index cards and your image and sound files ready!

Return to the project window for “Legends of the Sky” and open the window “Legends of the Milky Way”. This window will display all of the cards in the sample program of the Cherokee Milky Way legend (see Figure A4).

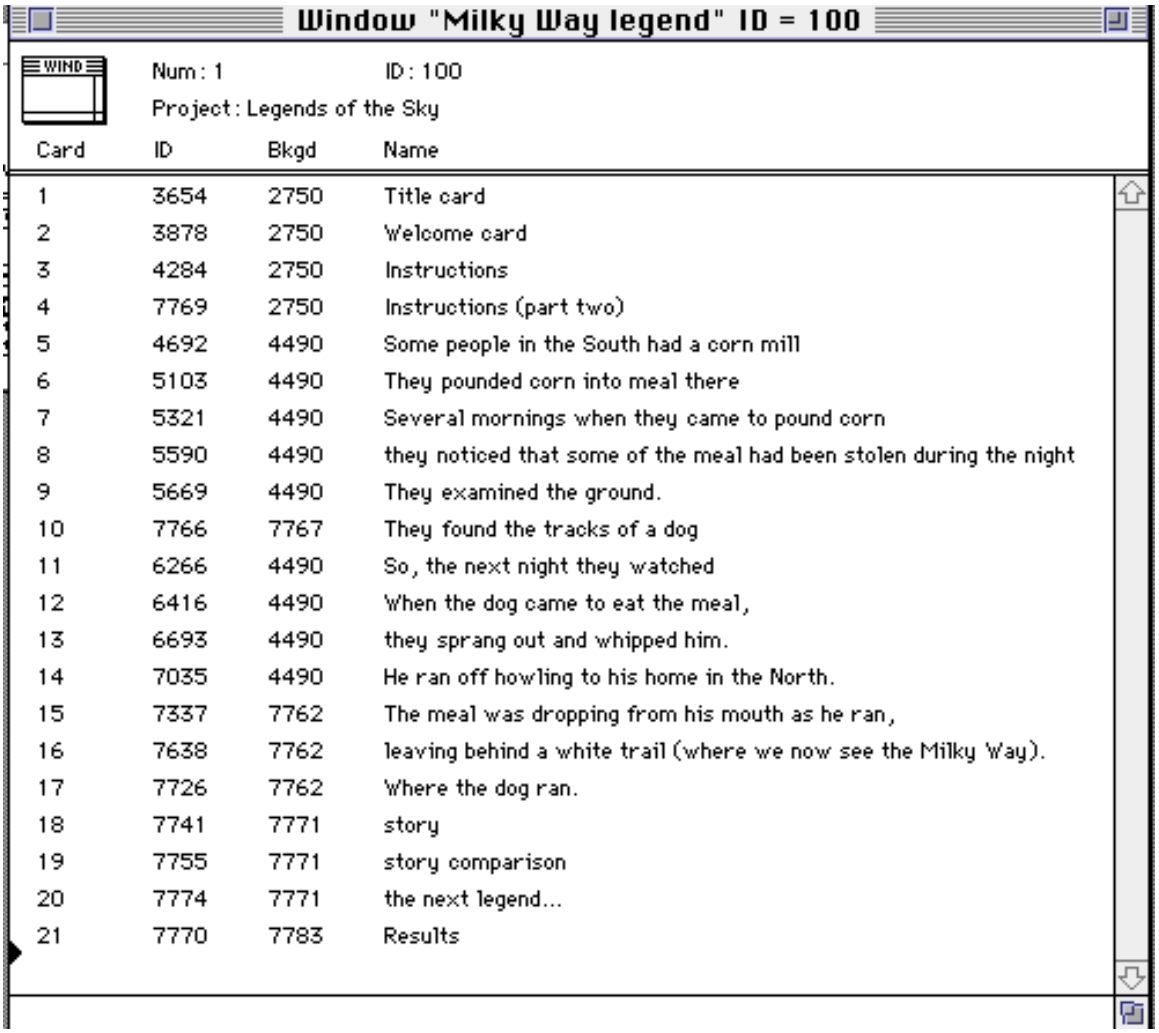

Figure A4. Window for “Legend of the Milky Way” displaying all cards in the sample program.

Instructions.

The first card to change in this window will be the instructions card. Customize it to reflect the name of your tribe. You can do so by double clicking on the name of card number three, entitled “Instructions”. Once open the card will contain the instructions seen in Figure A5.

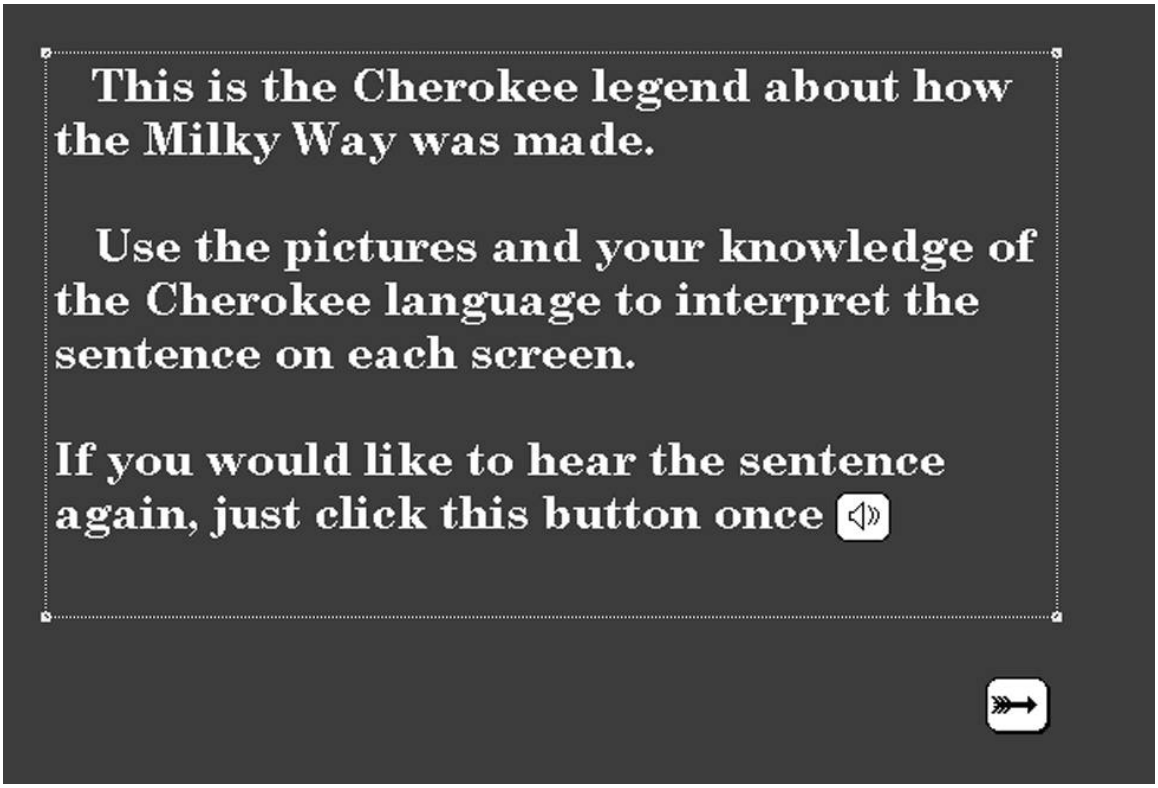

Figure A5. "Legend of the Milky Way" description of student task.

While here in the SuperEdit environment, toggle the tool palette until you reach the "field" toolbar. Use the pointer to select the text field on the card and then choose the text tool on the "field" toolbar. The cursor turns into an I-beam inside the field on the card. Highlight the word "Cherokee" and type in the name of your tribe. It's that easy!

Save your changes and close that card window. You are now back at the "Legend of the Milky Way" window which displays all the cards of the sample program.

Adapting the legend.

Next, you are going to work through the cards of the this story and fill them in with components of your legend. The sample program which you will be modifying contains thirteen story cards. If you need additional cards for your legend, be sure to copy any

story card and paste it before card “story” in the legend window. Since you are copying a card within the program, it will have all of the buttons, fields, and scripts that you need. If you do not need thirteen story cards, be sure to eliminate all of the extra story cards from the sample program.

To begin replacing the sample legend with your legend, double click on the first story card, card number five titled “Some people of the South had a corn mill”. When that card is open, it will resemble Figure A6.

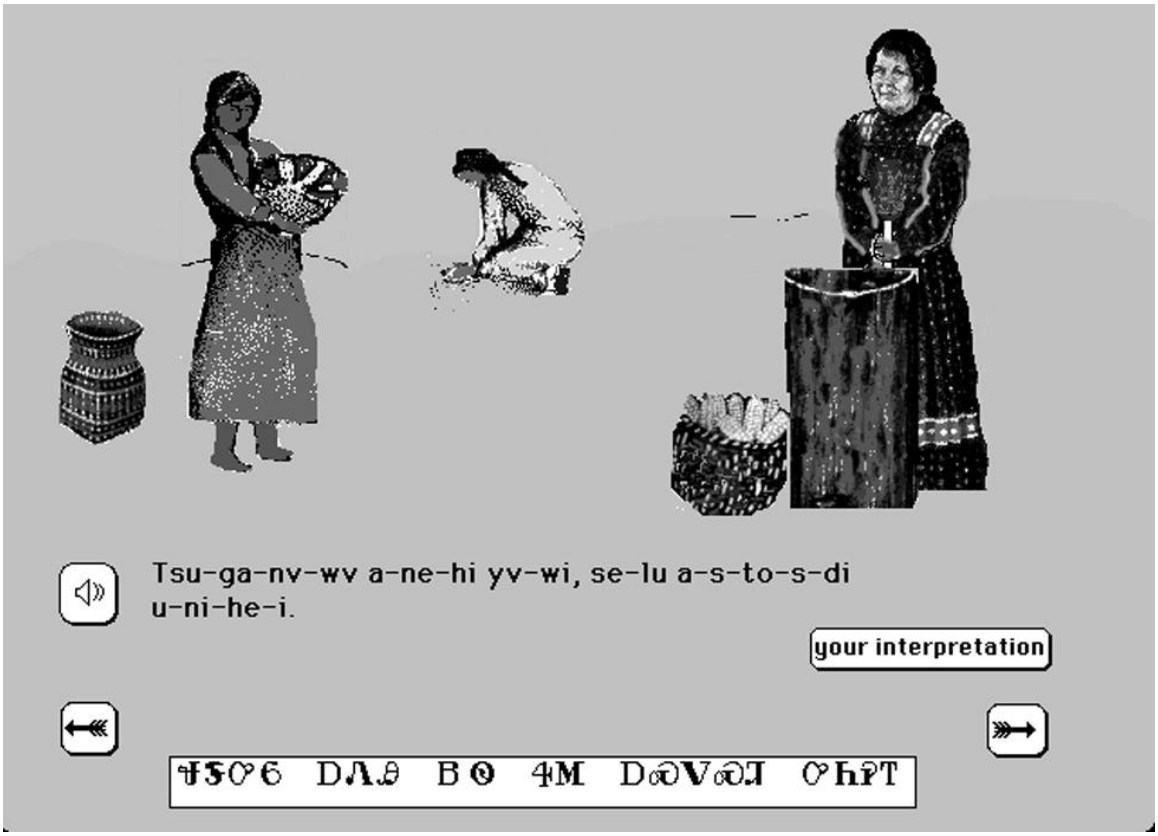

Figure A6. “Legend of the Milky Way” first story card.

Begin your work on this card by going to the SuperEdit menu item “Edit” and selecting “Card Info”. Here, replace the name of the card with the first sentence or phrase of your legend. Naming the card with the English translation of the Native American phrase will assist developers who are not familiar with the second language.

Text.

Next, go to the “View” menu in SuperEdit and select “Background”. The fields which contain the story text and the syllabary text are located on the background (see Figure A7).

Figure A7. Background of first story card in “Legends of the Sky”.

Now you are going to replace the Cherokee language in the text field with the language of your tribe (see Figure A8). Toggle to the “field” toolbar and select the text tool. Highlight the Cherokee language in the text field and replace it with the first phrase of your story using your tribal language.

Figure A8. Text field on the background of the first story card of "Legend of the Milky Way".

If your tribal language has a syllabary, then you can do the same for the syllabary field if you have a copy of the font(see Figure A9). The font for your syllabary must be placed in the fonts folder in your system folder. Many Native American fonts are available copyright-free on the World Wide Web. Try doing a search for your tribe's font!

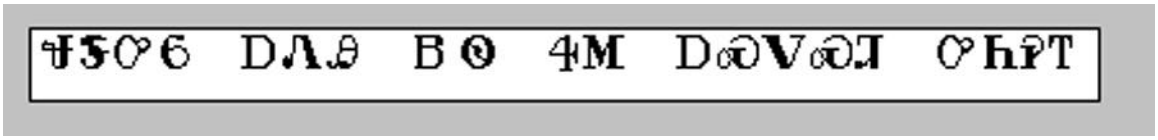

Figure A9. Syllabary field on the background of the first story card of "Legend of the Milky Way".

After you have replaced the text on the background of this card, return to the foreground by going to the "View" menu item in SuperEdit and toggling the background menu item so that it is not selected.

Audio.

Now you are ready to replace the speech segments on this card. This author has designed the template so that the spoken phrase occurs when the students open each card. Then, if users wish to hear the speech again, they can click on the "play speech" button on each card (see Figure A10).

Figure_A10. "Play speech" button on the card level of each story card.

Replace the speech segment at the card level first by opening the card script for this card on which you are working (Some people in the South had a corn mill). The script currently reads as such:

```
on opencard
  play sound file "some people in the South had a corn mill"
  pass opencard
end opencard
```

To have your sound file played as the card opens, highlight the text "some people in the South had a corn mill", and replace it with the name of your first sound file. Using our example, the script would read as such:

```
on opencard
  play sound file "Once there was an old grandmother"
  pass opencard
end opencard
```

After you close and save this script change, toggle to the "button" toolbar, and double-click on the "play speech" button (Figure A10). Once its info dialog box is open, select "script". The script window for this button will open. Currently, the script for this button reads as such:

```
on mouseup
  play sound file "some people in the South had a corn mill"
end mouseup
```

Do the same as you did for the card script. Replace the sound file name with the name of the sound file that coordinates with that card. You have successfully replaced the audio on the first story card! Now let's deal with graphics.

Graphics.

Toggle the tool palette until you reach the paint toolbar. Using the tools on the "paint" toolbar, you may illustrate your card using the 256 color-palette which SuperCard® supports. You will be creating bitmapped images. You may also create graphics which are not bitmapped by using the "draw" toolbar, although your tool choices are limited to geometric figures and line drawings.

Another option you have is to import images that you have previously scanned or created in another graphics application. This task is accomplished by selecting the "Import Graphics" item under the SuperEdit "File" menu. Any imported images must be saved in the PICT file format. Graphics may be minimally manipulated in the SuperEdit environment, so it is wise to enhance and size them appropriately before importing them into the program.

Animation.

If you wish to do an animation to illustrate the phrase on the card, consult the SuperCard® Macintosh User Guide for a variety of ways to do so. Each method has its pros and cons, so it is best to become acquainted with the different approaches before attempting to create an animation. Also, you may develop animations in MacroMedia Director® and import them into your program. The SuperCard® User Guide also has instructions about how to accomplish this task.

To maintain user attention, have your animation play as soon as the card opens and then have the speech segment play. The script will look something like this:

```
on opencard
  play PICS file "animation X"
  play sound file "sound Y"
end opencard
```

Although developing animations may take a bit more time and thought, they may help students comprehend the language better than still images. Pilot test interviews revealed that students believed that some animations helped them understand the meaning behind the text on a given card. Give it a try!

After you finish replacing the sample story with your legend, go to card "story comparison". On the "field" toolbar, select the "text" tool and highlight all of the text in the card field "actual legend". Delete this text and type in the accurate version of your legend. When students see this card, they will compare their interpretations of the story to the legend that you place in this field.

Program refinement and debugging.

Work through each card replacing the text, speech, and visual elements as you have done on this card. As you open each card, be sure to eliminate any scripting which is specific to the sample program so that it does not interfere with your program. Such script items would include sounds, graphics, and cues to play animations.

Anytime you want to check on your progress, save your changes and select "Run" from the SuperEdit "File" menu. The program will load into the SuperCard® environment and operate in user mode. Any unwanted items from the sample program will show up if they haven't been eliminated. Also, SuperCard® maintains a debugging feature similar to HyperCard™ if you encounter any unknown problems. If problems cannot be solved from SuperCard® User Guide troubleshooting information, Allegiant provides an on-line help service. Send your problem via e-mail to Allegiant.AOL.com. You may also phone Allegiant at (619)587-0500 or fax them at (619)587-1314.

Validation Phase

Upon completing your version of "Legends of The Sky", you may install it on the intended host machines. This author encourages you to validate your program using members of the target audience in order to gain valuable feedback before you distribute the package. The program produces an audit trail, a textual record of student activity within the program. The document will be titled with the student's name as they type it into the program. The file will show the student's path through the program, the time spent on each card, student input on each card, the final legend cumulated from student input, the student's self-rating as to how his or her legend compares to the accurate version, and the student's idea for a new legend they would like to tell. The developer can use the path, time, and input information to judge whether or not additional modifications need to be made to the program. Instructors may be interested in student interpretations and ideas for new legends for future language activities.

An equally important source of information is interviews conducted with pilot test users of the program. See Appendix E for sample questions that help reveal student opinions about the program and how it may need to be changed. Good luck with your new program!

Appendix B

Prototype Program Code

Script for project "Legends of the Sky" and its contents:

Project script:

```
on startUp
   editor full
end startUp

on doMenu menuItem
   -- File Menu DoMenus.
   if menuItem is "Compact Stack" then compact
   if menuItem is "Print Card" then print card
   if menuItem is "Quit" then close all wds and stop
   -- Edit Menu DoMenus.
   if menuItem is "Undo" then revert
   if menuItem is "Cut" then cut
   if menuItem is "Copy" then copy
   if menuItem is "Paste" then paste
   if menuItem is "Clear" then cut
   if menuItem is "New Card" then new card
   if menuItem is "Delete Card" then delete card
   if menuItem is "Cut Card" then cut card
   if menuItem is "Copy Card" then copy card
   if menuItem is "Paste Card" then paste card
   if menuItem is "Background" then set editBkgnd to not editBkgnd
   -- Go Menu DoMenus.
   if menuItem is "Back" then go back
   if menuItem is "Home" then prefs
   if menuItem is "Help" then send help to sharedScript
   if menuItem is "Recent" then go recent
   if menuItem is "First" then go first
   if menuItem is "Prev" then go prev
   if menuItem is "Next" then go next
   if menuItem is "Last" then go last
   if menuItem is "Message" then set visible of msg to not visible of msg
   -- Objects Menu DoMenus.
   if menuItem is "Bring Closer" then bringFront
   if menuItem is "SendFarther" then sendBack
   if menuItem is "New Button" then beep
   if menuItem is "New Field" then beep
   if menuItem is "New Background" then beep
   -- Paint Menu DoMenus.
   if menuItem is "Select" then beep
   if menuItem is "Select All" then beep
   if menuItem is "Fill" then beep
```

```
    if menuItem is "Invert" then beep
    if menuItem is "Pickup" then beep
    if menuItem is "Darken" then beep
    if menuItem is "Lighten" then beep
    if menuItem is "Trace Edges" then beep
    if menuItem is "Rotate Left" then beep
    if menuItem is "Rotate Right" then beep
    if menuItem is "Flip Vertical" then beep
    if menuItem is "Flip Horizontal" then beep
    if menuItem is "Opaque" then beep
    if menuItem is "Transparent" then beep
    if menuItem is "Keep" then save
    if menuItem is "Revert" then revert
    -- Options Menu DoMenus.
    if menuItem is "Grid" then beep
    if menuItem is "FatBits" then beep
    if menuItem is "Power Keys" then beep
    if menuItem is "Draw Filled" then beep
    if menuItem is "Draw Centered" then beep
    if menuItem is "Draw Multiple" then beep
end doMenu

on openProject
    global namer
    global timeOnCard
    global cardName
    global cardNumber
    global lineNumber
    open sound "ckee intromusic 2"
end openProject
```

Script for Window “Legends of the Sky” and its contents:

Script for card “Legends of the Sky” Menu Card:

```
on opencard
  set cursor to busy
  play sound file "ckee intromusic 2"
  pass opencard
end opencard
```

Script for graphic “Cloud”:

```
on mouseUp
  open window "Legend of the Milky Way"
end mouseUp
```

Script for Window “Legend of the Milky Way” and its contents:

Script for card “Welcome card”:

```
on opencard
```

```
  ask "What is your name ?" at 340,310
  put it into namer
  put namer && "!" into line 2 of cd fld "good luck" of cd ID 7769
  put namer && "!" into line 2 of cd fld "thanks" of cd "the next legend..."
  put namer into cd fld "student name" of cd "Results"
  go next
  pass opencard
end opencard
```

Script for card “Instructions” and its contents:

No card script for this card.

Script for card button “play speech”:

```
on mouseUp
  play sound somepeople
end mouseUp
```

Script for card button “go next”:

```
on mouseup
  go next
end mouseup
```

Script for card “Instructions (part two)” and its contents:

Script for card “Instructions (part two)”:

```
on closecard
  hide cd fld "demo field"
end closecard
```

Script for card button “your interpretation”:

```
on mouseUp
  show cd fld "demo field"
end mouseUp
```

Script for card button “go backwards”:

```
on mouseup
  go previous
end mouseup
```

Script for card button “go next”:

```
on mouseup
  go next
end mouseup
```

Script for Background ID 4490 and its contents:

Script for Background ID 4490:

```
on closecard
```

```
hide cd fld "script"
  hide cd fld "Whole Story"
  get the number of this card
  put it - 4 into cardNumber
  put cd fld "script" into line cardNumber of cd fld "story" of cd "story"
  put cd fld "script" into line cardNumber of cd fld "student legend" of cd "story comparison"
  put the number of lines in cd fld "Student Writing Input" of cd "Results" into lineNumber
  add 1 to lineNumber
  put cd fld "script" into line lineNumber of cd fld "Student Writing Input" of cd "Results"
  pass closecard
end closecard
```

Script for bg button “your interpretation”:

```
on mouseup
  show cd fld script
  put the loc of cd fld "script" into temp
  click at temp
end mouseup
```

Script for bg button “go next”:

```
on mouseup
  go next
end mouseup
```

Script for bg button “go previous”:

```
on mouseup
  go previous
end mouseup
```

Script for card “Some people in the South had a corn mill” and its contents:

Script for card “Some people in the South had a corn mill” :

```
on opencard
  play sound somepeople
  pass opencard
end opencard
```

Script for card button “play speech”:

```
on mouseup
  play sound file “somepeople”
end mouseup
```

Script for card “They pounded corn into meal there” and its contents:

Script for card “They pounded corn into meal there”:

```
on opencard
  play PICS file "pounding corn"
  play sound theypounded
  pass opencard
```

```
end opencard
```

Script for card button “play speech”:

```
on mouseUp
  play sound file “theypounded”
end mouseUp
```

Script for card “Several mornings when they came to pound corn” and its contents:

Script for card “Several mornings when they came to pound corn”:

```
on opencard
  show grc "sunrise 1"
  lock screen
  unlock screen with visual dissolve
  show grc "final sunrise"
  show grc "story sun"
  show grc "girl"
  show grc "wilma"
  play sound file “severalmornings”
  pass opencard
end opencard

on closecard
  hide grc "girl"
  hide grc "wilma"
  hide grc "story sun"
  hide grc "final sunrise"
  pass closecard
end closecard
```

Script for card button “play speech”:

```
on mouseUp
  play sound file “severalmornings”
end mouseUp
```

Script for card “They noticed that some of the meal had been stolen during the night” and its contents:

Script for card “They noticed that some of the meal had been stolen during the night”

```
on opencard
  play PICS file "empty basket"
  play sound file “theynoticed”
  pass opencard
end opencard
```

Script for card button “play speech”:

```
on mouseup
  play sound file “theynoticed”
```

```
end mouseup
```

Script for card “They examined the ground” and its contents:

Script for card “They examined the ground”:

```
on opencard
  play sound file “theyexamined”
  pass opencard
end opencard
```

Script for card button “play speech”:

```
on mouseup
  play sound “theyexamined”
end mouseup
```

Script for background ID 7767 and its contents:

Script for background ID 7767:

```
on closecard
  hide cd fld "script"
  hide cd fld "Whole Story"
  get the number of this card
  put it - 4 into cardNumber
  put cd fld "script" into line cardNumber of cd fld "story" of cd "story"
  put cd fld "script" into line cardNumber of cd fld "student legend" of cd "story
comparison"
  put the number of lines in cd fld "Student Writing Input" of cd "Results" into
lineNumber
  add 1 to lineNumber
  put cd fld "script" into line lineNumber of cd fld "Student Writing Input" of cd
"Results"
  pass closecard
end closecard
```

Script for bg button “your interpretation”:

```
on mouseUp
  show cd fld script
  put the loc of cd fld "script" into temp
  click at temp
end mouseUp
```

Script for bg button “go previous”:

```
on mouseup
  go previous
end mouseup
```

Script for bg button “go next”:

```
on mouseup
  go next
end mouseup
```

Script for card "They found the tracks of a dog" and its contents:

Script for card "They found the tracks of a dog":

```
on opencard
  play sound file "theyfound"
  pass opencard
end opencard
```

Script for card button "play speech":

```
on mouseup
  play sound file "theyfound"
end mouseup
```

Script for card "So, the next night they watched" and its contents:

Script for card "So, the next night they watched"

```
on opencard
  play sound thenextnight
  pass opencard
end opencard
```

Script for card button "play speech":

```
on opencard
  play sound thenextnight
  pass opencard
end opencard
```

Script for card "When the dog came to eat the meal" and its contents:

Script for card "When the dog came to eat the meal"

```
on opencard
  play sound whenthedog
  pass opencard
end opencard
```

Script for card button "play speech":

```
on mouseup
  play sound file"whenthedog"
end mouseup
```

Script for card "they sprang out and whipped him" and its contents:

Script for card "they sprang out and whipped him":

```
on opencard
  play sound file "theysprang"
  pass opencard
end opencard
```

Script for card button “play speech”:

```
on mouseup
  play sound file “theysprang”
end mouseup
```

Script for card “He ran off howling to his home in the North.” and its contents:

```
on openCard
  play sound heran
  show grc "frame 3-dog run"
  show grc "frame 4-dog run"
  hide grc "frame 3-dog run"
  show grc "frame 5-dog run"
  hide grc "frame 4-dog run"
  show grc "frame 6-dog run"
  hide grc "frame 5-dog run"
  show grc "frame 7-dog run"
  hide grc "frame 6-dog run"
  show grc "frame 8-dog run"
  hide grc "frame 7-dog run"
  show grc "frame 9-dog run"
  hide grc "frame 8-dog run"
  pass opencard
end openCard

on closecard
  hide grc "frame 9-dog run"
  pass closecard
end closecard
```

Script for card button “play speech”:

```
on mouseup
  play sound file “heran”
end mouseup
```

Script for background ID 7762 and its contents:

Script for background ID 7762:

```
on closecard
  hide cd fld "script"
  hide cd fld "Whole Story"
  get the number of this card
  put it - 4 into cardNumber
  put cd fld "script" into line cardNumber of cd fld "story" of cd "story"
  put cd fld "script" into line cardNumber of cd fld "student legend" of cd "story
comparison"
  put the number of lines in cd fld "Student Writing Input" of cd "Results" into
lineNumber
```

```
  add 1 to lineNumber
  put cd fld "script" into line lineNumber of cd fld "Student Writing Input" of cd "Results"
  pass closecard
end closecard
```

Script for bg button “your interpretation”:

```
on mouseup
  show cd fld script
  put the loc of cd fld "script" into temp
  click at temp
end mouseup
```

Script for bg button “go previous”:

```
on mouseup
  go previous
end mouseup
```

Script for bg button “go next”:

```
on mouseup
  go next
end mouseup
```

Script for card “the meal was dropping from his mouth as he ran” and its contents:

Script for card “the meal was dropping from his mouth as he ran”:

```
on opencard
  play sound file “themeal”
  pass opencard
end opencard
```

Script for card button “play speech”:

```
on mouseup
  play sound file “themeal”
end mouseup
```

Script for card “leaving behind a white trail where we now see the Milky Way” and its contents:

Script for card “leaving behind a white trail where we now see the Milky Way”:

```
on opencard
  lock screen
  show grc "trail one"
  unlock screen with visual dissolve slow
  lock screen
  hide grc "trail one"
  show grc "trail two"
```

```
  unlock screen with visual dissolve slow
  lock screen
  hide grc "trail two"
  show grc "trail three"
  unlock screen with visual dissolve slow
  play sound file “leavingbehind”
  pass opencard
end opencard

on closecard
  hide grc "trail three"
  pass closecard
end closecard
```

Script for card button “play speech”:

```
on mouseup
  play sound file “leavingbehind”
end mouseup
```

Script for card “Where the dog ran” and its contents:

Script for card “Where the dog ran”:

```
on opencard
  play sound wherethedog
  pass opencard
end opencard
```

Script for card “story” and its contents:

No card script for this card.

Script for card field “story” of card “story”:

```
on mouseup
  put the value of the clickLine into temp
  find string temp in cd fld "script"
  show cd fld "Whole Story"
end mouseup

on closecard
  set the scroll of cd fld story to 0
  pass closecard
end closecard
```

Script for card button “go next”:

```
on mouseup
  go next
end mouseup
```

Script for card “story comparison” and its contents:

Script for card “story comparison”:

```
on RadioScript1
  put the short id of the target into targetID
  put "122,123,124,125" into radioList
  repeat with i = 1 to the number of items of radioList
    put item i of radioList into thisRadio
    set hilite of btn id thisRadio to (thisRadio = targetID)
  end repeat
end RadioScript1

on closecard
  put cd fld "student legend" into cd fld "Final Student Legend" of cd "Results"
  set the highlight of cd button "PERFECTLY!" to false
  set the highlight of cd button "VERY CLOSELY" to false
  set the highlight of cd button "SOMEWHAT CLOSELY" to false
  set the highlight of cd button "NOT VERY CLOSELY" to false
  set the scroll of cd fld "actual legend" to 0


  pass closecard
end closecard
```

Script for card buttons “Perfectly!”, “Very Closely”, “Somewhat Closely”, & “Not Very Closely” (radio button group):

```
on mouseUp
  RadioScript1 short id of me
  put the name of me into cd fld "Rate Yourself Results" of cd "Results"
end mouseUp
```

Script for card button “go next”

```
on mouseup
  go next
end mouseup
```

<u>Script for card “the next legend...” and its contents:</u>

Script for card “the next legend...”

```
on opencard
  put the loc of cd fld "legend's first sentence" into temp
  click at temp
  pass opencard
end opencard

on closecard
  put cd fld "legend's first sentence" into cd fld "next legend results" ¬
    of cd "Results"
  put empty into DataVar
  set cursor to busy
  put cd fld "student name" of cd "Results" into LongFileName
```

```
  put cd fld "student name" of cd "Results" after DataVar
  put cd fld "Audit trail results" of cd "Results" after DataVar
  put cd fld "Student Writing Input" of cd "Results" after DataVar
  put cd fld "Final Student Legend" of cd "Results" after DataVar
  put cd fld "Rate Yourself Results" of cd "Results" after DataVar
  put cd fld "next legend results" of cd "Results" after DataVar
  open file LongFileName
  write DataVar to file LongFileName
  close file LongFileName
  pass closecard
end closecard
```

Script for card field “thanks”:

```
on closeproject
  put empty into line 2 of the target
  pass closeproject
end closeproject
```

Script for card button “Quit”:

```
on mouseup
  doMenu “Wait”
end mouseup
```

Script for card “Results” and its contents:

All of the fields on card “Results” hold data sent from previous cards. The fields are emptied at the Project level.

Appendix C

Prototype Program Screens

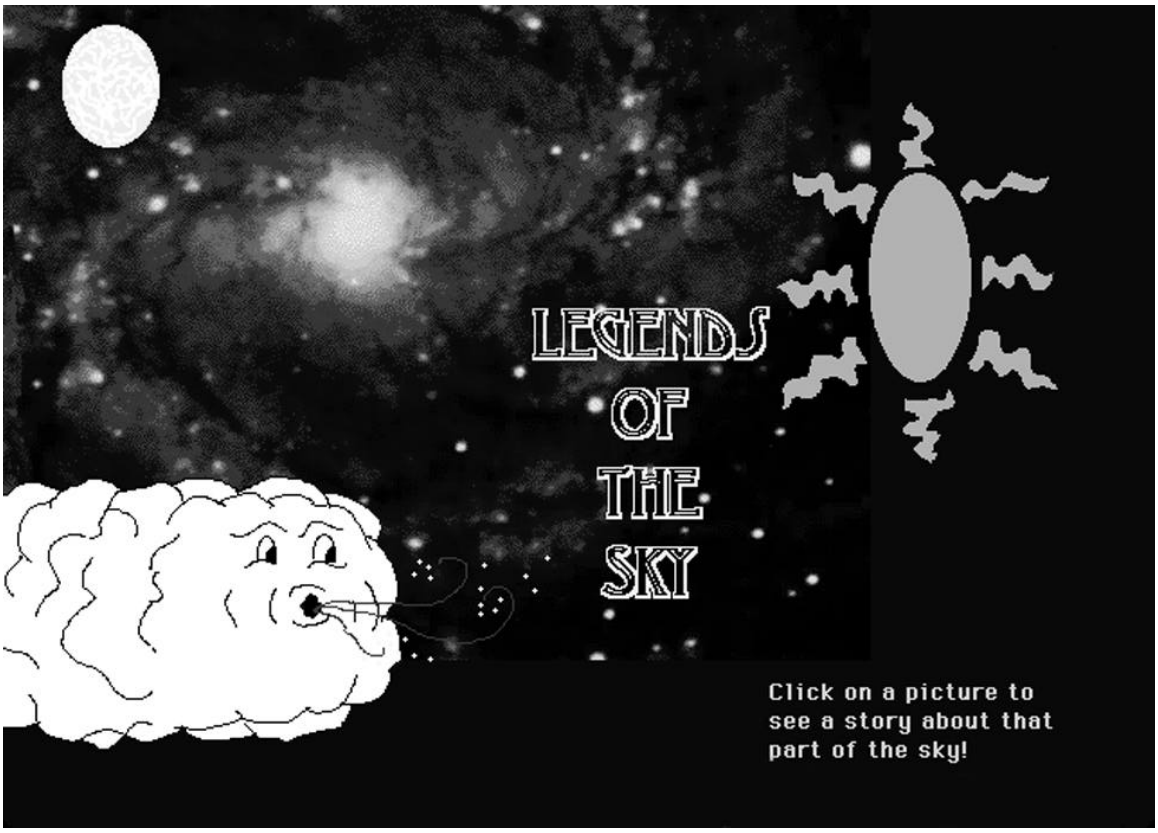

Figure C1. "Legends of the Sky" menu card with clickable objects. Once an object is clicked, the program will open the legend about that particular object.

Figure C2. "Legends of the Sky" welcome card.

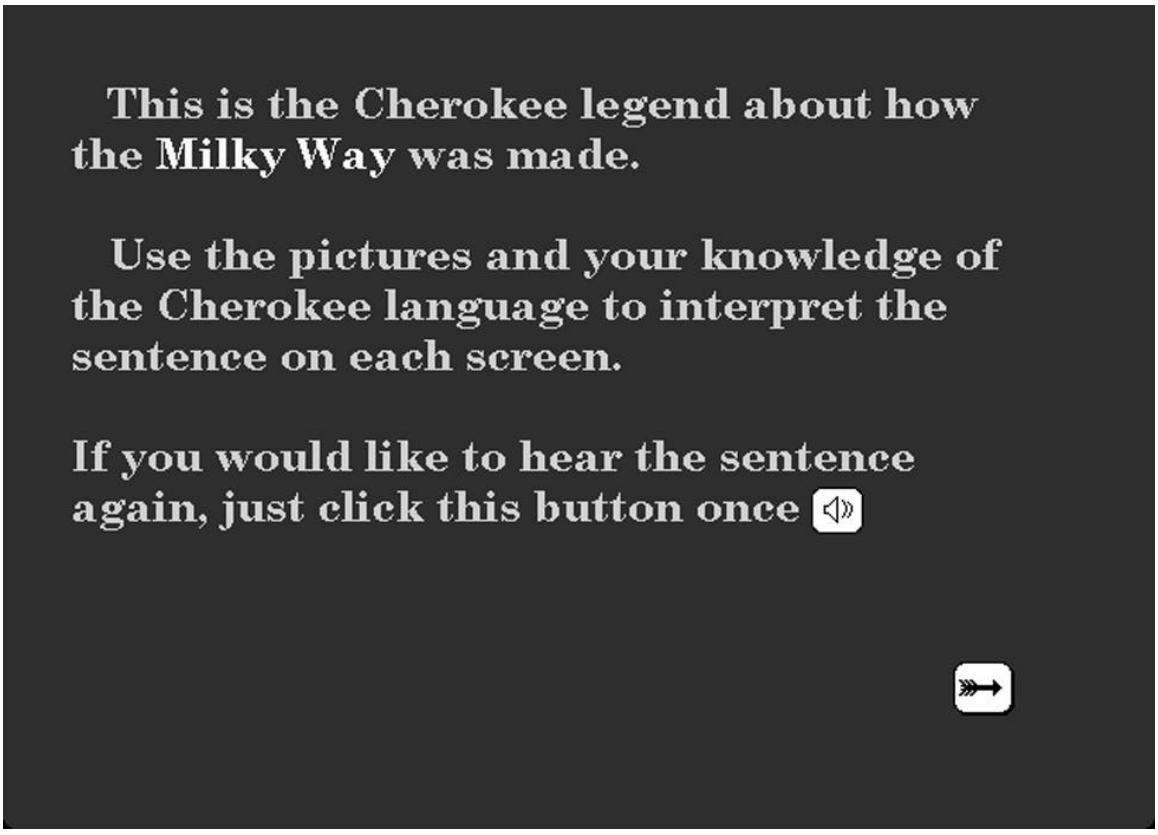

Figure C3. "Legend of the Milky Way" card "Instructions". This card explains the student task.

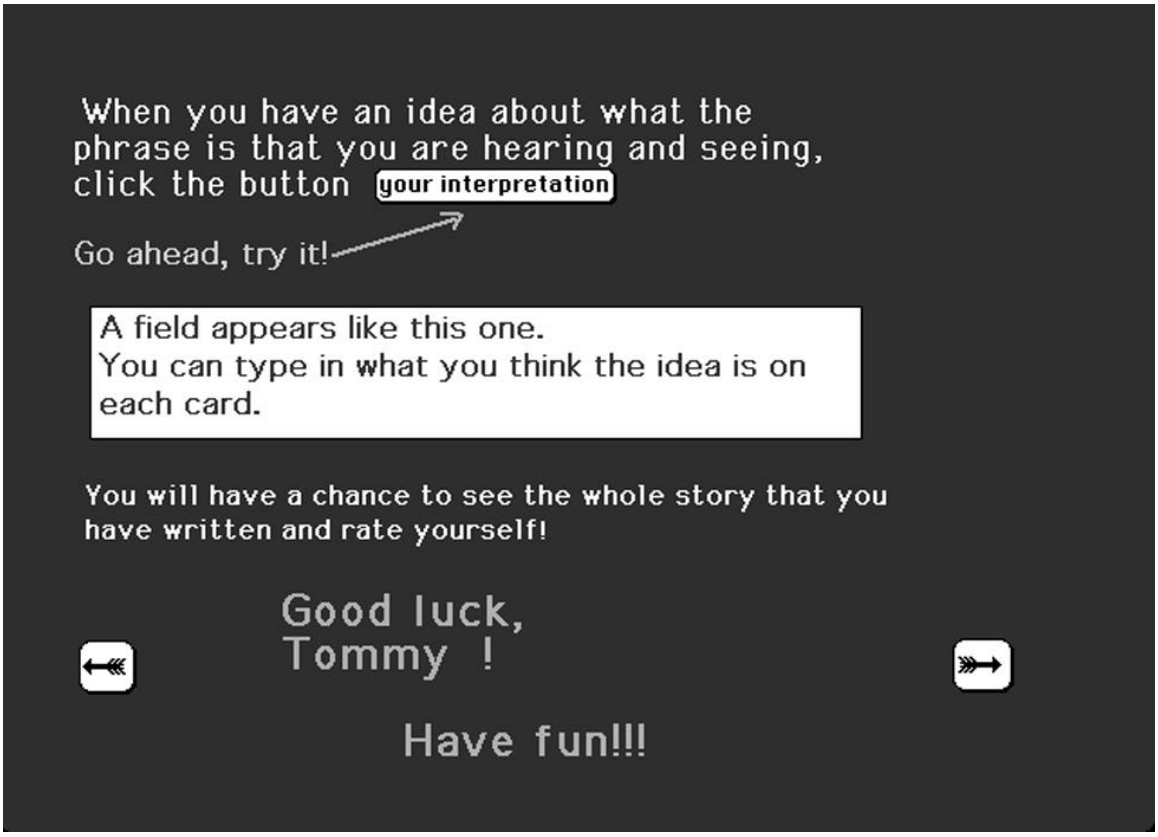

Figure C4. "Legends of the Milky Way" card "Instructions (part two)". This card explains the program interface.

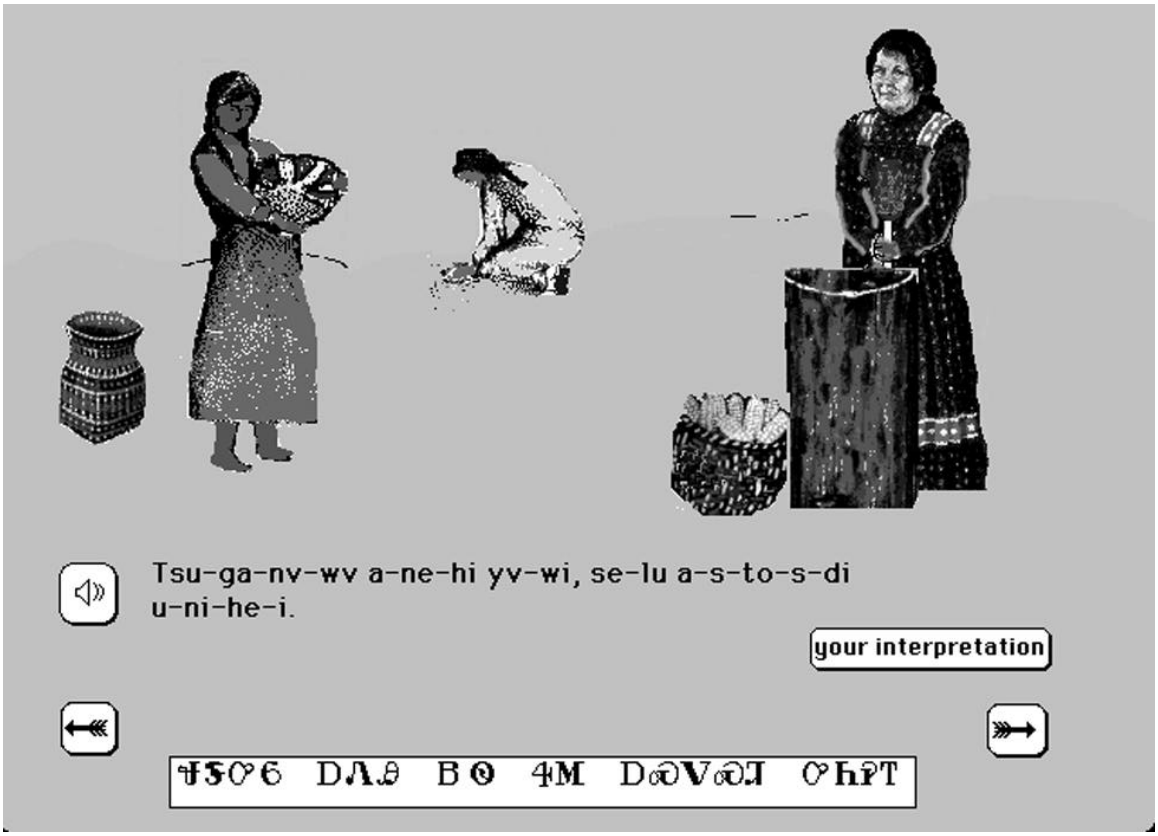

Figure C5. First story card for “Legend of the Milky Way”. This card is titled “Some people in the South had a corn mill”.

Figure C6. Card “they pounded corn into meal there”.

Figure C7. Card “Several mornings when they came to pound corn”.

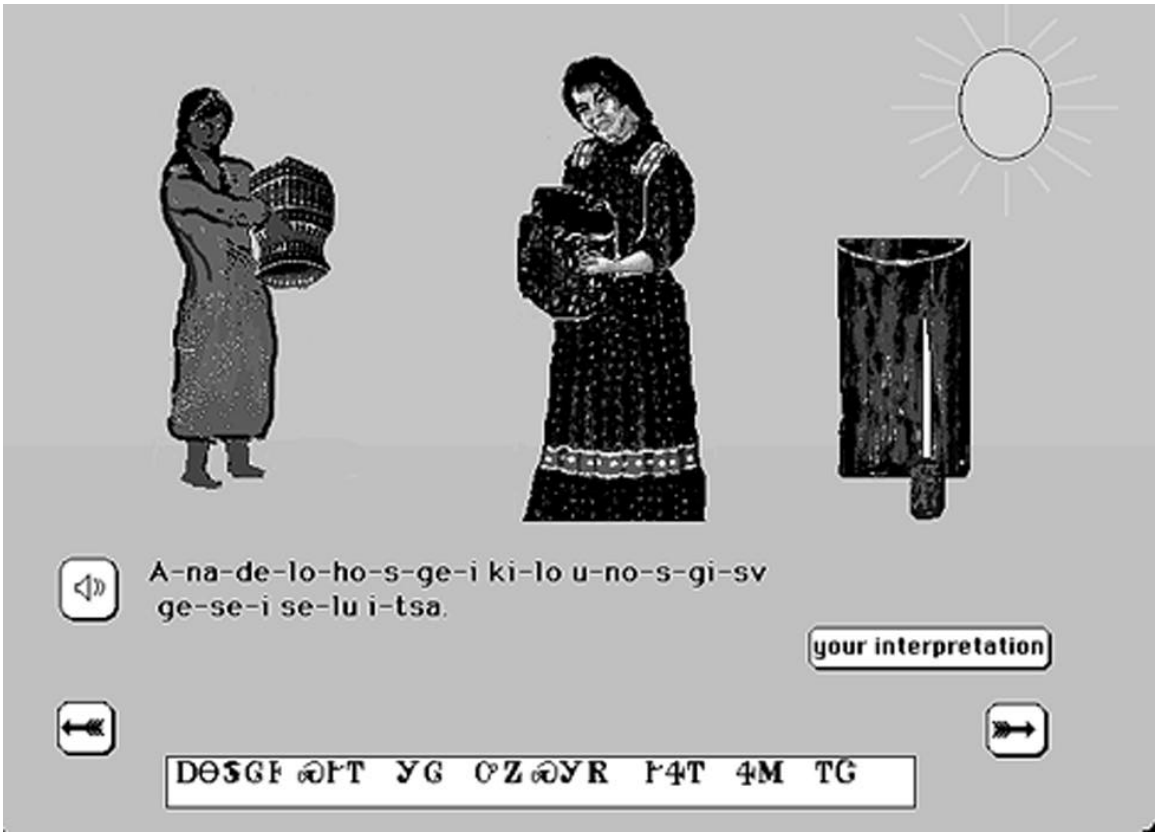

Figure C8. Card “they noticed some of the meal had been stolen during the night”.

Figure C9. Card “They examined the ground”.

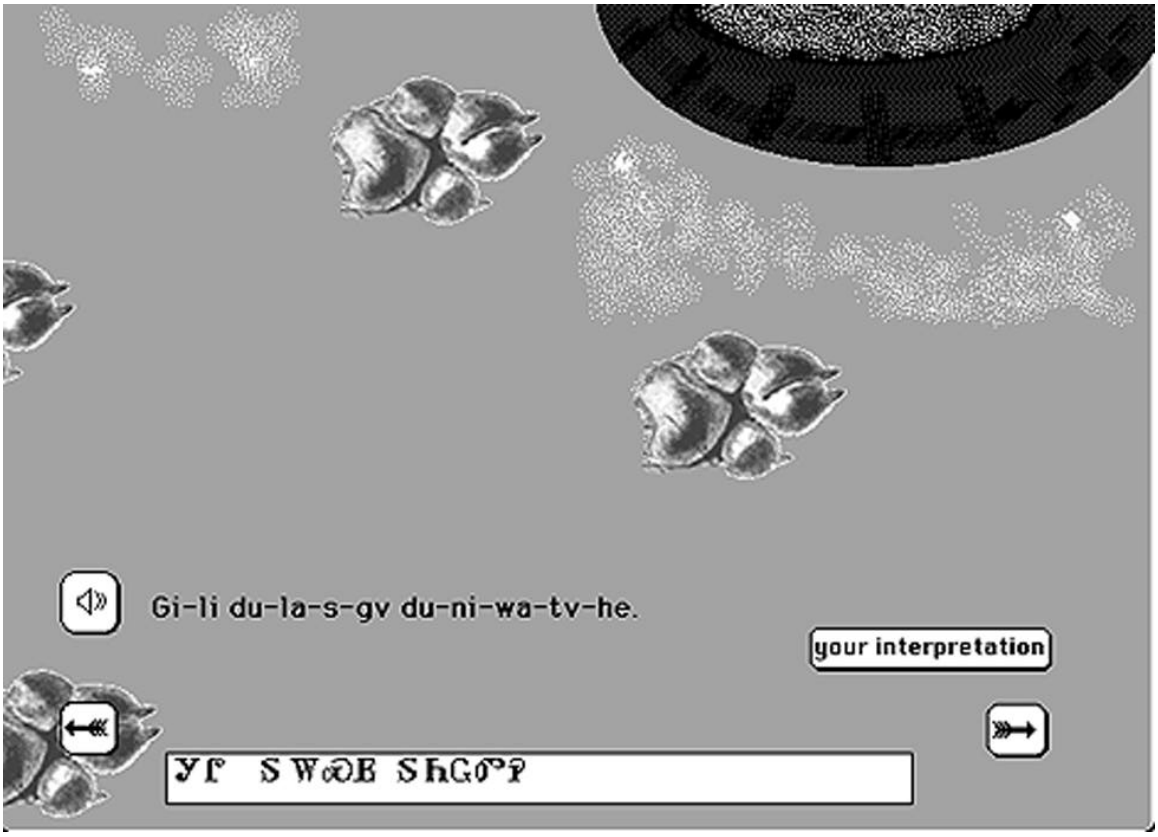

Figure C10. Card “They found the tracks of a dog”.

Figure C11. Card “So, the next night they watched”.

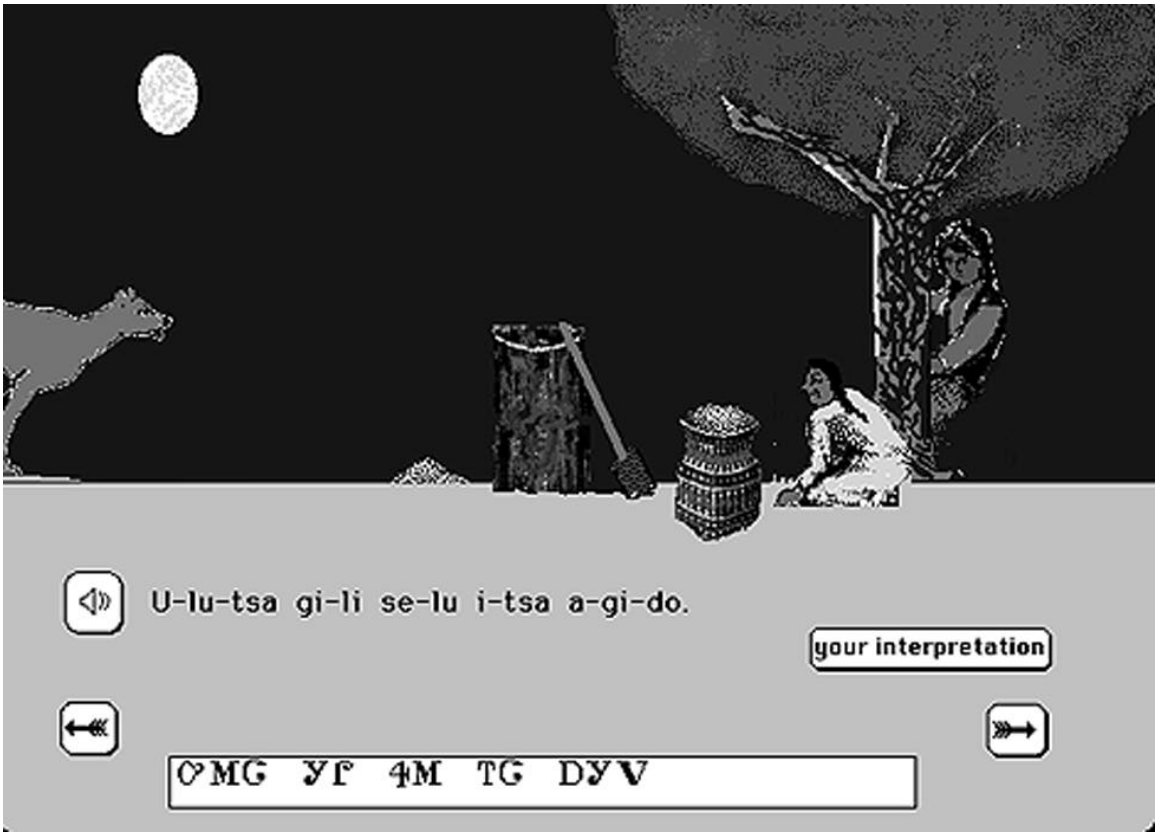

Figure C12. Card “When the dog came to eat the meal”.

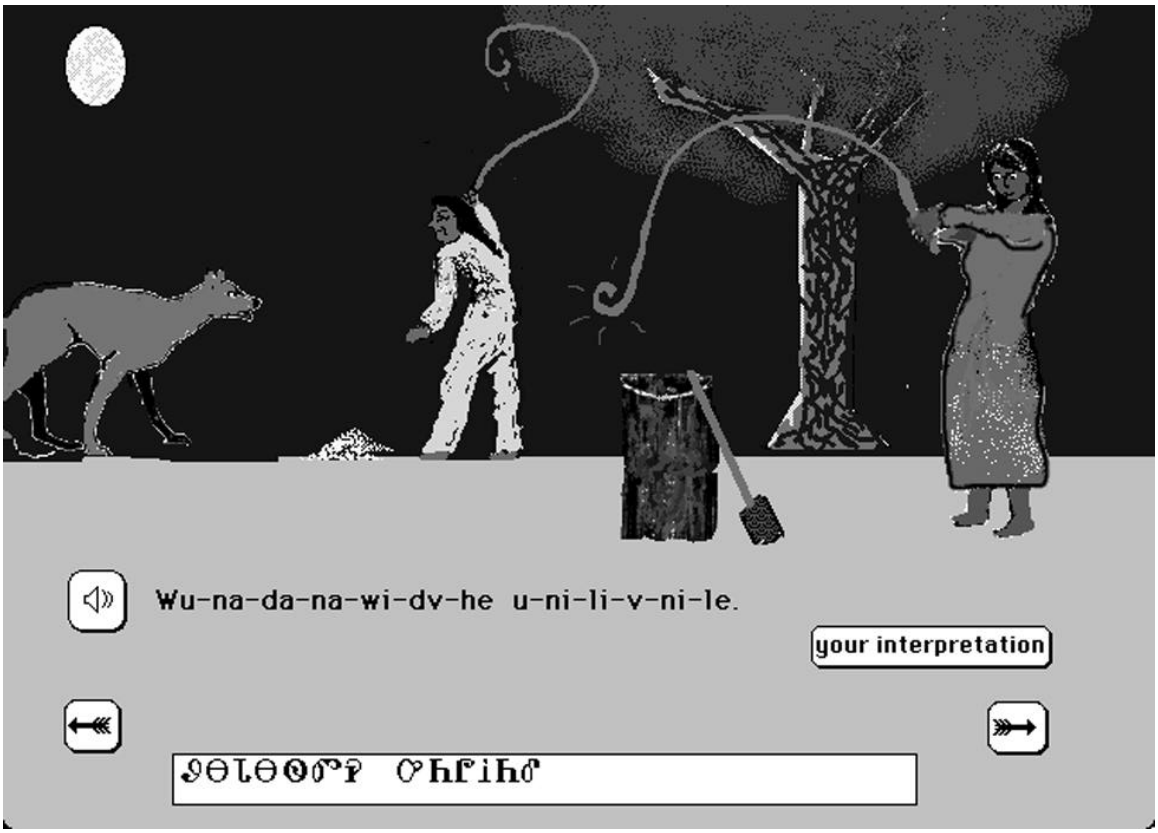

Figure C13. Card “they sprang out and whipped him”.

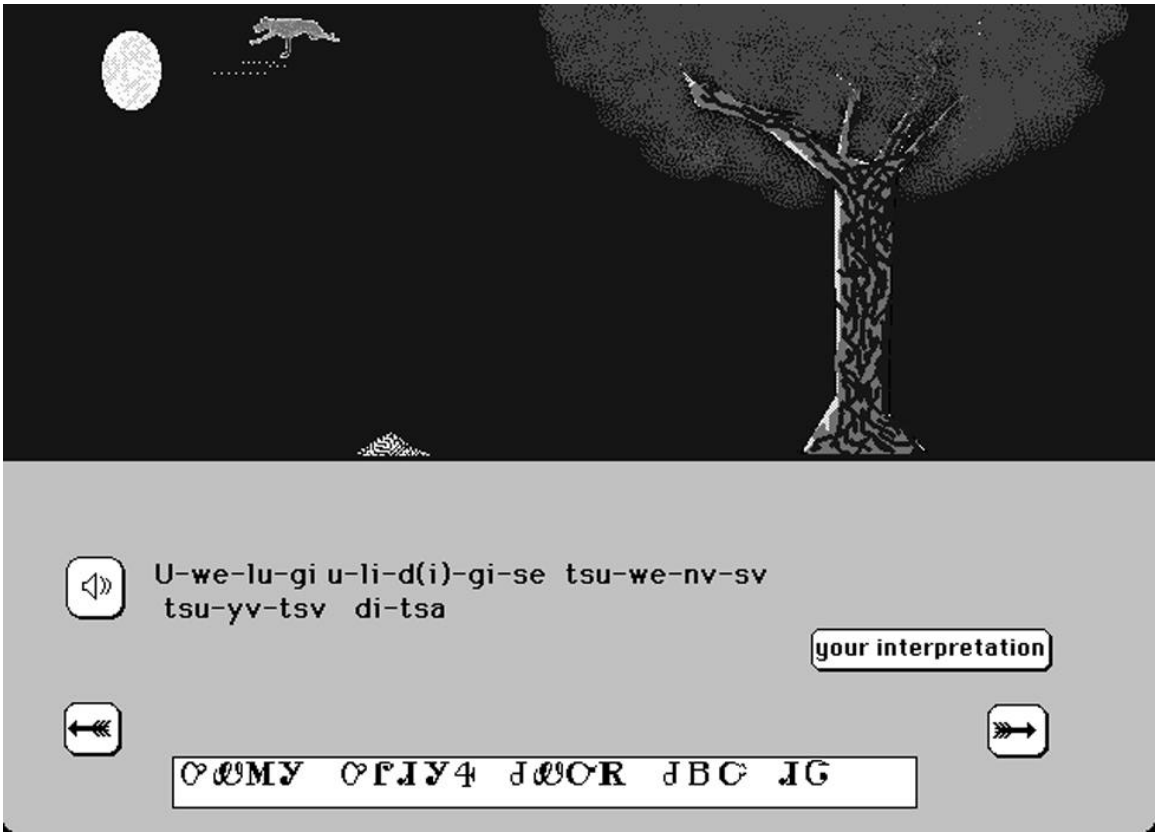

Figure C14. Card “He ran off howling to his home in the North”.

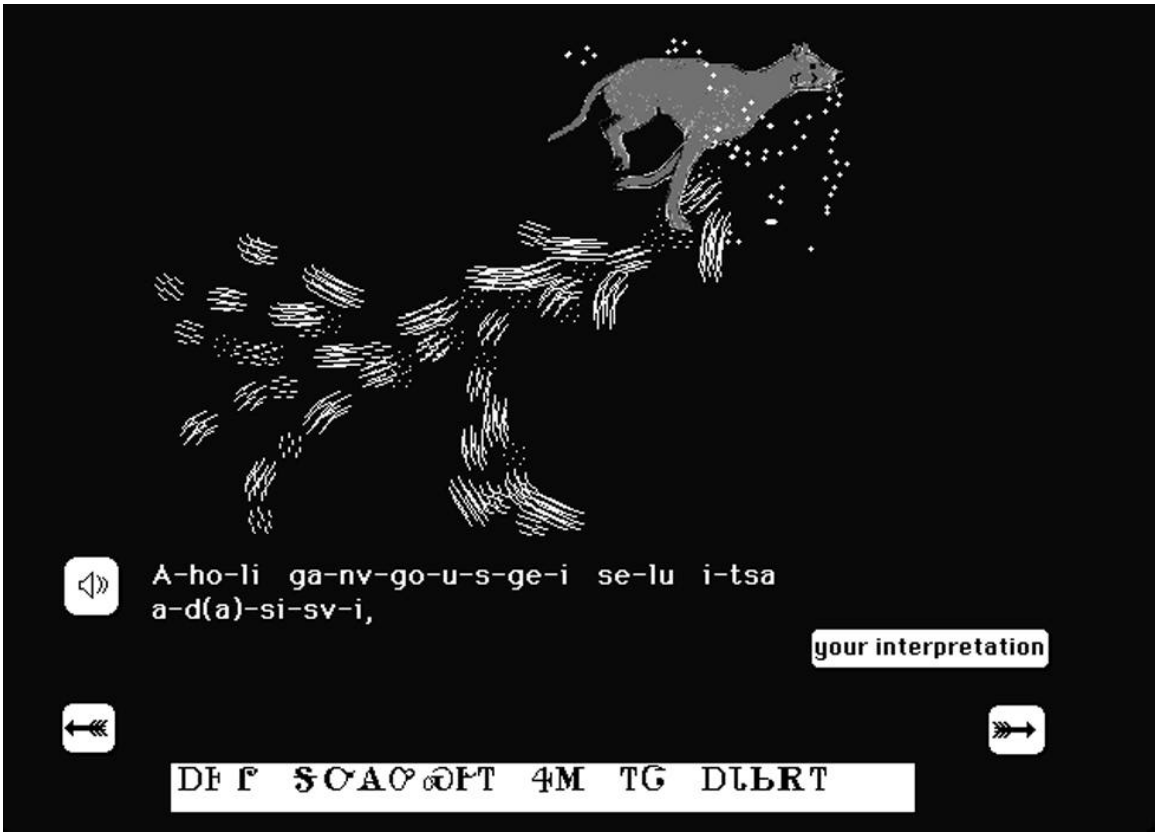

Figure C15. Card “The meal was dropping from his mouth as he ran,”.

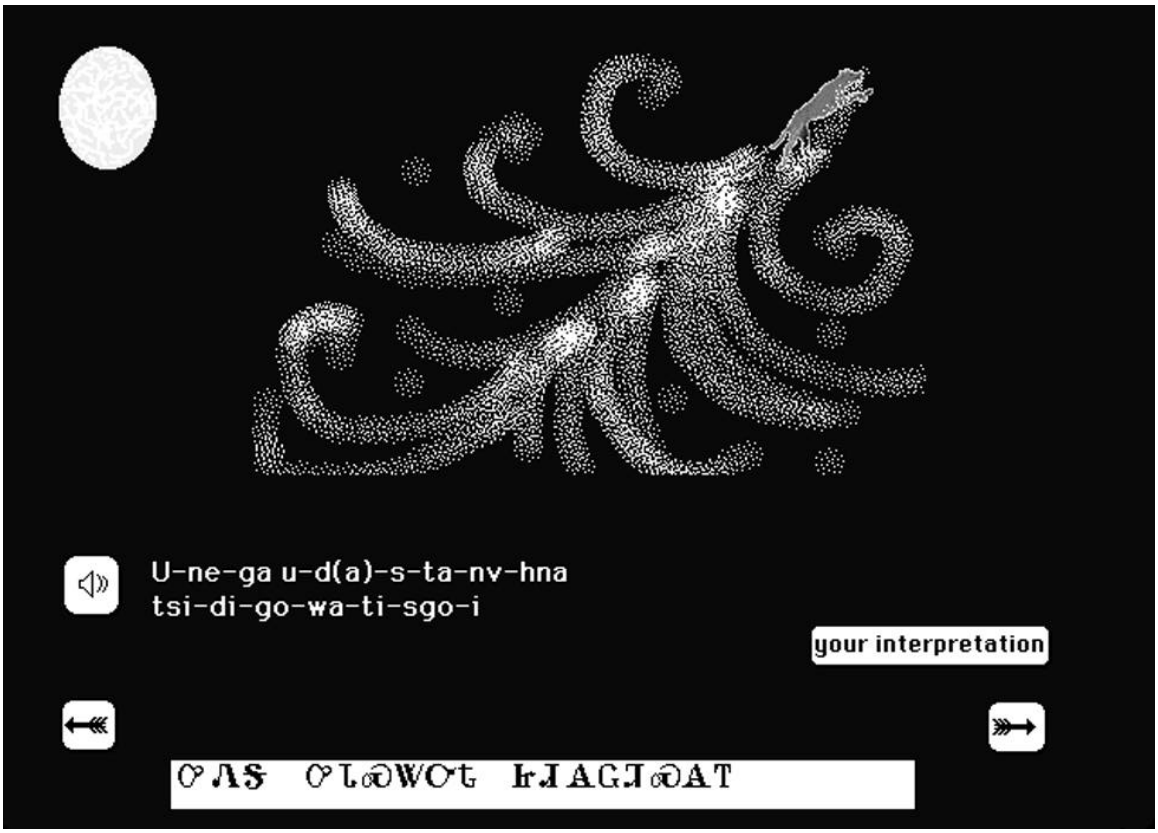

Figure C16. Card “leaving behind a white trail where we now see the Milky Way”.

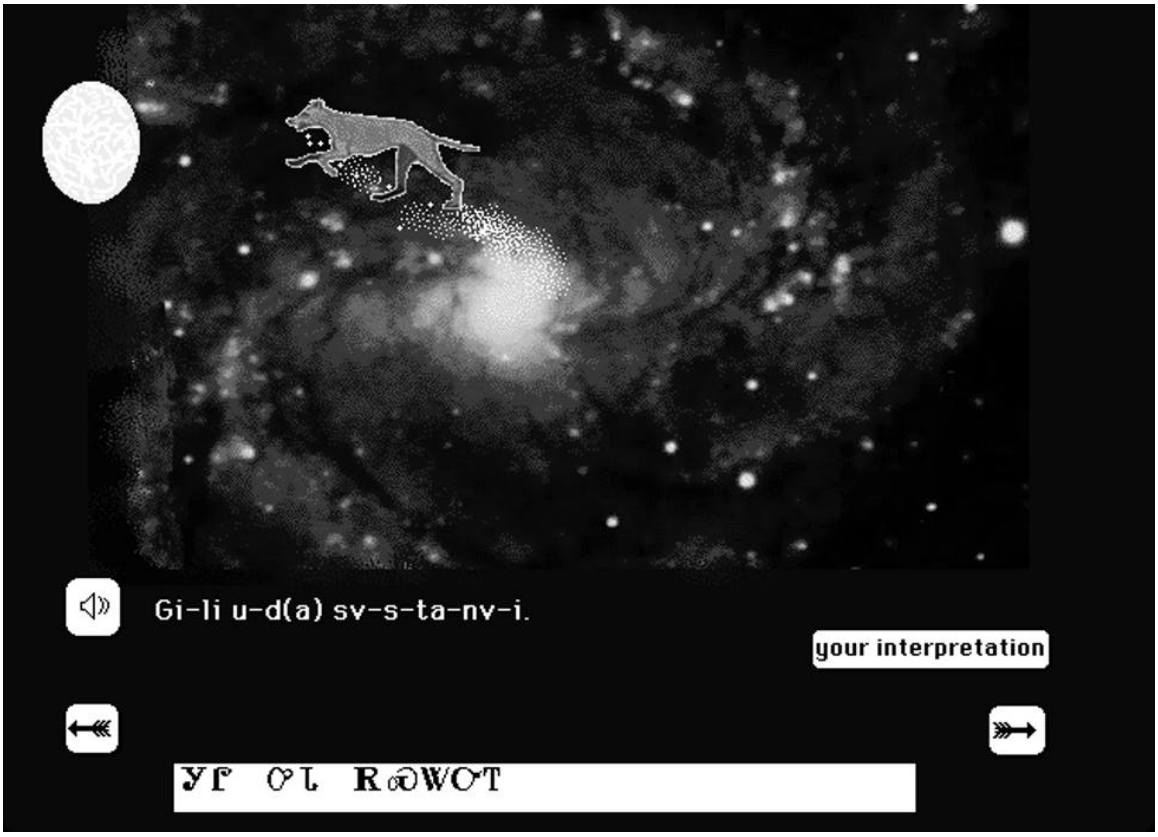

Figure C17. Card “Where the dog ran”.

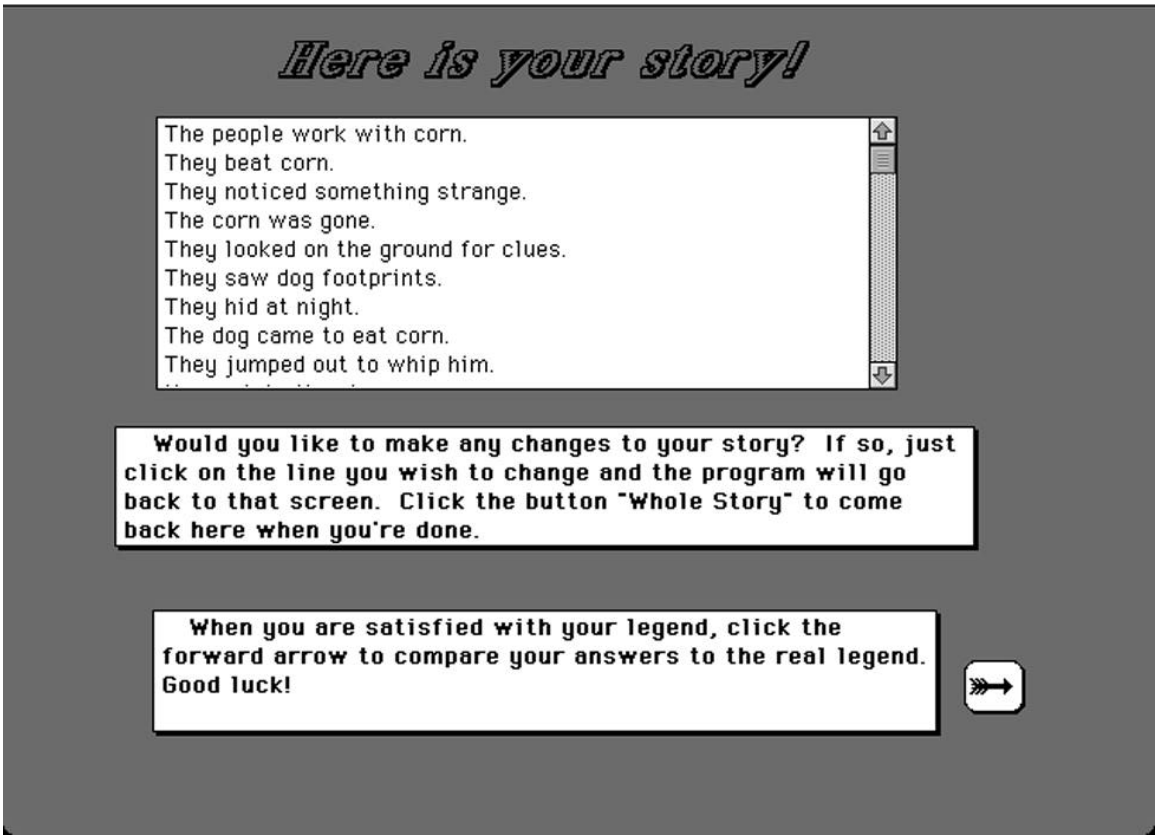

Figure C18. Card "story". This card displays the student's cumulative input.

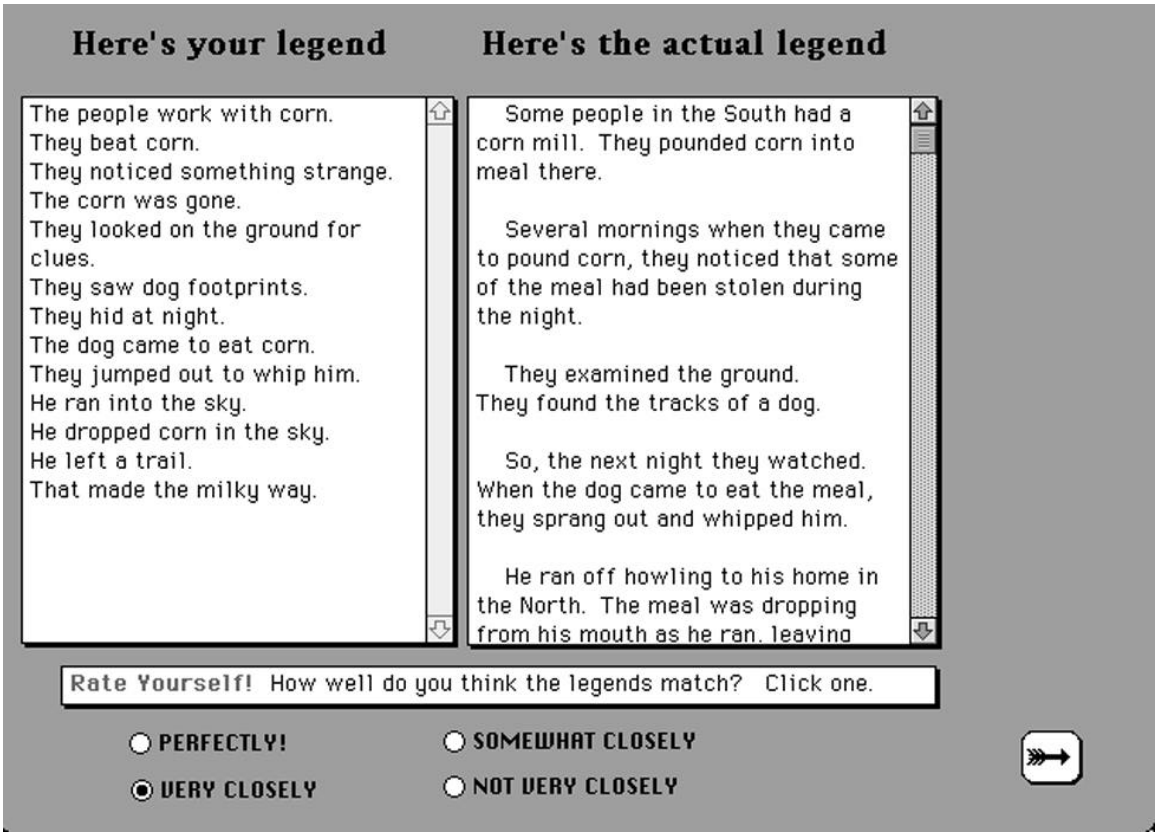

Figure C19. Card "story comparison". The user compares his or her legend to the accurate version and then rates how closely the two match.

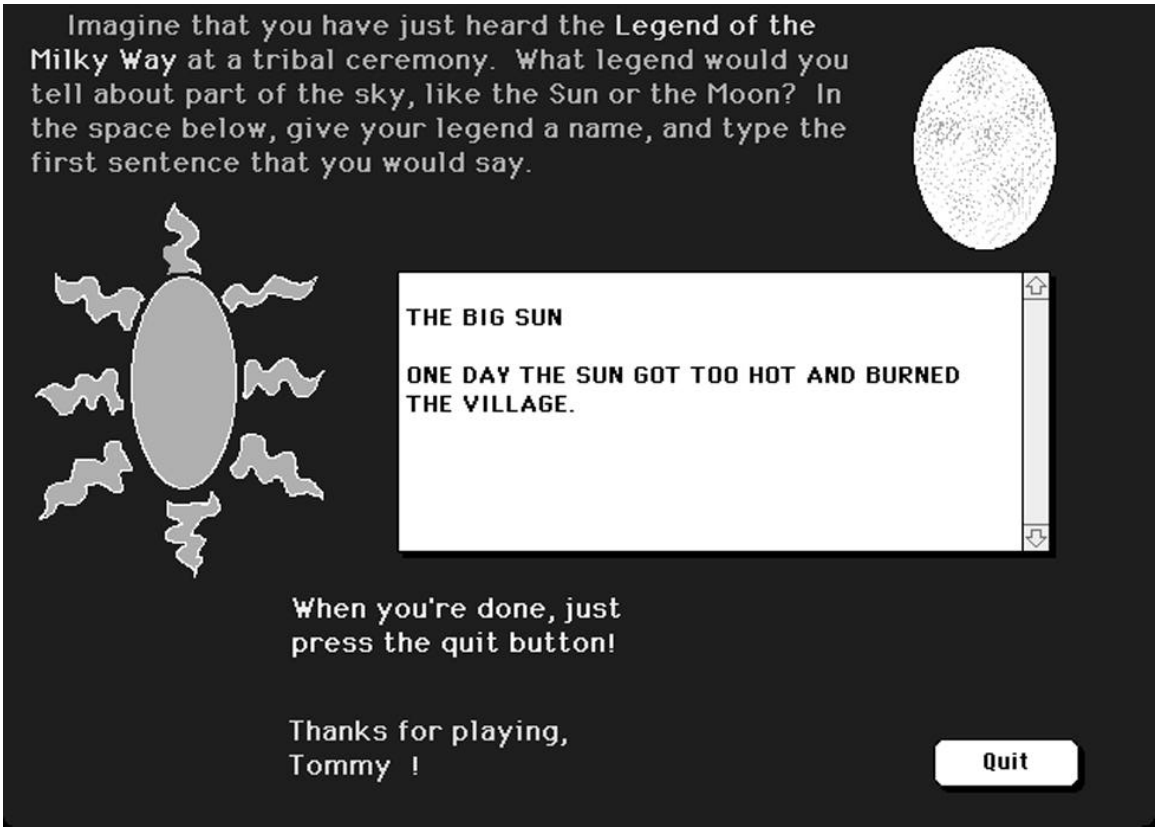

Figure C20. Card “the next legend...”. This card is the last card that the students encounter in the program. They create a title and first sentence of the next legend that they would tell at a tribal ceremony.

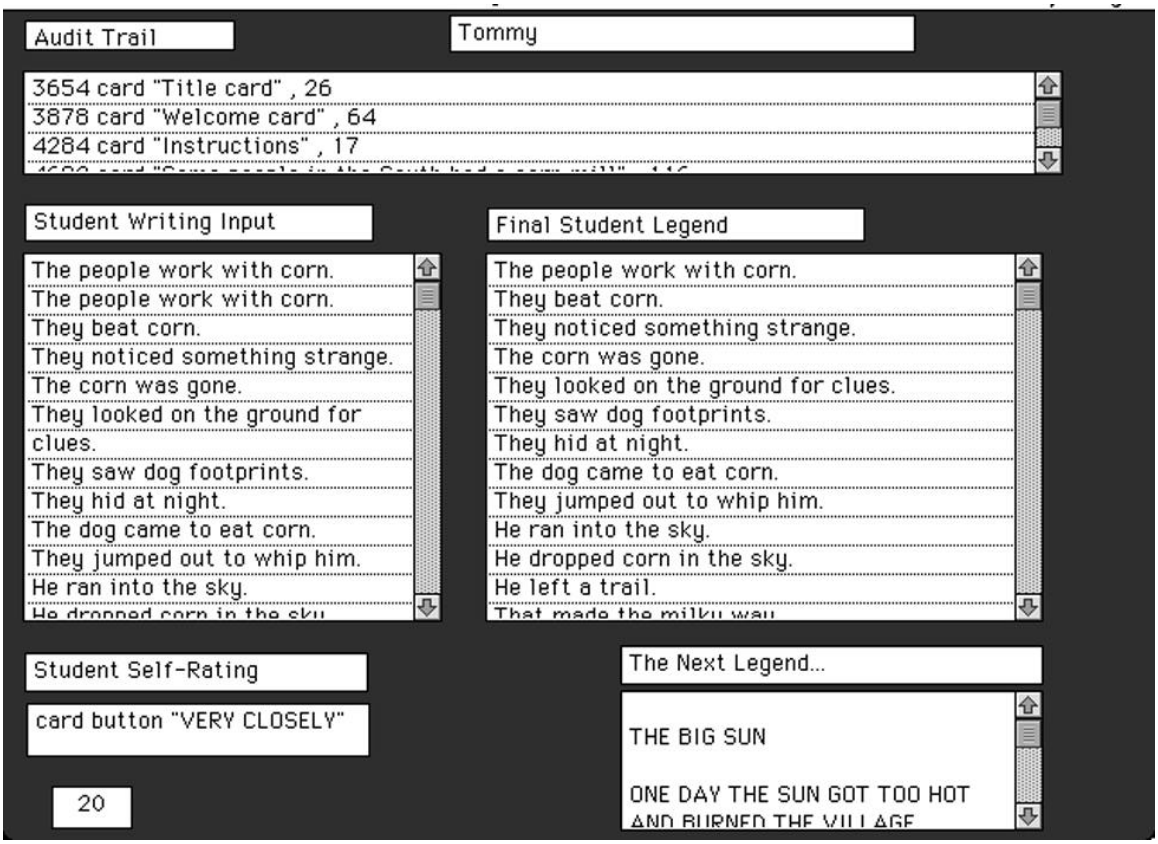

Figure C21. Card "Results". This card captures data about the student's path through the legend, time spent on each card, all student input, the student's final legend, student self-rating, and the title and first sentence of the student's next legend.

Appendix D

Project Formative Evaluation Checklists

Analysis Phase Evaluation Checklist

Justification

1. Has the problem been defined?
2. Have the available resources been described?
3. Have project constraints or limitations been explained?

Environment

1. Has a clear description of the planned application environment and its impact on the application design been provided? Environmental factors include:

- physical facilities and scheduling considerations
- equipment required
- application materials and complementary references
- administrative personnel and procedures
- personal considerations that influence the design

Audience

1. Has a clear, detailed description of the primary and secondary audiences been provided? These descriptions cover:

- previous experiences
- current capabilities

- personal characteristics/demographics
- attitudes and interests

Needs Analysis

1. Has needs analysis data for the application been provided? This data should include:

- task/needs description
- resources or tools required by end users
- influences on or by other systems
- input from end users, host site personnel, content experts, systems experts is included.

Content Analysis

1. Has the subject matter or content to be developed and its relative importance been specified?

2. Has the content been purged of excess or irrelevant items?

3. Can the specified content be covered effectively within the bounds of the planned materials?

Objectives

1. Have the general objectives to be accomplished by this application been listed?

2. Has a statement of requirements for the validation process been provided, including criteria for application success?

High Level Design Evaluation Checklist

General

1. Is this an instructional problem? Is the design process necessary to produce a solution?

2. Has an overview of the problem(s) and the proposed solution(s) been described?

3. Do the structure, treatment, and general strategies provide an effective solution to the problem(s)?

4. Is the proposed solution imaginative and creative?

Specific

1. Does the proposal describe each of the application development stages, the resources required, and the procedures to be followed? The explanations should outline how the project manager plans to :

- collect, analyze, and validate the content
- work with subject matter experts and other users
- further develop application treatments and strategies
- format and develop storyboards and scripts
- develop documentation for production
- manage the production process
- test and evaluate the application

Authoring Facility Selection

1. Is the selected authoring facility appropriate for the application's needs?

2. Do changes or maintenance depend on a single individual or organization?

3. Have all charges for software licenses been considered and detailed?

4. Can the application be maintained in-house?

5. Are the user interfaces (e.g., menu designs, control icons) appropriate for the application, the audience, and the environment?

6. If other applications are run at the site, will the user interface and administrative procedures be compatible?

Detail Design Evaluation Checklist

Application Design Session

1. Is the content properly presented and organized?
2. Is the content presentation at a proper level of completeness and detail for the end user?
3. Does the content presentation consider end user prerequisites and skill level?
4. Is the content presentation matched to analysis phase requirements?
5. Is the content accurately presented according to the sources identified in the analysis and design phase?
6. Is the content presentation appropriate to the program's objectives?
7. Is the content presented according to the time allocations approved in the Design Phase of the project?

Strategies

Structure and Sequence

1. Is the proposed structure and sequence appropriate and effective?
2. Can the user select activities and pace the instruction according to individual needs?
3. Is a conclusion or summary provided?
4. Are tests provided when appropriate?
5. Does the design provide smooth transitions and consistent development for all possible paths through the program?

Motivation

1. Does the design incorporate motivational techniques appropriate for the audience, environment, and application?

2. Does the program use specific motivation techniques such as invoking curiosity, providing rewards, setting a challenge, creating a fantasy, depicting a role model, or using pleasing media?

3. Are the motivational techniques used appropriate and cost-justified (time, money), such as the use of elaborate graphics or animation?

Interaction Strategies

1. Is the density of responses (i.e., how often the user interacts with the system) appropriate to the audience and application?

2. Do responses require intellectual participation as opposed to thoughtless paging through the presentation?

3. Is the level of user control appropriate to the application, the audience, and the environment?

4. Are interactions planned which maximize the capabilities of the media and the delivery system?

5. Are appropriate instructional techniques employed to achieve the stated learning objectives?

Learning Strategies

1. Is a positive user attitude set from the start of the program?

2. Is the user's mind actively involved with the presentation?

3. Does the design allow the user complete freedom and control when appropriate?

4. Does the design maintain interest by using a sufficient variety of presentation techniques?

5. Does the design build on assumed prior knowledge, experience, and internal models of the audience?

6. Are users always aware of where they are and where they are going in the program?

7. Does a user know approximately how long a module should take and how much remains to be done?

8. Can users validate their progress if they so desire?

9. Is the level of difficulty appropriate for the target audience?

Evaluation

1. Is feedback effectively used to provide information to the user regarding appropriateness of the user's response?

2. Is feedback positive?

3. Does feedback provide information as to why the user's response was correct or not correct?

4. Is information collected to show whether learning has taken place as a result of the program?

Audio Components

1. Is the narration written for the ear (speaking, not reading, vocabulary)?

2. Should audio coincide with visual material?

3. Would special effects contribute to the application message?

4. Is music appropriate? Would it add any value?

Development Phase Evaluation Checklist

This checklist directly parallels the Design Phase checklist. Bergman and Moore (1990) state that "in design, you need to insure that all the application strategies are created; during development, you must verify that those same strategies have been documented completely for the production effort" (p. 150).

The Storyboard

1. Is the storyboard presented in enough detail to enable the reviewer(s) to have a firm understanding of the program?
2. Is the storyboard complete--specifying all branching, instructions, icons, graphics, text, buttons, fields, etc.?
3. Is it clear from the storyboard that the goals and objectives of the program will be met?
4. Is it clear from the storyboard that the learner is informed of the objectives?

Content Analysis

1. Is the content properly presented and organized?
2. Does the content presentation consider end user prerequisites and skill level?
3. Is the content presentation matched to analysis phase requirements?
4. Is the content presentation appropriate to the program's objectives?
5. Is the content accurately presented according to the sources identified in the analysis and design phase?

Strategies

Structure and Sequence

1. Is the proposed structure and sequence appropriate and effective?

2. Can the user select activities and pace the instruction according to individual needs?

3. Is a conclusion or summary provided?

4. Are tests provided when appropriate?

5. Does the design provide smooth transitions and consistent development for all possible paths through the program?

Motivation

1. Does the design incorporate motivational techniques appropriate for the audience, environment, and application?

2. Does the program use specific motivation techniques such as invoking curiosity, providing rewards, setting a challenge, creating a fantasy, depicting a role model, or using pleasing media?

3. Are the motivational techniques used appropriate and cost-justified (time, money), such as the use of elaborate graphics or animation?

Interaction Strategies

1. Is the density of responses (i.e., how often the user interacts with the system) appropriate to the audience and application?

2. Do responses require intellectual participation as opposed to thoughtless paging through the presentation?

3. Is the level of user control appropriate to the application, the audience, and the environment?

4. Are interactions planned which maximize the capabilities of the media and the delivery system?

5. Are appropriate instructional techniques employed to achieve the stated learning objectives?

Learning Strategies

1. Is a positive user attitude set from the start of the program?
2. Is the user's mind actively involved with the presentation?
3. Does the design allow the user complete freedom and control when appropriate?
4. Does the design maintain interest by using a sufficient variety of presentation techniques?
5. Does the design build on assumed prior knowledge, experience, and internal models of the audience?
6. Are users always aware of where they are and where they are going in the program?
7. Does a user know approximately how long a module should take and how much remains to be done?
8. Can users validate their progress if they so desire?
9. Is the level of difficulty appropriate for the target audience?

Evaluation

1. Is feedback effectively used to provide information to the user regarding appropriateness of the user's response?
2. Is feedback positive?
3. Does feedback provide information as to why the user's response was correct or not correct?
4. Is information collected to show whether learning has taken place as a result of the program?

Audio Components

1. Is the narration written for the ear (speaking, not reading, vocabulary)?
2. Should audio coincide with visual material?
3. Would special effects contribute to the application message?
4. Is music appropriate? Would it add any value?

Production Phase Evaluation Checklist

Audio Components

1. Are the audio segments clear and of free of distortion?
2. Regarding narration, are words discernible and pronounced correctly?
3. Does the narration sound spoken, not read?
4. Do audio segments correlate with visual material?
5. Is music pleasing and appropriately used?

Computer Graphics

1. Do all screens have a consistent style?
2. Have all screens been checked for technical accuracy, spelling, and grammar?
3. Are text segments formatted for easy reading and retention?
4. Is the amount of information on each screen limited?
5. Are fonts easily read?
6. Are colors attractive and not over-used on a single screen?
7. Are icons and user instructions clear and unambiguous?
8. Are animations functional and well-paced?
9. Are visual images culturally-appropriate?

Authoring Phase Evaluation Checklist

1. Does the designer fully understand the capabilities and limitations of the selected authoring facility?
2. Has the author had proper training and time to become productive in the use of the authoring hardware and software?
3. Have arrangements been made to provide systems, software, and technical support to the author?
4. Have all necessary licenses for authoring, presentation, and other required software systems been obtained?
5. Are all graphics complete, identified, and accessible to the authoring facility?
6. Are systems and people available for testing and debugging the completed application?
7. Has enough time been allocated for all authoring activities including coding, testing, and tuning?

Validation Phase Evaluation Checklist

1. Is the validation plan complete, including all test and measurement instruments? Are these instruments representative of the application objectives?
2. Are plans for obtaining a sample audience in place? Will they be truly representative of the target audience? Will there be enough users to provide significant results?
3. Is the validation site the same as or representative of the host site?
4. Are personnel at the validation site prepared to participate in the validation?
5. Have enough time and resources been allocated to accomplish the final revision?

Appendix E

Student Interview Sample Questions

Learning

1. Tell me about the things you learned from this program.
2. How could you understand what was happening in the story?
3. What did you think about being able to hear the Cherokee language in this program?
4. What did you think about the images in the program?

User interface

1. Tell me what you thought were the good features of this program.
2. What did you think was difficult about this program?
3. How did you feel about the instructions in the program?
4. How would you suggest changing the program to make it better?

Attitude

1. How did you feel about using this program?
2. How did you feel about using this Cherokee legend to learn the Cherokee language?
3. How did you like using the computer for Cherokee language learning?

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Department of Communication Arts

Professional experience: Taught undergraduate courses in instructional technology, photography, instructional graphics, and public speaking. Advised undergraduate pre-service education majors.

Involved with a variety of distance learning efforts at Appalachian State University and at Virginia Tech. Development activities include all aspects of instructional design, from course transformation for distance delivery to evaluation of distance education programs.

Extensive experience with faculty development activities at Virginia Tech. Helped to train over 700 faculty to facilitate the integration of technology into instruction.

Research interests: Native American educational reform. Specifically, to further investigate the use of instructional technology for the preservation of Native American languages.